

Republic of India,
Government of Tamil Nadu

**INDIA
SKILL DEVELOPMENT EXPERTS
FOR
TAMIL NADU INVESTMENT
PROMOTION PROGRAM**

WORK COMPLETION REPORT

JANUARY 2017

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
JAPAN DEVELOPMENT SERVICE CO., LTD. (JDS)**

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PHOTOGRAPHS



▲ Combined government offices that contain TNSDC



▲ Labour and Employment Department, government of Tamil Nadu



▲ Welding space (ITI North Chennai (Mint))



▲ Turning space (ITI North Chennai (Mint))



▲ AIEMA Technology Centre building



▲ PCFCT Chennai Centre building



▲ PCFCT Walajah Centre building

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ABBREVIATIONS

Abbreviation	Meaning
AC	Apex Centre
AIEMA	Ambattur Industrial Estate Manufacturers' Association
ATI	Advanced Training Institute
CoE	Centre of Excellence
CSR	Corporate Social Responsibility
CTI	Central Training Institute
HIDA	Overseas Human Resources and Industry Development Association
ITI	Industrial Training Institute
JETRO	Japan External Trade Organization
JCCIC	Japan Chamber of Commerce and Industry, Chennai
JICA	Japan International Cooperation Agency
MD	Managing Director
METI	The Ministry of Economy, Trade and Industry, Japan
PCFCT	Premier Centre for Competency Training
PPP	Public-Private Partnership
RC	Regional Centre
SIPCOT	State Industries Promotion Corporation of Tamil Nadu
TNIPP	Tamil Nadu Investment Promotion Program
TNSDC	Tamil Nadu Skill Development Corporation
ToT	Training of Trainers

1. Outline of the Program

1-1 Background, Objectives and Target Area of the Program

Skill Development Experts (hereinafter “the Program”) for the Japanese ODA Loan Program “*Tamil Nadu Investment Promotion Program (TNIPP)*” (2013~2016) aimed to promote the industrial human resource development policy in the manufacturing sector which is positioned in the policy matrix of TNIPP through Training of Trainers (ToT) in the welding and metal work fields, and collaboration programmes between the state government and Japanese companies.

In the Program activities (September 2015~December 2016), as a result of the preliminary data collection survey (August~October 2014), the most commonly requested manufacturing skill areas by local Japanese companies were welding and metal work, so that these were selected as ToT target fields.

Moreover, the Program also aimed to formulate close relationships and collaboration between the state government and industries, through promoting the skill training programmes for state training institute trainees implemented by Japanese companies as part of their Corporate Social Responsibility (CSR) activities, and facilitating exchange of opinions among the state government including Tamil Nadu Skill Development Corporation (TNSDC) and Japanese organisations such as the Japanese Chamber of Commerce and Industry, Chennai (JCCIC), and so on.

The Program target areas were mainly in and around Chennai City, while Sri City, an industrial park in Andhra Pradesh, close to the border with Tamil Nadu, was also included for hearing survey and introducing graduates from the training institutes supported by the Program in the ToT activity.

1-2 Framework of Program Implementation

The Program was implemented with TNSDC, under the jurisdiction of Labour and Employment Department of the state government, as the counterpart (C/P) agency. TNSDC operates and manages Industrial Training Institutes (ITIs) and functions as an implementation agency of the state industrial training policy through consigning various training courses to various public and private training institutes (see Appendix A for the list of consigned training courses as of the end of October 2016).

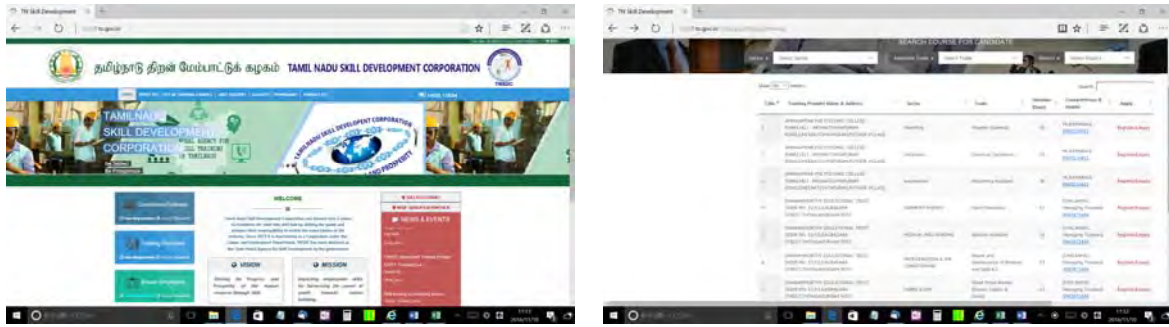
During the Program period, the number of employees of TNSDC remained almost the same, and TNSDC was given dedicated office spaces inside the newly constructed combined government offices building in February 2016. In addition to advertising its list of training courses and providing information for training institutes that wish to conduct consigned courses, TNSDC is currently developing a Job Portal (as of November 2016). The number of consigned training institutes is steadily increasing (approximately 160 institutes in October 2016, from 30 institutes in 2014), and its record of self-sustaining progress is worthy of merit.

Regarding consignment of training courses by TNSDC, the fees for training courses and introducing graduates to companies are free and consigned training institutes are obligated to ensure placement of no less than 70% of all the graduates. Exempting course fees is especially beneficial for unemployed persons who live in poverty, while the exemption of introduction fees is helpful to companies. It is found that challenges are the degree of recognition of TNSDC and its programs among companies, and capacity building of consigned training institutes.

Table 1 Outline of State Government Strategy and TNSDC

Item	Outline
Higher development plan	<ul style="list-style-type: none"> - Vision 2023, which aims for annual average growth of 11%, is basically a long-term infrastructure development plan, however, the Phase II paper devotes an entire chapter to education and industrial training (Chapter 11). - Concerning industrial training, it touches on making use of public and private ITIs by the Tamil Nadu Employment and Training Department Training Wing, utilising the Craftsman Training Scheme, Government Apprenticeship and other systems, making improvements to issues in publicly run ITIs based on PPP, and so on. - The objective is to create 20 million young workers by 2023 (15 million newly created workers and 5 million retrained or ongoing trained workers).
Main State Government strategies (industrial training-related)	<ul style="list-style-type: none"> - In July 2013, Tamil Nadu Skill Development Mission (TNSDM), which had been under the jurisdiction of the state Industry Department, was reorganised into TNSDC under the state Labour and Employment Department. It is responsible for skill development in the state. - TNSDC currently regards the following as the first group of priority fields: automobiles, automobile parts, machine tools, tourism, hospitality services, health, transport and transportation, media, entertainment, etc. As a second group, the following fields are raised: banking, insurance and financial services, building and construction, IT and IT-related services, electricity and electronics, agriculture, food processing, sewing, and medical care. - Concerning the skill standards incorporated into industrial training work, the National Skill Qualification Framework (NSQF) has been incorporated in collaboration with the federal government's National Skill Development Corporation (NSDC) and Sector Skill Council (SSC). - Looking forward, it is planned to establish Centres of Excellence (CoE) in various sectors based on public and private collaboration and construct 20~30 Regional Centres (RCs). These RCs will include not only ITIs but also polytechnics and universities.
TNSDC organisation	<ul style="list-style-type: none"> - The supreme decision-making agency is the Board Meeting composed of senior employees of related departments, industrial officers and so on. The Board Meeting is convened on an as needed basis and it also makes decisions on giving approval for consigned courses. - The organisation is headed by the Managing Director (MD). In August 2016, Mr. Samayamoorthy was replaced in this position by Mr. N. Subbaiyan. - TNSDC only has 12 full-time staff (as of November 2016).
Outline of TNSDC activities	<ul style="list-style-type: none"> - It has launched public and private industrial training courses (short-term) in 22 sectors. It consigns short-term training courses to federal, state-run and private sector training institutes (160 institutes as of October 2016). - Concerning these consigned courses, it is stipulated that trainees' course fees and fees for introducing graduates to companies should be free. (The training institutes operate the courses based on the work consignment fees).
Industrial training budget	<ul style="list-style-type: none"> - The TNSDC budget for consigning training courses was expanded from 1 billion rupees (2014) to 1.5 billion rupees (2015).
Number of persons intended for industrial training	<ul style="list-style-type: none"> - The target for training in fiscal 2016 is 200,000 people.

Source: Prepared by JDS based on Vision 2023 (TN state, 2014), TNSDC materials and interviews with related officials, etc.



▲ TNSDC Web Portal (demonstration screen) left: top page, right: training institutes search screen

In the Program, improving the degree of recognition of the scheme was tackled through promoting private sector collaboration, while the capacity building of the consigned training institutes was implemented by Training of Trainers (ToT). In the planning stage, the relationships between the relevant agencies on the Indian side and the Program were designed as illustrated in the following diagram.

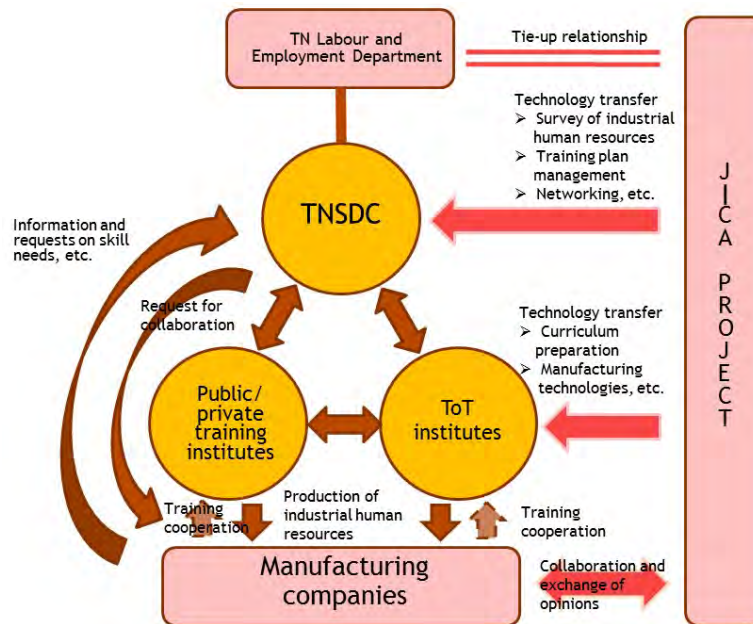


Figure 1 Relationships between the Program Related Institutes and Team of Experts (original plan)

Some of the cooperative works among the core agencies of Figure 1 (TNSDC, ToT institutes and public/private training institutes) and manufacturing companies were already being conducted before the program (underlined parts), however, most of activities needed to be facilitated through the Program. Moreover, technical assistance in the welding and metal work fields necessary in the ToT institutes and public/private training institutes was defined as a key component of the Program. These activity plans were modified for various reasons throughout implementation, and these modifications are described in the following paragraphs.

Table 2 (Supplement to Figure 1) Collaborative Relations between TNSDC, ToT Agencies, Public and Private Training Institutes, and Manufacturing companies (original plan)

Classification of institute	Role
TNSDC	<ul style="list-style-type: none"> - For ToT institutes: Examination of the composition of curriculums for training teachers based on skill demands from manufacturing companies with JICA experts, making proposals to ToT institutes (and their concerned institutes) about coordination and <u>consignment of course provision</u>, etc. - For public/private training institutes: Examination and database development regarding situations of distribution of existing resources in intrastate training institutes in response to skill demands and siting of manufacturing companies, coordinating training in target regions, <u>consignment of course provision</u>, etc. - For manufacturing companies: Survey of information on skill demands, encouragement of graduates' employment, requests for cooperation in technical guidance at public/private training institutes or ToT institutes (* where possible)
ToT institutes	<ul style="list-style-type: none"> - For TNSDC: Reporting of situations of ToT and relevant problems, informing demands for assistance, etc. - For public/private training institutes: <u>Training and production of teachers</u> - For manufacturing companies: Development of industrial human resources (*when they teach general trainees as well)
Public/private training institutes	<ul style="list-style-type: none"> - For TNSDC: <u>Proposals for training plans, reporting of the status of training, etc.</u> - For ToT institutes: <u>Sending teaching staff out to ToT requests, etc.</u> - For manufacturing companies: <u>Production of industrial human resources</u>
Manufacturing companies	<ul style="list-style-type: none"> - For TNSDC: Provision of information on skill demands, requests for coordination of training institutes for recruiting and training, etc. - For public/private training institutes: <u>Support and participation in technical guidance (*where possible)</u>, requests for recruiting and training, etc. - For ToT institutes: Participation in technical guidance (* where possible), requests for recruiting and training (* when teaching general trainees or external human resources), cooperation for training in Japan (* study tours at head factories and training facilities, etc.)

Note: Activities that were already conducted before the Program are underlined.

1-3 Plan Changes

1-3-1 Activities related to ToT Institutes

First, out of the activities indicated in Figure 1 and Table 2, those related to ToT institutes (the Advanced Training Institute (ATI) and (on the same campus) the Central Training Institute for Instructors (CTI)) were omitted and attention was directed to ToT in public/private ITIs. Although the ATI implements ToT, its training courses mainly target engineers belonging to federal and private sector corporations, the military and so on. Accordingly, these ToT institutes¹ were more concerned with technical assistance in the cutting edge production technology, which was not consistent with the purpose the Program.

Moreover, although CTI implements refreshing courses for trainers of public ITIs in other states apart from Tamil Nadu, the impact of the Program activities would have become dispersed. Also, since the

¹ Following the data collection survey (2014), the ATI Principal was replaced and the new Principal expressed needs for support concerning cutting edge production technologies.

style of practical re-training at CTI entails having ITI trainers memorize textbooks with less flexibility and partly old-fashioned equipment environment, it was decided to omit CTI from the activity targets.

Furthermore, at the end of the basic survey to finalize the target institutes (November-December, 2015), ATI and CTI were hit by flooding, and the resulting delay in the resumption of activities was another factor in its omission.



As a result, the activities at ToT institutes were revised as shown in Figure 2 and Table 3. The focus was directed to the axis of public and private collaboration activities vertically linking TNSDC with public and private training institutes with manufacturing companies.

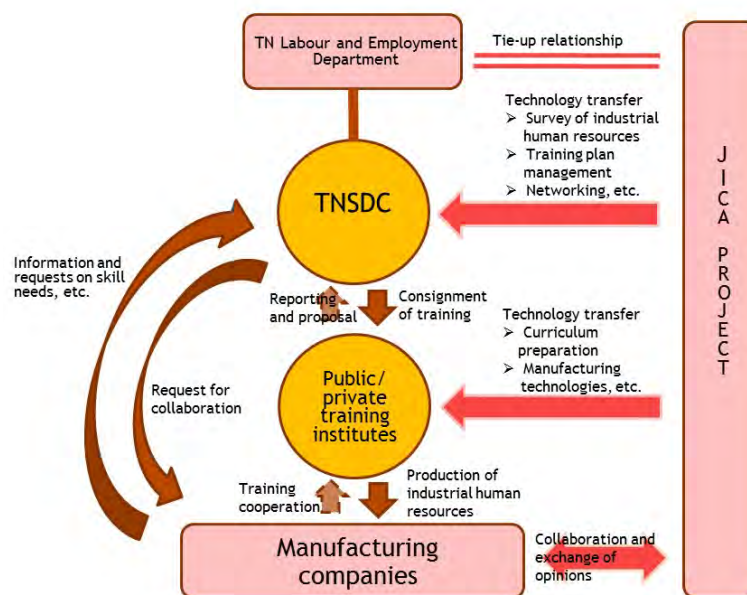


Figure 2 Relationships between the Program Related Institutes and Team of Experts (revised plan)

Table 3 (Supplement to Figure 2) Collaborative Relations between TNSDC, ToT Agencies, Public and Private Training Institutes, and Manufacturing companies (following correction)

Classification of institute	Role
TNSDC	<ul style="list-style-type: none"> - For public/private training institutes: Examination and database development regarding situations of distribution of existing resources in intrastate training institutes in response to skill demands and siting of manufacturing companies, coordinating training in target regions, <u>consignment of course provision</u>, etc. - For manufacturing companies: Survey of information on skill demands, encouragement of graduates' employment, requests for cooperation in technical guidance at public/private training institutes (* where possible)
Public and private training institutes	<ul style="list-style-type: none"> - For TNSDC: <u>Proposals for training plans, reporting of the status of training, etc.</u> - For manufacturing companies: <u>Production of industrial human resources</u>
Manufacturing companies	<ul style="list-style-type: none"> - For TNSDC: Provision of information on skill demands, requests for coordination of training institutes for recruiting and training, etc. - For training institutes: Participation in technical guidance (<u>employee dispatches, there are proven cases in some companies</u>), requests for recruiting and training, cooperation for training in Japan (* study tours at head factories and training facilities, etc.)

Note: Activities that were already conducted before the Program are underlined.

1-3-2 Program Changes Resulting from Flooding

In November to December 2015, toward the end of the basic survey, the area around Chennai was hit by serious flooding, and TNSDC, ITI Guindy, ATI, CTI, and the private Premier Centre for Competency Training (PCFCT) were inundated up to ground floor level. Since it was necessary to check the extent of damage to buildings and equipment in the target institutes, it was decided to postpone the overall activities by February 2016 and conduct an assessment survey of the damage over 2 weeks. As a result, it was decided to select ITI North Chennai (Mint), which had almost no damage of equipment and was found to have relatively high capacity of trainers, as the state-run ITI. The program completion period was postponed from November 2016 to the end of December 2016 (However, as is described in Section 1-3-4, the activities were completed in early December 2016).



▲ Documents being dried outdoors following the flooding (TNSDC)



▲ Flooded training equipment (ITI North Chennai (Guindy))



▲ Road flooding around Ambattur

1-3-3 Program Changes in Private Sector Collaboration

Concerning collaboration with the JETRO Chennai Office and the JCCIC, the Program did not try to compile a specific roadmap geared to establishment of a working group, even though it was initially

planned. Firstly, private companies' activities are supporting ITIs mostly as CSR activities for building a good neighborhood relationship, therefore, JCCIC and other company organisations have less direct interests to collaborate with the state government in a larger scale. Secondly, there is almost no Japanese company which has human resource strategy which treats consistently from vocational training to recruitment. Accordingly, the strategy of the Program was changed into collaboration with individual companies based on separate contacts between the Program and each company (Detailed description of the collaboration with JCCIC, etc. is given in Section 2-3-3).

Moreover, concerning collaboration with individual companies, since there are many manufacturing companies that mainly wish to recruit diploma holders and university graduates not covered in the Program, it was difficult for the Program to generate merits for such companies via introduction of graduates from institutes under ToT program. The recruitment support in the Program is given in Section 2-3-1.

1-3-4 Other Changes

- (1) Activities related to development of a database of training institutes based on manufacturing hubs

Concerning the “Examination and database development regarding situations of distribution of existing resources in intrastate training institutes in response to skill demands and siting of manufacturing companies, coordinating training in target regions, consignment of course provision, etc.” activities under TNSDC in Table 2 and Table 3, the Program did not cover this area for the following reasons.

First, in the basic survey conducted in the first half of the activities, it was found that since many Japanese manufacturing companies arrange vehicles for workers to factories over a wide area, there is little need to identify the location of training institutes (active area of trainees) strictly correspond to the location of industry and factories. Moreover, there were no nearby industrial training institutes in Oragadam and Sri City (Andhra Pradesh), where many companies that were individually contacted and collaborated with in the Program are operating². On the other hand, looking at the entire state going beyond Chennai, TNSDC is independently consigning training courses in areas of industrial concentration outside of Chennai, for example, Trichy, Coimbatore and so on. Accordingly, for the above reasons, it was decided that the support for a database of training institutes based on manufacturing hubs had a low priority under the Program. Additionally, it was too early for this technical assistance since the state government and TNSDC just came up with development of job portal and further discussions among them were required.

² Sri City industrial park is located in Andhra Pradesh state situated adjacent to the north of Tamil Nadu. An engineer college is located on the Tamil side of the state boundary, however, there are no state-run ITIs or industrial training institutes. On the other hand, there is a state-run ITI and a skill centre operated by an industrial park close to Sri City.

(2) Changes to composition of technical experts and procurement of equipment

At the beginning of the Program, there was one expert (Mr. Okumura) assigned in the welding field, however, the number of experts was subsequently increased to three, taking into consideration the extent of needs in this field and extent of the support area. Mr. Okumura mainly took charge of survey work, curriculum designing in the welding field overall, compilation of the instruction policy, etc., and advice concerning survey and examination of hard elements such as establishment and procurement of facilities and equipment, while the other two experts were mainly responsible for the ToT in their respective specialist fields (arc welding and spot/resistance welding).

At the same time, resistance welding-related equipment was procured for ITI North Chennai (Mint) based on the assessment of training needs by industries. Moreover, the Program purchased and used safety equipment, steel materials and other consumable materials for trainers in both the metal work and welding fields for this institute.



▲ Visit to and survey of a local welder maker



▲ Steel retailer from which materials were purchased



▲ Spot welding expert in discussion with a resistance welding parts supplier

(3) Changes to institutes implementing training of trainers

In addition to ATI as described in Section 1-3-1 “Activities related to ToT Institutes”, ToT was implemented at other state-run ITIs and private institutes that were not initially considered as candidates. The reasons are described in Section 2-1.

2. Program Achievements

2-1 ToT Implementing Institutes

2-1-1 Background to Selection and Comparison of Institutes

The candidate institutes for implementation of ToT in the planning stage were as shown in the following table. In addition to this initial group of institutes, which were selected in consideration of location (close to city centres or industrial zones) and ToT functions, it was planned to also consider other newly unearthed outstanding institutes and then examine the actual target training institutes. However, all the institutes initially planned were eventually eliminated from the actual target training institutes.

Table 4 Originally Planned ToT Institutes (Candidates)

No.	National / State-run / Private Sector: Name of Institute	Data	Main Manufacturing Technology Course Fields (related to the Survey)	Reason for Omission from Targets
1	National: Advanced Training Institute (ATI), Chennai	<ul style="list-style-type: none"> - Location: Guindy - Number of trainers: Unknown - Number of trainees: 7,810 (2012) - Website: www.atichennai.org.in 	Welding, metal work, press, CAD/CAM, 5S/TPM, automobiles (engines), measurement, electric control, etc.	<ul style="list-style-type: none"> - ITI ToT is limited in scale, and it was found that judgments of ToT results are left to the CTI. - The New Principal wanted transfer of new technologies rather than industrial training level technology. - It was damaged in the flooding of December 2015. The equipment environment was greatly damaged.
2	State-run: Industrial Training Institute (ITI), Guindy	<ul style="list-style-type: none"> - Location: Guindy - Number of trainers: Approximately 40 - Number of trainees: Co-ed approximately 700 + women's department 259 =Total approximately 959 (2014) - Webdite: None 	Welding, metal work, automobile (maintenance), tool & die maker, etc.	<ul style="list-style-type: none"> - It was damaged in the flooding of December 2015. The equipment environment was greatly damaged. - TNSDC recommended ITI North Chennai (Mint).
3	State-run: Industrial Training Institute (ITI), Chengalpattu	<ul style="list-style-type: none"> - Location: Chengalpattu - Number of trainers: Approximately 50 - Number of trainees: 907 (2014) - Website: http://www.kanchi.nic.in/iti/iti 	Welding, metal work, motorcycles and automobiles (maintenance), plastic moulding, electric machines and electronics, quality control, etc.	<ul style="list-style-type: none"> - TNSDC recommended ITI North Chennai (Mint).
4	Private sector: TVS Training & Services	<ul style="list-style-type: none"> - Location: Ambattur - Number of trainers: 16 (not including part-timers) - Number of trainees: 5,154 (2013, including diploma trainees) - Website: www.tvsts.com 	welding, metal work, CAD, motorcycles (maintenance and assembly), soft skills, production and quality control (5S/TPM, QC 7 tools, etc.), electric machines and electronics, etc.	<ul style="list-style-type: none"> - The welding and metal work courses were excluded from the training consigned by TNSDC. - The institute's decision on receiving support was delayed.
5	Private sector: RMK Engineering College	<ul style="list-style-type: none"> - Location: Thiruvallur - Number of trainers: Unknown (doctoral trainers 51, guest trainers 150, etc.) - Number of trainees: Unknown - Website: www.rmkec.ac.in 	Metal work, electric machines and electronics, machines, soft skills, etc.	<ul style="list-style-type: none"> - Although it was included in the list due to proximity to Sri City, it was the only college on the list. It was excluded because it was decided to limit collaboration with companies in Sri City to introduction of human resources from institutes in Chennai.

Eventually, the three training institutes shown below were targeted for ToT activities. The welding and metal work-related courses in these training institutes are outlined in the following table. Concerning the Premier Centre for Competency Training (PCFCT), it was scheduled to implement ToT at the main school in Chennai and the branch school in Walajah, however, because training courses at the main school were changed and training equipment was primarily installed at the Walajah centre, it was decided to concentrate the ToT at the Walajah centre. Although this institute is a partner agency of the National Skill Development Corporation (NSDC), it had no relationship with TNSDC at the start of the Program. Accordingly, although the Team recommended it as an outstanding institute and requested that it be approved as a TNSDC institute for consignment of training, the approval was delayed due to the flooding and change of MD, and it was only approved at the middle of November 2016 near the end of the Program. As a result, it wasn't possible to start the free-of-charge introduction of graduates from this institute under the TNSDC scheme during the Program term. This was one of the reasons why the number of training graduates introduced to companies during the Program was so limited.

Table 5 Outline of Institutes Targeted for Technology Transfer

Institute	Features of the Training Implementation Setup and Capacity	Reasons for Selection	Remarks
ITI North Chennai (Mint): State-run (general courses)	<ul style="list-style-type: none"> ● Welding <ul style="list-style-type: none"> ➤ Curriculum and teaching materials (common to all ITIs): long-term courses (one year). The institute has national common texts, trainer manuals, etc. Since there are social needs for automobile repairs, etc. in conditions with no electricity, gas welding, which is hardly ever used in modern manufacturing settings, is handled a lot. Despite this and other issues in composition and detailed contents, the teaching materials are generally all in place. Resistance welding is also introduced (a few pages) and there are sections on safety concepts too, however, training on such contents had not been adequately conducted before the start of the ToT by the experts. ➤ Equipment environment: As a general trend of government ITIs, the practical training equipment and safety equipment environment is vulnerable for areas of arc welding other than gas welding. In the case of Mint, it only has one MAG welder and one arc welder each in addition to the operating gas welding (and cutting) equipment. Under the equipment procurement in the Program, one resistance welding machine was introduced in November 2016. ➤ Trainers: Mint has four trainers for 63 enrolled trainees (as of November 2016). They were unable to read and write in English and didn't know the Ohm calculation method. ● Metal work (turner courses) <ul style="list-style-type: none"> ➤ Curriculum and teaching materials (common to all ITIs): conventional lathe courses (two years). Teaching materials and instruction manuals common to ITIs all over the country are used. The ratio of classroom learning to practical skill training in each grade is roughly three to 10 in terms of curriculums. The turner course, which teaches about conventional lathes, has a capacity of nine groups with 16 trainees per group (fiscal 2016). ➤ Equipment environment: one CNC lathe (out of order) and 18 conventional lathes (including some units out of order and some used only for demonstrations). Since calipers and other measuring devices were old and lacked precision, new devices were purchased in the Program. The institute has no budget measures for buying clerical supplies and consumable tools, so the trainers have to buy their own such items. Overall, the equipment environment is not in place and the conventional lathes lack precision. ➤ Trainers: There are nine conventional lathe trainers (16 trainees per trainer). There is a lack of ability to obtain precision in the range of $\pm 0.02\text{mm}$ using a micrometre, however, the trainers are willing to autonomously work on improving the work environment. Their English level is business level or lower. 	<ul style="list-style-type: none"> ● High rating from one Japanese company that conducted CSR activities at the school in the past. ● It was also recommended by TNSDC in light of the number of level of trainers. ● Its practical training facilities were not damaged in the flooding. 	<ul style="list-style-type: none"> ① In the case of state-run ITIs, trainers are generally advanced in years. Many of them have low safety awareness and use old instruction manuals and textbooks. However, safety awareness was improved to an extent through the ToT activities in the Program. ② The annual training calendar includes no long-term vacations and the days are packed with lessons. Trainers have limited time for ToT and it is necessary to devise ways to conduct daily lessons parallel with the technology transfer. ③ New admissions are required to have reached 10th grade (15 years old) or higher. Some graduates do not reach the company recruitment age (18) by the time they finish. ④ It also conducts short-term courses (180 hours~). The courses differ from time to time.

Institute	Features of the Training Implementation Setup and Capacity	Reasons for Selection	Remarks
	<ul style="list-style-type: none"> ● Soft skills (this is handled in the textbook “Employability Skills” that is common to all courses). <ul style="list-style-type: none"> ➤ Two official texts (one for each term) are distributed to trainees in all courses. The contents widely deal with such contents as PC, English conversation, quality control (5S, QC), etc. 		
PCFCT: Private sector	<ul style="list-style-type: none"> ● Welding <ul style="list-style-type: none"> ➤ Curriculum and teaching materials: The main school in Chennai <u>had implemented short-term courses that last just over 1 month.</u> These courses were provided with syllabuses and trainer manuals. The courses comprise 70 hours of classroom time and 90 hours of practical training (three courses of OFW, SMAW, GMAW, 30 hours each), however, most of the practical training was conducted in a simulator prior to the technology transfer by the experts. (Practical training in a simulator is not very effective). ➤ Equipment environment (case of Walajah centre): Originally the school only had two cover arc welders and 1 MAG welding power source (moreover, this was idle because shield gas wasn’t supplied), however, as a result of improving the equipment environment under the advice of the experts, it now owns four MAG units and six cover arc welders. ➤ Trainers: The main school has two trainers and the Walajah centre one. All trainers also conduct metal work. Past courses at the main school have been conducted by one trainer for 25 trainees (a total of 166 training courses). Compared to at the other training institutes, the welding trainers are mostly young here (late 20s to early 30s). During the Project term, the Walajah centre did not conduct any purely welding courses, however, it intends to do so in the near future in line with elevation to a TNSDC institute for consignment of training in November 2016. ● Metal work <ul style="list-style-type: none"> ➤ Curriculum and teaching materials: The lathe operator courses conducted at the main school were <u>short-term courses that last for approximately 30 days (approximately 180 hours);</u> they comprise 70 hours of classroom time, 90 hours of practical training, and final examinations (total of 16 hours for all topics). The machining technician course lasts for <u>approximately 30 days (approximately 180 hours),</u> and it also comprises 70 hours of classroom time, 90 hours of practical training, and final examinations (total of 16 hours for all topics) The institute has text books, syllabuses and assessment guides for both courses. In the practical skill training, trainees are required to manufacture 10 practical training work pieces by the time they graduate, and internship is separately implemented (150 hours). Courses at Walajah centre are currently being coordinated with TNSDC. 	<ul style="list-style-type: none"> ● The institute has small schools in the city centre and to the west in Walajah. The latter school is relatively accessible for Japanese companies. ● The trainers and staff are young and, although they lack skill, they are honest and easy to teach. ● The institute has good relations with HIDA and the HIDA alumni association (ABK=AOTS DOSOKAI), and trainees can also learn Japanese and soft skills. 	<ul style="list-style-type: none"> ① During the Program period, training functions in welding and metal work were concentrated into the Walajah centre. ② It conducts training courses in automobiles, logistics, etc. Training in welding and metal work is often conducted as a part of the automobile course. ③ The institute has signed Memorandum of Understanding (MOU) concerning the consignment of training with Kerala state and AP state, and it is also an NSDC partner. It has also been recognized by TNSDC as an institute for consignment of training following recommendation by the experts. ④ Concerning launch and PPP operation of the training institute, a 5-year contract was signed with Oragadam State Industries Promotion Corporation of Tamil Nadu (SIPCOT) (October 2016~).

Institute	Features of the Training Implementation Setup and Capacity	Reasons for Selection	Remarks
	<ul style="list-style-type: none"> ➤ Equipment environment: In the case of Walajah centre, it has two conventional lathes, four grinders, one milling machine, and two drilling machines. In 2017, it plans to purchase CNC lathe and programming simulation software (FANUC). ➤ Trainers: There are two trainers for the lathe operator/CNC turning technician course (M.E, diploma). They have experience of working in companies, but their skill level on the conventional lathe is elementary. Their English is at medium business level. There are no problems regarding PC skills. <hr/> <ul style="list-style-type: none"> ● Soft skills <ul style="list-style-type: none"> ➤ Dedicated teaching materials comprising excerpts from the ITI official textbook were prepared. Similar contents have also been included in individual course textbooks. Communication is raised as a general core soft technology in soft skills. It is used for instructing on the purpose, essence, types of conversation, communication networks and listening. These contents do not include 5S, separation of wastes or safety. 		
AIEMA Technology Centre: Private sector	<ul style="list-style-type: none"> ● Metal work <ul style="list-style-type: none"> ➤ Curriculum and teaching materials: <u>Short-term courses (CNC lathe, machining centre) that last for approximately one month (approximately 180 hours);</u> they comprise 72 hours of classroom time, 108 hours of practical training, and final examinations of 3 hours. OJT (seven days) is also conducted in collaboration with local companies. Private institute texts are used. Cutting contents are mostly basic, however, the level of training is excellent regarding programming creation (G code, M code) and training using simulation software, etc. ➤ Equipment environment: two CNC lathes (including one used only for demonstration) and one machining centre. There is also one conventional lathe but no course has been implemented for this yet. ➤ Trainers: For 30 trainees in each course (two courses: 60 trainees), there is one trainer for CNC lathe and one for the machining centre. The trainers are relatively young (20s) compared to at other training institutes and they have between 1~5 years of work experience. Their English is at medium business level. There are no problems regarding PC skills. ● Soft skills <ul style="list-style-type: none"> ➤ The syllabus version of the “Soft Skills Book” broadly covers general and basic soft items. As with PCFCT, 5S and separation of wastes are not covered. 	<ul style="list-style-type: none"> ● It is operated by Ambattur Industrial Estate Manufacturers’ Association (AIEMA). Since this area is home to many parts suppliers for Japanese companies, benefits for Japanese manufacturing companies can be expected from fostering human resources. 	<ul style="list-style-type: none"> ① Graduates of the institute mainly find employment in companies around Ambattur, however, <u>avenues for employment in Japanese companies are being developed through the Program.</u> ② The institute conventionally conducted a motorcycle maintenance course on consignment from TNSDC, however, on the recommendation of the experts, CNC has also been included in the TNSDC consigned courses (opening of a welding course is also under consideration).

2-1-2 On-site Work Schedule of Experts

On-site work in the Program was implemented according to the following schedule. It was scheduled to conduct survey on reviewing the ToT support institutes and curriculums in 2015, and to start the ToT from 2016, however, as a result of having to survey flood damage and modify the plans in February 2016, the ToT was actually started from the end of March 2016 and the on-site work period was extended by around two months.

Table 6 On-site Work Members and Schedule (Implemented)

Name	Affiliation	Work Area	Site Work Period
Akira DOI	Japan Development Service Co., Ltd.	Team leader / Public and private network / Training plan	September 26 (Sat)~December 5 (Sat), 2015 February 7 (Sat)~February 20 (Sat), 2016 April 9 (Sat)~May 28 (Sat), 2016 August 14 (Sun)~August 30 (Tue), 2016 October 24 (Mon)~December 11 (Sun), 2016
Kunimori OGIYAMA	Japan Development Service Co., Ltd.	Metal work (1)	September 26 (Sat)~October 24 (Sat), 2016 May 14 (Sat)~May 27 (Thu), 2016 December 2 (Fri)~December 11 (Sun), 2016
Masato DOHRO	Japan Development Service Co., Ltd.	Metal work (2)	October 18 (Sun)~December 5 (Sat), 2015 February 7 (Sun)~February 27 (Sat), 2016 March 26 (Sat)~April 22 (Fri), 2016 August 13 (Sat)~September 10 (Sat), 2016 November 20 (Sun)~December 11 (Sun), 2016
Makoto OKUMURA	The Japan Welding Technology Center	Welding	October 31 (Sat)~11/28 (Sat), 2015 February 9 (Tue)~February 20 (Sat), 2016 November 5 (Sat)~November 20 (Sun), 2016
Hideaki IZUMI	The Japan Welding Technology Center	Arc welding	May 9 (Mon)~5/28 (Sat), 2016 August 20 (Sat)~September 10 (Sat), 2016 November 5 (Sat)~November 20 (Sun), 2016
Kazuyoshi HASEGAWA	The Japan Welding Technology Center	Spot welding	October 31 (Mon)~November 20 (Sun), 2016

Having finished the basic survey, the experts implemented the on-site work in earnest during 2016 while having a gap of around two months between visits (see the following table, June/August and September/October). Since routine habit forming plays a major part in the ToT, it was necessary to set a period when the Japanese experts were absent in order to observe the degree of embedding of the instructed contents after these periods. Moreover, concerning the building of relationships between the training institutes and companies, after initial contacts were made through the mediation of the Japanese experts, the absence period was used to observe how the relationships developed. (Conditions regarding the maintenance of relationships between the training institutes and companies are described in Chapter 3).

Table 7 Work Schedule of Members (Actual Performance Chart)

	Work Area	Name	Affiliation	2015					2016												2017		
				8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1		
On-site work	Team Leader / Public-Private Networking / Training Plan	Akira DOI	Japan Development Service Co., Ltd.			72d						15d		51d					18d		50d		
	Welding	Makoto OKUMURA	The Japan Welding Technology Center				30d					13d									17d		
	Welding (Resistance Welding)	Kazuyoshi HASEGAWA	The Japan Welding Technology Center																		22d		
	Welding (Arc Welding)	Hideaki IZUMI	The Japan Welding Technology Center											21d					23d		17d		
	Machine Work (1)	Kunimori OGIYAMA	Japan Development Service Co., Ltd.			30d									14d							9d	1d
	Machine Work (2)	Masato DOHRO	Japan Development Service Co., Ltd.			15d	10d						22d	29d					30d			17d	3d
Work in Japan	Team Leader / Public-Private Networking / Training Plan	Akira DOI	Japan Development Service Co., Ltd.		2d								2d									8d	2d
	Machine Work (1)	Kunimori OGIYAMA	Japan Development Service Co., Ltd.												6d								

Legend



On-site work

Work in Japan

Work of own company

IC/R: Inception Report

PR/R: On-site work results

2-1-3 Actual Training Performance

(Note: Number of trainers who received ToT, and number of trainees trained by them)

The following table shows the number of the trainers under ToT activities, and trainees they taught thereafter (See Appendix B for the names of the trainers that received ToT during the on-site work period). As was described in Section 2-1-2, it was too much to expect the overall level of trainees at each institute to be improved as a result of the limited program period. However, the numbers of trainees are given as indirect beneficiaries of the Program.

Table 8 ToT Performance at Each Institute

Institute	ToT Performance (Reference: number of trainees taught by trainers)
ITI North Chennai (Mint)	Total number of trainers 15 (of which one was moved, total number of trainees 539) <u>Breakdown:</u> <ul style="list-style-type: none"> ➤ Welding: 5 members (of which one was moved) (welding course number of trainees: 63 * November 2016) ➤ Metal work: 9 members (turner course number of trainees: 138 * May 2016) ➤ Soft skills: 19 members (turners: 138, machinists: 45, fitters: 273, electricians: 20 * May 2016). Note: In addition, three welding trainers received presentations at the start of the ToT of Soft Skills.
PCFCT	Total number of trainers 9 <u>Breakdown:</u> <ul style="list-style-type: none"> ➤ Welding and metal work total: 9 members (many trainers work in multiple fields) ➤ Soft skills: 5 members (of which three overlap with welding and metal work) Note: Since this institute has trainers who work jointly in the welding and metal work fields, totals for both courses are stated. Individual courses in the welding and metal work fields were not held in 2016. Since details of the new courses in 2017 are still being adjusted by TNSDC, the numbers of trainees are not stated.
AIEMA Technology Centre	Total number of trainers: 3 (including 1 chief, number of trainees 400 * Capacity base) <u>Breakdown:</u> <ul style="list-style-type: none"> ➤ Metal work: 2 members + 1 chief (CNC number of trainees: 400 * Capacity base) ➤ Soft skills: 2 members (overlapping with metal work)

2-2 Contents and Results of Technology Transfer by Experts

2-2-1 Arc Welding

(1) Outline

The following table shows the requests voiced by Japanese companies during the survey period (September-December, 2015), which are basic welding principles, understanding of defects, safety awareness, basic equipment operations, welding techniques, etc.

Table 9 Contents of Training Requested by Japanese Companies (Welding Field)

Contents
<p>[General knowledge and skills]</p> <ul style="list-style-type: none"> ➤ Understanding of the functions and structures of various welding devices ➤ Understanding of the principles of welding processes ➤ Understanding of welding defects and ability to discover defects ➤ Ability to conduct autonomous maintenance of welding devices ➤ Ability to discover abnormalities in welding devices <p>[Knowledge and skills of each welding technique]</p> <p>(i) MIG/MAG</p> <ul style="list-style-type: none"> ➤ Adjustment of appropriate welding conditions (current and voltage, welding speed, etc.) ➤ Ability to replace welding wire, liner cable, tips ➤ Lap joint welding process for thin sheets and thick sheets <p>(ii) Gas welding</p> <ul style="list-style-type: none"> ➤ Gas handling method (oxygen, acetylene) ➤ Adjustment of standard flame <p>(iii) Resistance spot welding</p> <ul style="list-style-type: none"> ➤ Ability to replace electrodes ➤ Ability to correctly adjust alignment of upper and lower electrodes ➤ Ability to measure the diameter of welding nuggets using calipers

The technology transfer curriculum in the arc welding field was planned and implemented as shown below. Through this technology transfer it was intended to impart correct equipment handling from the viewpoints of maintenance and safety, teach basic skills and ensure definite implementation at each training institute.

The following table sections (1) and (2) include contents that are also covered by existing teaching materials at each institute; hence it was initially planned to implement ToT for the courses over one to two weeks at each institute. In reality, however, the ToT took three weeks at ITI North Chennai (Mint) and two weeks at PCFCT. This was because it was necessary to assess the degree of embedding of the ToT contents and conduct review as needed at each institute, while in the case of PCFCT, the ToT was added later on because the equipment environment got ready just before the experts' final activity on-site (specifically, the welding skill test that was initially included in the classroom learning was covered in the practical training and so on).

Table 10 Contents of Technology Transfer in the Arc Welding Field

Name of Course	Training Objectives	Program Contents	
(1) Gas and arc special education	Safety and maintenance education in arc and gas handling	Session 1	<ul style="list-style-type: none"> - Introduction (attitude to practical training) - Composition and basic knowledge of gas devices - Operation of gas cylinder and safety valve and handling of torch (practical training) - Melting work (demonstration & practical training) - Brazing demonstration - Introduction to accident case examples - Test
		Session 2	<ul style="list-style-type: none"> - Introduction (attitude to practical training) - Fitting of safety wear (practical training) - Composition and maintenance of MAG welder (practical training) - Arc welding work (demonstration) - Introduction to accident case examples - Test
(2) Semi-automatic carbon dioxide gas shield arc welding basics course	Central plate MAG welding basic skill acquisition course	Session 1	<ul style="list-style-type: none"> - Introduction (attitude to practical training) - Basic posture and rod handling and setting of appropriate welding conditions - Bead on plate
		Session 2	<ul style="list-style-type: none"> - Horizontal fillet welding training / manufacture of joint samples for training - External appearance inspection and evaluation of training welding joint samples - Manufacture of bend test pieces, bend testing, fracture plane observation and evaluation
		Session 3	<ul style="list-style-type: none"> - Downward-facing fillet welding training / manufacture of joint samples for training - External appearance inspection and evaluation of training welding joint samples - Manufacture of bend test pieces, bend testing, fracture plane observation and evaluation
		Session 4	<ul style="list-style-type: none"> - Downward-facing butt welding (backing metal) / manufacture of joint samples for training - External appearance inspection and evaluation of training welding joint samples - Manufacture of bend test pieces, bend testing, fracture plane observation and evaluation

(2) Training Results at ITI North Chennai (Mint)

The welding courses at ITI North Chennai (Mint) are outlined in Table 5. Compared to private institutes, the welding equipment environment is poor in terms of quantity and quality and the training environment is poor in that there are more than 80 trainees (increased by 20 in fiscal 2016, although this has fallen to around 60 due to dropouts) under only four trainers.

Only one MAG welder can actually be used for practical training. Since current and voltage settings cannot be made and no maintenance is performed, the effects of practical training have been low in terms of operability. These misgivings over operability explain why the trainees are not allowed to

practice setting current and voltage, however, this may be construed as an excuse on the side of the trainers (the trainers have not known how to calculate appropriate voltage from the current value too at the beginning). Moreover, due to the equipment environment (poor state of the test devices³), the bend testing and fracture surface observations were limited to classroom learning only. Leaving aside the method of teaching, problems were also observed in the attitude towards the training: for example, some trainers appeared unwilling to conduct practical training, and the classroom learning only consisted of having the trainees memorizes the textbooks. In order to overcome these issues, it is necessary for senior management to have a strong desire to improve the training environment and to adopt a long-term approach to enhancing the motivation of trainers.

However, looking at the scope of ToT implementation, it is prominent to mention that the skill level of each trainer more or less reached a certain level. The skill level of trainers at this institute was higher than at private institutes (PCFCT) to begin with, and it had been selected after it was recommended ahead of other ITIs by TNSDC and a Japanese company in Chennai that had conducted guidance of trainers via its CSR activities (the welding trainers at this institute received ToT from the said Japanese company). Rather than the skill levels, the motivation to improve guidance and work was more of an issue concerning the welding courses at this institute. Moreover, concerning safety awareness, which was taught with perseverance by the experts, some minor improvements were observed; for example, a list of necessary safety apparatus was posted before the practical training booths so that the trainees could autonomously fit the safety apparatus when receiving ToT. According to the results of monitoring the degree of understanding and embedding of the overall guidance contents and the conditions of guidance for trainees (Appendix C), since the degree of embedding was around 50% with some variation between trainers, the training was repeated. When mock lessons entailing actual guidance of trainees (four trainers each, 16 in total) were conducted, the guidance was conducted very carefully, unlike conditions in regular lessons (one reason could be that the results of monitoring were shared by the experts with the management).



▲ Classroom learning on safety education



▲ Arc welding expert and trainees



▲ Pilot lesson

³ This gives the impression that the training equipment at only ITI Mint was in poor condition, however, the experts' survey found that there were no ITIs (including private ITIs) that taught welding performance tests in the Chennai area. (As an exception, PCFCT introduced a materials test device under the guidance of the experts just before the final visit to India).

Concerning the welding course at this institute, the English ability (reading and writing) of the trainers was not good and they couldn't even understand the simple English questions for the written ToT test. Therefore, if this institute is targeted for further technical assistance, it will be necessary to employ a Tamil interpreter (the English ability of trainers at other state-run ITI trainers is at a similar level to those at Mint).

(3) Training Results at PCFCT

At the beginning of the Program, this institute implemented 80% of practical training using a welding simulator (with hardly any training effect) in order to cut costs. However, ever since it became involved with the Program, it has invested in training equipment under the advice of the welding experts. As a result, looking at the welding training courses alone, PCFCT is developing into one of the best training institutes in terms of equipment environment in the Chennai region.

Moreover, unlike ITI North Chennai (Mint), there are no problems concerning the English ability of trainers at PCFCT. They initially did not know how to appropriately calculate voltage from current values, however, after the training they got able to teach it to the trainees in the pilot classes without any problem. At the beginning of the ToT, many of the trainers were at beginner's level in terms of practical skills, however, according to the results of monitoring the pilot lessons, they had already reached the level of the ITI North Chennai (Mint) trainers by the end of the ToT.



▲ Welding simulator for training (PCFCT main school)



▲ Universal materials tester (PCFCT Walajah)



▲ Theoretical instruction to trainers (PCFCT Walajah)

This institute is thought to be the only training institute in the Chennai region to have a universal materials tester (pulling, cutting, bending, etc.), a shielding screen, a dust collector (hume collector) and gas collecting pipes, albeit locally made. As a result, it has an advantage over other institutes (including private institutes) in terms of training hard capacity (albeit small-scale) and safety.

2-2-2 Spot Welding (Resistance Welding)

(1) Outline

Spot welding (resistance welding) is a commonly adopted welding technology in the automobile and motorcycle manufacturing industries, which are the leading sectors of Japanese manufacturing companies in the Chennai area. This field accordingly has great potential for

expanding employment in these companies. According to the survey findings, prior to the Program activities, there were no public or private training institutes that were equipped with an adequate practical training setup in the Chennai area. Since this is a special field that involves a different body of technology from normal arc welding, one expert was assigned to specialize in this field.

The requests made by Japanese companies are summarized in Table 9. Basic skills such as exchange and adjustment of electrodes, measurement of nugget diameter, etc. are shown, and ToT was implemented according to the programme contents shown on the right in order to address these.

Table 11 Contents of Technology Transfer in the Resistance Welding Field

Name of Course	Training Objectives	Program Contents	
Resistance welding practical training course	Hands-on learning of basic technologies for the motorcycle and automobile industries	Basics	<ul style="list-style-type: none"> - Building of the resistance welding education setup - Basic knowledge on resistance welding (classroom learning) - Practical training: Manufacture of test pieces (peel and shear tensile tests) - Implementation of evaluation testing - Data analysis and summarization

Since delivery and setting of the resistance welders procured newly by ITI North Chennai (Mint) was delayed, it was necessary to readjust the number of days spent on ToT at PCFCT. As a result, compared to the scheduled plan of technical training (one week = five weekdays), six weekdays were spent at Mint and three days were actually spent at PCFCT. Break and meal times needed to be cut at PCFCT, however, thanks to the enthusiasm, preparations and quick understanding of the trainers, it was achieved to cover the planned contents of guidance at both institutes.

(2) Training Results at ITI North Chennai (Mint)

Procurement of resistance welders to ITI North Chennai (Mint) was implemented with the objectives of establishing a training institute that can perform practical training in resistance welders, thereby taking a first step towards responding to the skill needs of automobile and motorcycle manufacturing companies, and appealing to the state government and TNSDC the need for resistance welding facilities in industrial training institutes. Since the resistance welders was delivered and installed at the end of November 2016, the guidance for trainers had to be limited to introductory and elementary contents. However, thanks to the fact that the introduction of new training equipment was such as revolutionary event, the trainers displayed far greater motivation for the delivery, installation and practical training of resistance welders than they did regarding the arc welding ToT (first and foremost, they wished to touch and feel actual machines rather than learn theory).

Trainers and trainees from the piping and electrical works courses were mobilised to help with the installation work and, although this meant that the works took a long time, this arrangement provided precious opportunities as a practical training. Also, guidance and advice were offered to the local staff of suppliers and manufacturers during the installation works and ToT. Moreover, due to the large numbers of trainees, since there was concern that the trainees in the practical training rooms could not be managed as well as in private institutes, customized modifications for greater safety were made to the resistance welder machines (for example, the foot switch was changed to a manual switch to prevent accidental operation of the welder due to accidental stepping on the switch by trainees; the fitting plate on the operation box was removed to prevent people banging their heads, and so on). In addition, training was also conducted on jig manufacture. Such contents were not implemented at PCFCT.

Concerning evaluation testing in the welding department, since this institute has no test devices, after giving a video introduction to the test piece and offering guidance on jig manufacture for conducting a simple peel test (a type of destructive inspection), the trainers were asked to conduct peel tests and the nugget diameters were measured. Since the trainers did not have PCs, graphing of the measurement results was conducted using the expert's PC. In order to build an effective lesson setup, it is conventionally desirable to have a tensile testing machine as well as a PC, however, the practical training environment of this institute does not even have the minimum required tools with enough condition (spanners, wrenches, pipe wrenches, vices, etc.), the training was conducted in accordance with the on-site equipment environment.

Monitoring was implemented with four trainees per trainer. Since one was absent, there were only three trainers, but they instructed the trainees while understanding the minimum required contents of guidance. However, the trainers were learning about resistance welding for the first time, and it was also found that they had scant understanding of electrical theory (for example, they seemed unsure about the number of transformer coils and voltage calculation, how to calculate welding current using impedance, understanding of $\mu\Omega$, Mpa and kN units and so on). Accordingly, it is suspected that understanding of the training contents is still superficial, however, it is anticipated that understanding will deepen as the trainees use the resistance welder in training settings from now on. Textbooks do contain sections on resistance welding, however, they have hardly been covered in the lessons until now. It is concerned how to build the training time and system in existing training plan with the procurement and ToT as a start⁴.

⁴ It was scheduled to conduct guidance on this point through conducting repeated visits, however, because only one visit could be made due to delays in the equipment procurement, this guidance issue remained uncovered at ITI Mint.



▲ Trainees being mobilized for electrical works



▲ Welding department trainers in the practical training



▲ Nugget diameter measurement using calipers

(3) Training Results at PCFCT

This institute rapidly completed preparation of the equipment environment at Walajah centre during the period before and after the visit by the resistance welding expert (Mr. Hasegawa) (October to November, 2016). Before the visit of Mr. Hasegawa, the on-site work schedule was adjusted to enable the resistance welding ToT that was only possible at ITI North Chennai (Mint) to also be implemented at PCFCT. The contents of ToT were basically the same as at ITIs, however, because the equipment installation work and settings were not completed by the start of the guidance, guidance could not be implemented on those contents. Also, since there was sufficient capacity to conduct independent jig manufacture, guidance on jig manufacture was restricted to guidance on drawings only.

Lesson monitoring was implemented by four trainers for 11 trainees. It was only possible to conduct short-term practical training and lectures, however, all the necessary contents were conveyed to and understood by the trainees. All four trainers were rated highly for their ability to certainly convey the lessons of lectures to trainees.



▲ Scene from classroom learning in a pilot lesson (Walajah centre)



▲ Locally made resistance welder purchased by this institute



▲ Scene from practical training in a pilot lesson (Walajah centre)

The Indian-made resistance welder introduced to this institute has inferior performance comparing to the Japanese-made one introduced to ITI Mint and can only weld pieces of soft steel measuring 1mm each (maximum pressurizing force 2.5kN, compared to 6.0kN at Mint). In order to respond to the needs of automobile manufacturing companies in future, it might be recommended to add high-tension materials and stainless steel and so on to the practical training lesson contents. However, there is concern that lack of pressurization force will become an issue

in such cases. As a practical training facility for teaching the basics, the equipment environment is already in place. In order to fully respond to the above training needs, however, it would be necessary to conduct further investment, collaborate with companies for factory practical training and so on (collaborating with automobile manufacturing factories is advantageous for deepening understanding of technologies through experiencing actual trouble case examples and so on).

2-2-3 Metal Work

(1) Outline

In the metal work field, compared to the welding field, in which manual skills play a major part, computer-controlled machine tools are predominant in Japanese factories. Accordingly, more than specific processing skills, there were high needs for training in basic knowledge and attitude concerning selection of metals and cutting tools in the setting phase, correct setting of coordinates, know-how about mechanisms and machine maintenance, safety awareness and so on.

Table 12 Contents of Training Requested by Japanese Companies (metal work field)

- | |
|--|
| <ul style="list-style-type: none">➤ Knowledge of cutting tools (names of tools: e.g. tip, drill, etc.)➤ Understanding of the purpose and theory of selecting tools corresponding to workpiece➤ Origin point and offset adjustment when processing➤ Mechanism and maintenance (machining, CNC lathe)➤ Understanding of programming and ability to create programmes➤ Measurement knowledge and skills (including handling of micrometre and other measuring devices) |
|--|

Accordingly, in addition to covering technical guidance items that could be covered in the short term, for example, knowledge on selecting metals and cutting tools, coordinate settings, basic processing principles, etc., it was intended to build a teaching environment in which trainees could virtually experience indirect work based on periodic inspection sheets, work manuals, maintenance records and other documents used in the production setting and to impart machine maintenance, safety inspections, etc. as routine habits.

Table 13 Contents of Technology Transfer in the Metal Work Field

Name of Institute	Introduced and Instructed Documents (Indirect Work)	Main Technical Guidance Items (Technical Work)
ITI North Chennai (Mint)	<ul style="list-style-type: none"> ➤ Conventional lathe periodic inspection sheet ➤ List of conventional lathe failure points ➤ Progress management sheet for equipment environment maintenance planning (including responsible staff assignment sheet) 	<ul style="list-style-type: none"> ➤ Examination of efficient cutting procedure (conventional lathe) ➤ Improvement of conventional lathe work efficiency ➤ Appropriate measurement method, handling method, inspection and maintenance of calipers and micrometre ➤ Improvement of equipment environment centred on conventional lathes (9 units and 16 lathes in total)
AIEMA Technology Centre	<ul style="list-style-type: none"> ➤ NC lathe and NC milling machine periodic inspection sheet ➤ NC lathe and NC milling machine operating procedures ➤ NC lathe and NC milling metal work procedures 	<ul style="list-style-type: none"> ➤ Examination of efficient cutting procedure for NC lathe and NC milling machine ➤ Improvement of NC lathe and NC milling metal work efficiency ➤ Definition of authorization criteria for NC lathe and NC milling machine operation ➤ Appropriate measurement method and handling method for calipers and micrometre
PCFCT (Walajah centre)	<ul style="list-style-type: none"> ➤ Conventional lathe periodic inspection sheet ➤ Conventional lathe safe work manual ➤ Conventional lathe breakdown repair maintenance records ➤ Conventional lathe work manual ➤ Creation of evaluation standards sheet ➤ Conventional lathe practical skill course syllabus ➤ Preparation of practical training processing drawings ➤ Progress management sheet for equipment environment maintenance planning (including responsible staff assignment sheet) 	<ul style="list-style-type: none"> ➤ Examination of efficient processing procedure ➤ Improvement of conventional lathe work efficiency ➤ Appropriate measurement method and handling method for calipers, micrometre and dial gauge ➤ Improvement of equipment environment centred on conventional lathes ➤ Preparation of syllabuses for conventional lathe and CNC lathe new courses

In the metal work field, the materials and equipment environment differs among training institutes, and, although the general contents are similar, the specific technical guidance contents were configured according to each institute as shown above. Concerning introduction and guidance of indirect work based on documents, it was decided to allow various contents since this would have added to the everyday workload of the trainers and because of the differences in the number of trainees taught by trainers, conditions of combined responsibilities, the established systems and so on. Since indirect work does not become embedded following ToT unless the trainers have the strong desire to autonomously tackle it, the documents for introducing were set according to each training institute upon holding in-depth discussions with the trainers, adjudicating their issue awareness and capacity, and determining the contents that they can autonomously operate and embed.

The “indirect work” in the above table requires a long-term approach in order for habits to become set, so activities were conducted throughout the entire guidance term of the Program. The “technical work” was implemented simultaneously with the “indirect work” guidance, but the net time devoted to these guidances was flexibly adjusted according to the skill level and understanding of the target trainers and ranged from a few hours to around 15 hours.

(2) Training Results at ITI North Chennai (Mint)

Originally there were two target trainers at ITI North Chennai (Mint), however, depending on the contents of ToT (measurement device handling methods and so on), the number of participants increased to nine people (and one Training Officer). Only one indirect work document (pre-work periodic inspection sheet) was introduced and taught at this institute, however, this was because the trainers had misgivings about the trainees’ reading ability. However, since it was confirmed in August 2016 that the said sheets were being already used by the trainees, this institute started to also operate the failure list for the conventional lathe that it had decided to independently introduce as well as the equipment environment preparation plan progress management sheet (a spreadsheet document stating the responsible person for environmental improvement actions, countermeasure deadlines, etc.).

At this institute, the experts prepared the steel materials required for the ToT, but at the same time they encouraged the institute to improve its equipment as far as their time and budget would allow. Budget measures sufficient to introduce and make improvements to a jig (tool centre height adjustment jig) for one conventional lathe used in the ToT, a tool rest lever, work table, chuck handle, drawing tables, conventional lathe feed handle grip, lighting, etc. were taken, and instructions were given to take steps for other lathes during the visit to the metal work expert (Mr. Dohro) (September to October 2016). As of the end of November 2016, drawing tables were prepared for all 16 conventional lathes, while budget clearance is awaited for the remaining measures⁵. In addition, because the gear change displays had worn off, they were repainted (the trainers immediately had the trainees do this repainting work).

On comparing the adjustment time between the newly introduced tool centre height adjustment jig and the conventionally installed lathe tailstock centre, it took approximately 30 seconds to finish adjusting the tool centre height adjustment jig and approximately 70 seconds to adjust the lathe tailstock centre. On conducting a hearing about the tool centre height adjustment jig and lathe tailstock centre among trainees who took part in the monitoring lessons, the trainees stated a preference for the tool centre height adjustment jig since the latter one takes more time and effort. As a result, it is scheduled to use the tool centre height adjustment jig in practical training four times a day from now on (four groups).

⁵ Apart from the cost borne by the training institute, the trainers have also paid for installation of one lathe byte (tool), tip, feed handle grip and coolant out of their own pockets.



▲ Trainee repainting a gear change



▲ Tool centre height adjustment jig for which guidance was given on manufacture and introduction



▲ Grip of conventional lathe feed handle

Concerning the gear change paint effect, on comparing the gear replacement from 900 rpm to 500 rpm on the conventional lathe, whereas the work took approximately 5 minutes before the repainting, the time was reduced to approximately 32 seconds after the repainting so that the trainers were able to confirm a large time saving. In the ToT concerning tool centre height adjustment jig and gear change, in addition to implementing simple on-site improvement and advice, the trainers also conveyed the importance of measuring and numerically verifying (visualizing) by means of tests.

Also, in the technical guidance, since this institute's calipers were old and broken, guidance was implemented on measurements and handling using the newly procured measuring devices and on improving processing efficiency (extension of tool life, improvement of cutting performance) by means of drill thinning (method of reducing cutting resistance and improving removal of cuttings by sharpening), and this was well received by the trainers.

The trainers displayed proficiency of around 50 to 80% as a result of pilot lessons targeting actual trainees (one trainee for each trainer, two in total). In the case of this institute, "quality awareness" of the need to keep dimensions in the dimensional tolerance is low among trainers and trainees. They blame the old equipment for the ability to fit within tolerance, however, they changed their thinking when they saw the Japanese expert achieved the tolerance using the same lathe.

Table 14 Results of Dimensional Accuracy Comparison after Processing in Pilot Lessons

Participant	Dimensional accuracy	Dimensional Evaluation
Japanese Expert	Φ58.01mm	Within dimensional tolerance
Trainer A	Φ57.65 mm (-0.33mm)	Outside of dimensional tolerance
Trainer B	Φ58.1 mm(+0.08mm)	Outside of dimensional tolerance
Trainee A	Φ58.2 mm (+0.18mm)	Outside of dimensional tolerance
Trainee B	Φ58.5 mm (+0.48mm)	Outside of dimensional tolerance

Note: Tolerance is $\Phi 58 \pm 0.02$ mm. In the ITI textbook, tolerance of around 0.05~0.3mm is indicated for each practical training task. (In the Japan Vocational Ability Development Association Grade 2 skill examination, it is 0.01~0.1mm). In the dimensional accuracy measurements, the experts and trainers used a micrometre. Since the trainees had not received micrometre training, they conducted measurements using calipers.

(3) Training Results at PCFCT

The main school of PCFCT (in Chennai) had a conventional machine classroom on the ground floor and a machining centre classroom on the first floor (it has one 5-axis CNC milling machine). Due to flooding of the basement floor and termination of the building lease contract, the metal work classroom functions are currently being transferred to the Walajah centre on the outskirts of Chennai. In view of this situation, although technical guidance was initiated in the CNC classroom at the main school, a total of six trainers from the PCFCT main school gathered to receive ToT at the Walajah centre⁶. Moreover, since an NC machine tool wasn't installed in the Walajah centre during the ToT period⁷, the work here mainly comprised technical training using the conventional lathe and indirect work (preparation of the training environment based on routine document management).

As is indicated in Table 13, out of the three target institutes, the most varieties of operating documents were introduced and taught at PCFCT, however, this was due to the fact that the specialist metal work course was essentially launched for the first time at Walajah centre and the trainers were highly motivated to tackle the work. The introduced and taught documents were generally finalized up to the completion or introduction of samples. Based on discussions with the trainers at this institute, drastic advice was offered on the preparation of practical training syllabuses and correction of processing drawings for use in practical skill classes in the new courses (two courses: conventional lathe and CNC lathe). As a result, the syllabuses were completed and around 70% of the processing drawings for the practical training tasks were finished during the Program period (this institute is also a partner for the PMKVY scheme⁸ being implemented by MSDE and NSDC, and since the Walajah centre is preparing to start PMKVY certification courses (three months each) for conventional lathe and CNC lathe, advice was also offered on the syllabus for CNC lathe).



▲ Scene from conventional lathe training at Walajah centre



▲ Trainer conducting a pilot lesson (classroom learning)



▲ 5-axis machining centre installed in the main school

⁶ In addition, four persons participated only in the initial ToT at the main school.

⁷ Scheduled for installation in 2017

⁸ Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is a poster programme of the Ministry of Skill Development & Entrepreneurship (MSDE), and trainees who complete the programme receive cash subsidies from the government.

The metal work course trainers at this institute are much younger (20s) than trainers at public ITIs, and another feature is that many of the trainers also combine duties in the welding courses, however, at the start a lot of effort was devoted to conducting re-education in efficient tooling and processing procedures for a trainer of advanced age who had worked for decades at a local major manufacturing company (this trainer was very stubborn about adhering to the “Indian way of doing things” that he had practiced for many years, and he was eventually excluded from the ToT targets following discussion with the training institute). Starting from the appropriate method of calipers, scales, round bar (processing steel) setting, front grinding byte (right hand turning) and so on, the guidance was slowly advanced from basic phased processing, while improving awareness with respect to processing accuracy. Concerning processing technology ToT, an experienced trainer (not the one mentioned above) offered guidance to the younger trainers, and the tackled skill improvement through taking part in training during the break times and holidays. Eventually, as was also the case at ITI North Chennai (Mint), the results in terms of improvement in the processing accuracy of trainers left something to be desired as shown below.

Table 15 Results of Dimensional Accuracy Comparison after Processing in Pilot Lessons

Participants	1 st Dimensional Accuracy	1 st Dimensional Evaluation	2 nd Dimensional Accuracy	2 nd Dimensional Evaluation
Japanese Expert	Φ23.01 mm	Within dimensional tolerance	Φ22.98 mm	Within dimensional tolerance
Young trainer A	Φ23.35 mm (+0.33mm)	Outside of dimensional tolerance	Φ23.02 mm	Within dimensional tolerance
Young trainer B	Φ23.14 mm (+0.12mm)	Outside of dimensional tolerance	Φ22.97mm (-0.01mm)	Outside of dimensional tolerance
Trainee A	Φ23.50 mm (+0.48 mm)	Outside of dimensional tolerance		
Trainee B	Φ22.66mm (-0.32mm)	Outside of dimensional tolerance		

Note: Tolerance is $\Phi 23 \pm 0.02$ mm. In the dimensional accuracy measurements, all members used a micrometre.

The trainers displayed proficiency of around 60% as a result of pilot lessons targeting actual trainees (one trainee for each trainer, two in total). Since the trainers had not even acquired the correct method of measurement and handle operation, it is thought that the trainers here acquired the same degree of processing accuracy as at ITI North Chennai (Mint), though they are still inferior to the trainers of ITI North Chennai (Mint) in terms of understanding of efficient processing procedures and understanding of cutting tools, cutting conditions, materials of workpieces and so on).

(4) Training Results at AIEMA Technology Centre

AIEMA Technology Centre has conventionally been consigned by TNSDC to conduct automobile machine-related training courses, and the CNC-related course has been operated as a TNSDC consigned one at the recommendation of the experts since April 2016. Since this institute is located in Ambattur in Chennai, a centre of small and medium manufacturing companies, and

it is operated by an organisation of the local manufacturing companies, a feature is that it has an extremely good record of mediating employment opportunities for graduates (numerous suppliers of Japanese companies are also located in this area). In the winter of 2016, it became a partner agency of the NSDC, and it currently proposes two CNC courses, and a 4-wheeled vehicle and motorcycle maintenance course to TNSDC. It is also actively engaged in expanding facilities (it has added a new floor) and displays relatively high operating capacity including funding ability.

Currently, in the area of metal work, this institute operates two courses: CNC lathe and milling (30 trainees, one-month courses), and these are almost filled to capacity every month. Guidance has conventionally been conducted on operation checking after switching power on, origin point adjustment and other setting of processing workpieces, and various appropriate steps had been adopted even before the experts conducted the ToT (for example, failed equipment lists were prepared, and pocketbook-size programming quick charts (M code, G code) were distributed). In addition, through the Program guidance, periodic inspection sheets (they had previously existed but check items were limited and they were discontinued), operating procedures and work procedures (newly prepared in the ToT) were introduced and the practical training set-up was further strengthened. The documents introduced through the ToT were immediately utilized by the trainees and had become fully embedded in the training institute by December 2016.

As a result of monitoring the pilot lessons⁹, it is evaluated that the trainers achieved a proficiency level of around 80%, however, there were some deficient points in the guidance for the trainees. For example, the trainees were unable to do the following without the aid of trainers: attaching bytes (tools), replacing tips, replacing chuck teeth, cancelling program alarms and so on. All of these tasks, except for cancelling program alarms, are included in the “basic setting capability” demanded by the Japanese companies. In the case of this institute, since the existing training placed emphasis on curriculum and the amount of practical training equipment operating time per trainee in both courses was extremely limited with just one unit for 30 trainees per course (it is preferable for one unit per 15 trainees in three groups), it was difficult for the trainees to acquire the above skills.

The Japanese experts requested that the number of trainees per course be reduced, which is determined and ordered by the TNSDC. The training institutes also sought to change the numbers of trainees in the approved courses, however, no changes were effected during the Program. Also, concerning the curriculums that were slightly biased towards practical training, it is regarded to make improvements such as thoroughly educating about production management terms, enhancing classroom examinations in the final tests, taking recruitment interview

⁹ In the case of ToT at AIEMA Technology Centre, manual technology practical skill training using a conventional lathe was not implemented as at the two other institutes. Accordingly, comparison of dimensional accuracy was not implemented in the monitoring.

countermeasures (mock interviews) and so on, while it was impossible to take in place during the limited Program period.

Moreover, concerning the time allocation of curriculums, when the public and private network expert sat in on the recruitment interviews for graduates of AIEMA at Japanese company A (described later in Section 2-3-1), the questions asked in the interviews and the assessment given by the company managers regarding the graduates were utilized in reviewing the time allocation of curriculums.



▲ Trainees wearing the training institute's original training wear



▲ Utilized work procedure (Work Procedure Sheet)



▲ Practical training room (machining centre: left rear: CNC lathe: front)

2-2-4 Soft Skills

Even though 5S (Sort, Set in order, Shine, Standardize, Sustain) and safety awareness are regarded as the basics of factory management, many of the Japanese companies in Chennai area are struggling to incorporate these principles among their workers. Training needs in the area of “Soft Skills”¹⁰ that includes these principles were voiced by Japanese companies in various sectors during the Program implementation, and the common themes were concerned with upholding the set rules, cleaning, in-team communication, improvement of safety awareness and so on.

In the Program, no expert assignments or time frames were initially set solely for soft skills, but it was planned to tackle these contents as far as possible as part of the work on preparing the practical training environment (hard and soft side) in both the welding and metal work fields throughout the ToT period. However, in view of the large training needs, particularly in the metal work field, in consideration of the relationship with the indirect work guidance, supplementary lecture hours were separately set concerning 5S and general safety awareness in each institute. Furthermore, following the classroom lectures, improvement guidance was conducted using the practical training settings in each institute as hands-on teaching materials. The metal work experts spent the independent guidance time for 5S in consideration of the emphasis on “indirect work” guidance, which is closely linked to soft skills.

¹⁰ As opposed to systematic and stereotyped knowledge (hard skills) concerning finance, accounting, law, etc., soft skills refer to mental abilities including communication skills, leadership and stress resistance and atypical skills concerning relations with self and others. The required contents of soft skill vary according to each sector and job category.

In the case of developing countries, it is not unusual for introduction and guidance of 5S in production settings to be carried out over a number of years in a company. Moreover, compared to production facilities, where the embedding of 5S and safety awareness is directly connected to company performance and the health and lives of workers, when this topic is handled in education and training institutes, the issue concerns how to stimulate and sustain the motivation of management and trainers. Within the limited time available in the Program, its resource was devoted to explaining the basic concept of 5S and stimulating awareness on the side of the training institutes. Moreover, in guidance based on actual cases, emphasis was placed on 2S (Sort and Set in order) or 3S (2S plus Shine) in particular.

(1) Training Results at ITI North Chennai (Mint)

ITIs throughout the country include a topic called “Employability Skills” in all their year-long courses, and this topic includes English, computer, communication, entrepreneur spirit, and production management (including 5S). These contents are covered broadly but not at great depth in two colour texts, one for each term. ITI North Chennai (Mint) also conducts lessons on this subject, although the time allocation and detailed contents of lessons have not been confirmed.

Initially the trainers of this institute did not give a positive response on the grounds of lack of budget and insufficient understanding among trainees. However, in order to ensure that trainees can find employment in Japanese companies, the experts emphasized that they need to tackle this field. As a result, in April 2016 the former principal of the institute requested that 5S be instructed to trainers other than those in turning and welding. Accordingly, compared to the two other private institutes, the number of days of guidance and number of target trainers were far greater at this institute. Whereas the independent lessons and practical training guidance on 5S and safety at the private institutes targeted two or three trainers and were finished in around three days, at ITI North Chennai (Mint), there were 19 participants at the busiest times and the guidance took at least twice as long. The trainers who received ToT displayed a very enthusiastic attitude, maybe stimulated by the passion shown by the said principal.



▲ Former principal explaining the importance of 5S to trainers in the ToT



▲ Discussions with the former and new principals and staff concerning 5S activities



▲ Guidance on actual case studies concerning 5S and safety control in the practical training room

The former principal who had been keen on introducing 5S reached retirement age at the end of June 2016 and was replaced by the new principal from July 2016. Since this coincided with a time when the experts were not in India, the autonomous 5S-related activities tailed off. However, this institute rekindled its interest in 5S after an inspection tour of a Japanese company as a part of its welding course in November 2016. In particular, the trainers and trainees got very impressed when the human resource manager at this company explained the importance of “Sustain”, discipline, safety awareness and other soft skills and they were able to observe the approach to work of the factory workers on lines who practiced these principles (The factory inspection is described further in Section 2-3-2)¹¹.

Table 16 Main Training and Guidance Contents related to 5S (ITI North Chennai (Mint))

Guidance Item	Guidance Contents and Progress
Categorizing of practical training equipment	<ul style="list-style-type: none"> • There was a mixture of ① non-operating lathes, ② lathes that can move but cannot perform actual processing, and ③ lathes under repair. Signs indicating status were attached to each and 1S (Sorting into necessary items and unnecessary items) was applied and understood. • Following the guidance, the sign displays are still being adopted.
Tidying of shelves in the practical training room	<ul style="list-style-type: none"> • It was confirmed that this has continued during the period of absence of the Japanese expert.
Cleaning of the practical training room by trainers and trainees	<ul style="list-style-type: none"> • Immediately after the guidance, all members took part in tidying, however, it hasn't been sustained due to the influence of the caste system. Complaints were made by family members.
Separate processing of cuttings	<ul style="list-style-type: none"> • The shapes of different metal cuttings were shown and it was explained that cuttings are separately processed in companies. • Since only steel is used in routine practical training, there is no need to separately scrap cuttings. The guidance was merely imparted as know-how. (It was implemented because companies requested that it be included in the training).
Introduction of rules for disposing of waste cloth (*)	<ul style="list-style-type: none"> • The guidance was limited to highlighting the necessity.
Training in discovery of unsafe elements	<ul style="list-style-type: none"> • Training in discovery of unsafe elements with one person in the training workshop • In doing this, the trainer discovered breakage of the concrete cover of a floor gully cover and damage of a foot board of a lathe work floor. (Repairs have not yet been implemented).
Introduction of group activities for rooting of 5S and continuation of facility improvements	<ul style="list-style-type: none"> • With the consent of the former principal, the mechanism of the PDCA cycle was constructed while conducting competition between groups comprising all trainers and trainees in the four courses (metal work and electrical courses). • Following change of the principal, the teachers lost motivation and this wasn't implemented.

Note: Waste cloth refers to cloth that is used for wiping oil, dirt and impurities off machines.

¹¹ Following the inspection tour at this factory, trainers from the other courses also requested that factory tours be coordinated, and some of them displayed an enthusiastic approach to 5S, Kaizen, etc. With the new principal also showing a desire to further approach soft skills, it was very unfortunate that the second factory visit (turning course) that had been scheduled for December 2016 had to be postponed due to the death of the Chief Minister and a cyclone.

(2) Training Results at PCFCT

One of the directors has deep knowledge of soft skills such as 5S and Kaizen, and the main school runs Japanese language classes. This principal is also active as representative of the Chennai branch of AOTS DOSOKAI (ABK=AOTS DOSOKAI), which is an alumni association of trainees who have travelled to Japan under the AOTS and HIDA schemes, and he conducts more full-fledged 5S, Kaizen dissemination and Japanese education activities in this role.

Currently teaching materials in the subject of soft skills at this institute consist of edited extracts from the chapter on communication in the ITI official textbook “Employability Skills.” The same contents are also used in individual course texts. There is no curriculum that combines soft skills particular to production activities and Japanese language training, however, this training institute has the potential to develop such a curriculum in future. In the case of PCFCT Walajah centre, since equipment development was implemented in tandem with the experts’ survey and ToT work, and the practical training facilities were new and small-scale, there was less scope to implement 5S-related practical training than at ITI North Chennai (Mint), so the training in soft skills at this institute was limited to only what the schedule and resources would allow. Having said that, it was still possible to achieve similar or greater results than at ITI North Chennai (Mint), however, this was largely thanks to the enthusiastic approach on the side of the training institute and its prompt budget measures. The following table shows the main practical training guidance contents at PCFCT.

In addition to the above, displays of Kaizen Sheets which are general in company factories were introduced (comparison before and after improvement and explanation of improvement points).

Table 17 Main Training and Guidance Contents related to 5S (PCFCT)

Guidance Item	Guidance Contents and Progress
Training in discovery of unsafe elements	<ul style="list-style-type: none"> ● Training in discovery of unsafe elements with three persons in the training workshop ● Since the lathe earthing wires were disconnected, improvements were instructed and completed. ● Since the fire extinguisher was installed at a height of approximately 1.2m and was at risk of falling, improvement was instructed. Since the situation still wasn't adequate following the improvement, additional improvements were instructed. ● Instructions were given to install lighting on the lathes. Completion of installation was confirmed.
Revision to layout of work tables	<ul style="list-style-type: none"> ● Unnecessary work time was reduced by instructing not to place tools and measuring devices that are rarely used in phased processing (hammers, files, etc.) but to place tools that are frequently used (micrometres, bites, etc.) and so on (2S: Sort and Set in order).
Change to height of lathe tool rests	<ul style="list-style-type: none"> ● Since the lathe tool rest lever was touching the chuck and in a position that could trap fingers, the lever height was raised. ● Guidance was also given on how to clean the tool rest (removing the tool before cleaning, etc.)

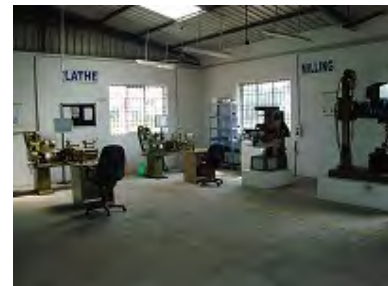
Guidance Item	Guidance Contents and Progress
Separation and control of cuttings	<ul style="list-style-type: none"> Separate management was introduced by the instructors and is still in progress. Following separation, a cuttings separation and storage area was also secured outside. It is scheduled to prepare this for use.
Separation and control of new waste cloth, reusable waste cloth and waste cloth for scrapping in designated positions	<ul style="list-style-type: none"> Separate management was introduced by the instructors and is still in progress. It is scheduled for the trainees to perform this in future.
Tidying of shelves for documents and unnecessary items, etc.	<ul style="list-style-type: none"> Tidying was instructed. A lot of improvement has been made, however, tidying is still needed (further scrapping of unneeded items), so improvement guidance will continue to be implemented.
Safety measures on slope ways	<ul style="list-style-type: none"> Slope ways have been constructed to cater to disabled trainees in the future, however, since these did not have handrails, it was instructed to fit them. This still hasn't been implemented.
Change of floor colour	<ul style="list-style-type: none"> Since it is difficult to spot cuttings and screws when they have fallen on the floor, it was instructed to paint the concrete. This still hasn't been implemented.
Change of the storage area for welding steel materials	<ul style="list-style-type: none"> Steel plate of 2~3m was placed between the conventional lathes, however, this was repositioned because it was prone to stumbling, it was moved. It was moved to a safe place in the corner of the workshop.



▲ 5S and safety guidance in the practical training room (Walajah centre)



▲ Classroom learning concerning 5S and safety control (Walajah centre)



▲ Well tidied metal work practical training space (Walajah centre)

(3) Training Results at AIEMA Technology Centre

AIEMA is an association of manufacturing companies in Ambattur, where numerous local small and medium manufacturing companies are located, and concepts of 5S, QC circles, etc. are well understood by the management of such companies. Meanwhile, although its training centre does have a common soft skills syllabus for all courses, it did not devote a great deal of time to soft skills training until the experts encouraged it. However, since admissions to this institute include diploma holders and persons with employment experience, a feature is that there are many settled trainees. Moreover, it conducts highly disciplined training, as may be gathered from the fact that it distributed and makes trainees wear training uniforms after it was certified as a training provider of TNSDC courses, and it conducts practical training using only NC machine tools. Accordingly, compared to the other target institutes that use conventional machines, there is little scope to conduct training in 5S and safety; hence the experts only allocated minimal time to ToT in the area of soft skills at this institute.

Table 18 Main Training and Guidance Contents related to 5S (AIEMA Technology Centre)

Guidance Item	Guidance Contents and Progress
Training in discovery of unsafe elements	<ul style="list-style-type: none"> • Training in discovery of unsafe elements with two persons in the training workshop • Since the cutting workpieces made by trainees were placed in a manner at risk of falling onto the floor and causing harm, they were instructed to correct the situation.
Instructions in 2S (Sort & Set)	<ul style="list-style-type: none"> • Since unnecessary items (paper, waste cloth, etc.) were scattered on the floor and the shelves were untidy, the trainers were instructed to clear up. After improvements were made, the entire workshop was cleaned and tidied.
Items regarded necessity to train but not implemented due to the limit of Program duration	<ul style="list-style-type: none"> • Separate processing of cuttings, waste cloth and other rubbish • Specific procedures and methods at the start of 5S • Methods and discipline for continuation of 5S • Addition of indirect work-related documents (inspection sheet at start of work, work procedures, etc.) to the classroom tests • Review of recruitment interview measures

In addition to the above, as was described in Section 2-2-2, when the public and private network expert sat in on the recruitment interviews for graduates of this institute at a certain Japanese company in November 2016 at the end of the on-site work, since some of the interviewees displayed shaky understanding of basic 5S and Kaizen, it was decided to review the lesson time spent on soft skills. However, this review work had to be cut short when the experts made on-site work shorten in December 2016. It is necessary to further enhance the syllabus and teaching materials for soft skills and to select and concentrate the contents of soft skills lessons within the limited training period (30 days), and these issues still need to be tackled.



▲ 5S explanation board (AIEMA member company)



▲ Common syllabus for all soft skill courses



▲ Classroom learning concerning 5S and safety control

This institute has until now introduced graduates to small and medium factories that belong to AIEMA in Ambattur, however, generally speaking the local companies do not emphasize soft skills in the recruitment stage as much as Japanese companies. As a result, the local companies might not put strong demands on soft skills training to this institute. In order for this institute to produce human resources for Japanese companies from now on, there is a need in building a more enhanced soft skills training setup.

2-2-5 Necessity for Ongoing Support in the Target Institutes

As has been described in the preceding sections, the Program entailed implementing ToT in training institutes that were selected as partner training providers, and efforts were initially focused on improving training capacity. In the welding and metal work fields (not including soft skills), ToT was completed in the three institutes on short-term curriculums focused on the basic elements that are required by Japanese companies. However, there are still some training institutes and courses where further monitoring and ongoing guidance need to be implemented to ensure the embedding of the taught contents.

Concerning welding, at ITI North Chennai (Mint), it is deemed necessary to incorporate resistance welding, which wasn't covered until now, into the existing lesson schedule. In addition, an additional ToT for AIEMA will be needed in order to implement welding courses. As for PCFCT, it has digested the ToT contents covered in the guidance here, however, this institute undertakes management of OSMA training centre (see the note in Section 4-1-4) and short-term courses consigned by other state governments, and it has a growing need to expand its staff and strengthen the capacity of education facilities. Supplementary advice will be required on these points too.

Moving onto metal work, the indirect work guidance has resulted in a certain degree of achievement and embedding at each institute. The area of "Sustain" and discipline are common weakness among the trainers, trainees and workers in this region and effort was made to attempt the difficult task of conducting ToT with a high proportion of indirect work, and it is thought that the guidance was as successful as it could be over the period of the Program activities. Meanwhile, concerning the conventional lathe, the Program could not cover to enhance manual skills to the extent of clearing the dimensional tolerance level of Japanese skill examinations. This is an issue that can be overcome through reforming the awareness of trainers regarding processing accuracy and conducting repeated practice. At Japanese companies, NC machine tools are more widely adopted than conventional machines, however, since it is better to conduct practical training on conventional machines rather than NC machine tools for acquiring processing principles and 5S, and it is highly unlikely that graduates of local training institutes are asked to conduct programming of NC machine tool after being newly recruited by Japanese companies, there might be greater significance in conducting ToT using conventional machines, even assuming that the resulting human resources seek employment in Japanese companies. In this respect, ToT concerning processing accuracy still remain required at ITI North Chennai (Mint) and PCFCT.

Concerning soft skills, the guidance at all institutes was limited to supplementary contents. The proposals are made concerning future Program activities in Section 4-2.

Table 19 Need for Ongoing Support (ToT) at the Three Institutes Targeted for ToT Support

Training institutes	Welding	Metal work	Soft skills
ITI North Chennai (Mint)	<ul style="list-style-type: none"> - Concerning spot welding, ongoing guidance is required for revision of the classroom learning theory, coordination with the existing lesson calendar and teaching materials, implementation of practical training and so on. - Concerning arc welding, since additional ToT would exceed the contents of the lessons, the trainers do not strongly desire it and the necessity is low. 	<ul style="list-style-type: none"> - Concerning processing accuracy, there is need for additional guidance. 	<ul style="list-style-type: none"> - Work has not yet been started on the “Employability Skills” course based on the official textbook and lesson calendar. - Some trainers are motivated to receive additional ToT, however, since it is also necessary to allocate budget for equipment improvements and safety measures, it will be necessary to confirm intentions and promote understanding across the entire training institute.
PCFCT	<ul style="list-style-type: none"> - Concerning arc and resistance welding, no more ToT is required so long as the contents are limited to basic training. - In order to respond to needs for welders, it is necessary to conduct support in terms of class operations for training of new personnel in line with strengthening of the training setup and increase in the number of trainers. 	<ul style="list-style-type: none"> - Concerning processing accuracy, there is need for additional guidance. 	<ul style="list-style-type: none"> - The institute is at the stage of preparing teaching materials.
AIEMA Technology Centre	<ul style="list-style-type: none"> - ToT support is needed in order to open the welding courses that are currently under consideration. 	<ul style="list-style-type: none"> - More than technical guidance for trainers, it is necessary to adjust curriculums and hours to ensure that each trainee obtains adequate practical training time. 	<ul style="list-style-type: none"> - The institute is at the stage of preparing teaching materials.

2-3 Activities and Results concerning Collaboration with Companies

2-3-1 Support for Company Recruitment

Although there has been some variation in terms of positive response among the Japanese companies (including companies in Sri City) contacted in the Program, around 10 manufacturing companies have so far expressed interest in recruitment from ITIs. Requests for the introduction of graduates were made in fields other than welding and metal work mainly because many companies already have in-factory training equipment and contents locally and their recruitment policy emphasises not skills but potential of candidates. The following table describes the cases that resulted in actual recruitment interviews during the Program period.

Table 20 Cases of Recruitment Interviews resulting from the Program

Company Information	Requested Contents	Results (as of the start of December)
A Co.	4 metal workers (first time), 3 painters (second time)	AIEMA Technology Centre responded on both occasions. 3 workers were recruited on the first time, but no recruitments resulted from the second time. (*one member passed the recruitment requirements, however, he refused because he didn't want to be assigned to the painting department).
B Co. *Not Japanese	40 metal workers 40 welders	The private institutes (AIEMA, PCFCT) are responding to each individual case.
C Co.	2 assemblers	AIEMA Technology Centre is responding to each individual case.
D Co.	1 press processor	AIEMA Technology Centre is responding to each individual case.
E Co.	2 metal workers	1 member was recruited from AIEMA Technology Centre as part of the CSR activities, however, he quit.

On interviewing the personnel manager of A Co., which was the only company to recruit from the ToT target institutes during the Program, he said that the three graduates recruited so far have displayed excellent technical skills and work attitude¹².

Concerning the problems encountered in the Program regarding recruitment and placement facilitation, first of all, the only training institute that was able to introduce trainees to companies was AIEMA Technology Centre. In the case of ITI North Chennai (Mint), it only implements long-term courses in welding and metal work (while the experts were dispatched to India) and the graduation and company recruitment period is summer. However, the ToT was still in progress when summer came around. As a result, this institute was a target for an active matching with companies in this field (The next opportunity for matching after the long-term courses will be summer 2017). Moreover,

¹² As was mentioned previously, the experts feel that AIEMA Training Centre still has room for improving CNC courses, however, on observing the actual company interviews, it was found that more emphasis is placed on elementary production management knowledge and work attitude rather than programming ability. Accordingly, it emphasizes potential in its recruitment criteria, and it is thought this is why it rated graduates from this course so highly. Since this company has still only recruited three graduates so far, it will be necessary to conduct further hearings and analysis to gauge the recruitment interviews and work performance of additional graduates recruited in future.

concerning PCFCT, since it took until November 2016 to be approved as a TNSDC consignment institute, PCFCT could not offer to Japanese companies the free-of-charge introduction of graduates from the TNSDC courses during the Program period (However, a charged training and introduction service for B Co. was arranged). As a result, all the cases in the above table, except for the case of welders to B Co., are linked to graduates from AIEMA Technology Centre.

Furthermore, the matching with ToT target institutes was difficult by the fact that there were so many requests for diploma-holding workers from industries (For example, only diploma holders were introduced to three out of the five companies in the above table). Fortunately, many of the trainees at AIEMA Technology Centre are diploma graduates and it was possible to meet these needs. However, since this institute doesn't handle welding, the Program could not introduce graduates in welding field to companies (Since deepening its relationship with the Program, this institute has come to realize the size of welding needs in Japanese companies and it is examining the establishment of welding courses).

Many companies have also raised needs for female workers in the areas of assembly work and quality control, however, it was difficult to respond this request because there are so few female trainees at all the training institutes. The only case of introducing a female worker was to Co. C in the above table, whereas the needs for female workers couldn't be met¹³. Introduction of diploma holders and female workers will be further discussed in Chapters 3 and 4.

2-3-2 Results of Collaboration with Japanese Companies

(1) Executive-level discussions between a Japanese manufacturing company and TNSDC

On November 16, 2015, discussions were held at TNSDC among five TNSDC managers, the Japanese top manager and personnel manager from one Japanese-affiliated manufacturer that had expressed the desire to actively collaborate with the JICA skill development Program from the time of the data collection survey (2014). Information and opinions were exchanged concerning the company's demands for skill development (for example, enhancement of ITI training, procedural confirmation and requests concerning apprenticeships, etc.), potential collaboration with the JICA Program and TNSDC (for example, cooperation with ToT incorporating factory tours and utilization of in-factory education facilities). Following the meeting, the top manager of the said company conducted a tour of the ITI Guindy.

¹³ It was not possible to also respond to recruitment needs for persons with work experience and university graduates and so on, however, it is very unusual for line workers to be restricted to persons with work experience and university graduates. As a result of widely introducing contact information to TNSDC officers, several companies have contacted TNSDC concerning recruitment of human resources. However, the details are unknown because the employees that conducted the interviews couldn't recall the contents.

This meeting was coordinated by the experts, and three members from the Program attended and proposed requests concerning equipment improvements at ITIs (introduction of basic safety equipment, resistance welders, etc.).

It subsequently took one year to actualize the factory visits for ITI trainees that were proposed in the meeting (Reasons were as follows: the personnel managers of the reception company were too busy with other activities; the ITI principal was replaced and so on). However, the contents that were discussed in this meeting provided major hints for future company collaboration, so the discussions could be viewed as preliminary talks geared to the purchase and procurement of equipment.



▲ Scene from discussions
(TNSDC officers are in front)



▲ Project Director making
a statement in the meeting (left)



▲ Observation tour of ITI
Guindy after the discussions

(2) Factory inspections

From the time of the data collection survey, there were found to be some Japanese companies that offer support for ITIs and accept factory visits as CSR activities in Chennai area (However, on conducting renewed survey during the Program, it was found that some of those CSR activities had been suspended or were no longer in progress). As a result of the company hearings and questionnaires, there are confirmed to be roughly 25 companies (including companies in Sri City) that expressed a positive attitude to accepting factory visits and participating in training activities.

In the Program, the following three companies accepted requests of factory visits in or after the middle of November 2016. In (1) and (3), as part of their CSR activities, the companies offer means of transport (commuting buses) and lunches.

In the case of A Co., the personnel manager introduced the company and its Chennai factory and gave a lecture on the soft skills that Japanese companies demand from workers (in particular, communication skills, safety awareness, time management, desire to continuously learn, importance of discipline, etc). Since most of the trainees didn't understand English, the explanations were given in Tamil. It was highly significant that this Japanese-affiliated factory, moreover a company with a history of recruitment from ITIs, stressed the importance of soft skills as a recruitment policy.

Table 21 Arranged Factory Tours

Company: Date	Inspectors	Main Contents on the Day
(1) A Co.: November 14, 2016	ITI North Chennai (Mint) welding courses (63 trainees, four trainers, 1 employee)	- Introduction to A Co. and Chennai factory - Inspection of factory assembly line - Lecture by the personnel manager on the importance of soft skills
(2) B Co. (non-Japanese): November 24, 2016	PCFCT: 1 trainer (jointly in charge of welding and metal work), 1 director AIEMA Technology Centre: 1 trainer (CNC head), 1 operations officer	- Inspection of welding process (*Only PCFCT officials) - Inspection of in-factory welding training facilities (Dojo)
(3) C Co.: Mid-December 201 (Postponed due to death of the Chief Minister and a cyclone)	ITI North Chennai (Mint) turning courses (57 trainees, 7 trainers and employees)	- Introduction to C Co. and Chennai factory - Inspection of factory assembly line - Company culture and principles

Note: 1: In addition to the above, directors and operational staff of private sector training institutes visited factories as an accompanying person to Japanese expert for several times, however, they are not mentioned above.

Note: 2: Since the inspection tour in (2) took place incidental to discussions that resulted from a request by B Co. to have human resources introduced from two private institutes, it cannot be classed as CSR activity. It was included in the above table because the experts requested that a tour of welding processes be arranged and the PCFCT personnel did not participate as guests of the experts.

In the case of ITIs, trainers and trainees are often unable to buy shoes but wear sandals. In the case of Mint, factory inspection tour routes and contents have had to be altered due to participants wearing sandals and arriving late and so on (When the three-shift system commuting bus inward and outward services are used, disruption of the schedule due to the late arrival of factory visitors must be avoided at all costs). Due to the large numbers of trainees wearing sandals, difficulty was encountered in persuading companies to accept factory tours in turning courses as well as the welding courses. However, on hearing about the factory visits at A Co., C Co. was also persuaded to accept visits in responses to the passionate requests from staff of this institute, which has a strong interest in 5S and Kaizen. It was intended for C Co. to provide footwear for the factory visitors, however, the visit had to be cancelled following some political event.

2-3-3 Results of Collaboration with the Japanese Chamber of Commerce and Industry, etc.

The following table shows the collaboration that was conducted in terms of seminars, presentations, etc. with the JCCIC and the JETRO Chennai Office (which also served as the secretariat of JCCIC). In addition, member companies received Program introductions on several occasions at the Chamber of Commerce and Industry CSR Liaison Conference and Personnel and Labour Affairs Liaison Conference outside of the Program period.



▲ Project Director giving his presentation at the Personnel and Labour Affairs Liaison Conference



▲ Company meetings and seminars can be implemented in the TNSDC meeting room.



▲ Commemorative photograph with AIEMA members and the Japanese hosts (ACMEE)

Table 22 Main Results of Collaboration with the Chamber of Commerce and Industry and JETRO

Activities (date)	Contents
① Seminar for companies at JETRO (May 27, 2016)	<ul style="list-style-type: none"> - The Chief Adviser implemented a seminar entitled “An Introduction to the JICA Program for Development of Manufacturing Human Resources.” This was attended by around 15 company representatives. - The seminar was also announced at the annual general meeting of the JCCIC (May 17).
② Invitation of the JETRO Office Director General and member companies of the JCCIC to an AIEMA machine tool exhibition (June 17, 2016)	<ul style="list-style-type: none"> - The experts assisted the publicity and introduction of guests to this machine tool exhibition (June 17~20, 2016), which is staged once every two years in order to raise awareness of AIEMA among Japanese company officials. - The exhibition was also announced at the annual general meeting of the JCCIC (May 17). - The Director General of the JETRO Chennai Office was invited to given an address as a representative of Japan. Japanese representatives from three manufacturers also attended.
③ Setting of interview with the JCCIC CSR liaison committee companies JICA headquarters officials (August 23, 2016)	<ul style="list-style-type: none"> - Two officials from JICA South Asia Division 1 and the Chief Adviser exchanged opinions with the CSR liaison committee companies.
④ Attendance at the JCIIC Personnel and Labour Affairs Liaison Conference (November 16, 2016)	<ul style="list-style-type: none"> - The Chief Adviser took part in the JCCIC Personnel and Labour Affairs Liaison Conference together with the TNSDC Project Director and an assistant. He introduced the TNSDC activities and policies and Job Portal (under development). Representatives from 11 companies and JETRO were present on the day.
⑤ Cooperation with questionnaire survey at seminar venues, etc. (November 17 and 25, 2016)	<ul style="list-style-type: none"> - JETRO employees cooperated with the questionnaire on November 17, 2016 (JCCIC monthly general conference) and November 25 (JETRO seminar). As a result of individually asking companies for their cooperation, the target number of responses (30 companies) was achieved.

In this way, collaboration was smoothly deepened between the experts and JCCIC/JETRO officials, however, it cannot be denied that contact opportunities between TNSDC and Japanese companies were sporadic. Reasons for this were as follows: there were numerous times when TNSDC did not have enough time or resources to liaise with Japanese companies, for example, during the flooding in November and December 2015, the assembly election (May 2016), replacement of the MD (August 2016), and so on. Moreover, TNSDC is still a small organisation compared to its expected role, and senior managers often have to work until late at night simply to get their daily affairs finished.

Therefore, it was difficult for them to spend half a day in visiting the Japanese factories for negotiations or attending meetings.

On the other hand, the Japanese companies are not yet ready for holding regular discussions with TNSDC during the Program. This is because contacts between the experts and the companies are currently concentrated on support for recruitment. Even if companies can be persuaded that making contacts with training institutes and the Program is directly linked to “recruitment,” most company officials view discussions with state administrative officers as only being indirectly effective for resolving immediate personnel issues such as filling staff shortages or increasing the workforce.

Assuming there is need for regular discussions between TNSDC and Japanese companies, it is necessary to coordinate opinions concerning policy, legislation, administrative procedures and other issues that go beyond short-term “recruitment” issues in companies. This point is discussed further in Section 4-3.

2-3-4 Other Results of Company Collaboration

In addition to the above, opinions were exchanged concerning the possibility for future collaboration with officials of a welding manufacturer (an Indian corporation having head offices in Japan) that implements “*Program for promoting high-precision arc welding technology in India*” as the JICA funding project. The experts attended this company’s report and demonstration of activities conducted in Chennai in May 2016, and this company also responded to the Program questionnaire that was sent in autumn 2016.

Furthermore, although not Japanese-affiliated activity, discussions were arranged between an American HR training and dispatch company and TNSDC with a view to launching training courses for casual workers (short-term dispatch workers) as a TNSDC consigned course. This company was introduced by a certain Japanese manufacturing company and the experts coordinated up to the discussions between the company and TNSDC. Eventually, however, the company and TNSDC couldn’t agree on collaboration due to disagreement over the TNSDC payment regulations, introduction fee and other conditions.

3. Work Operation Ideas and Lessons

3-1 Module Management of Curriculums and ToT History

The contents of ToT were described according to each field in Chapter 2. Since it was assumed that a single batch of guidance would last around one week at each institute, the overall training was divided into short-term training modules. Moreover, in the metal work field especially, since it was necessary for two trainers to train indirect work and soft skills in shifts over the long-term, the guidance history was managed in the form of an Excel file sheet for each module, and the contents were confirmed and opinions were exchanged each time the trainers passed work on to each other. In the case of soft skills, which comprise atypical knowledge, unless such steps are taken, entirely different advice could end up

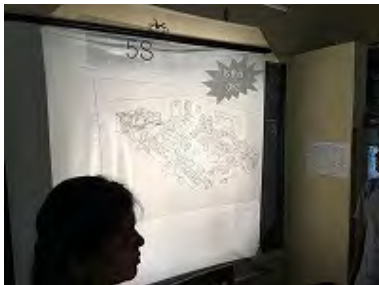
being given according to the trainer and this could cause confusion and decline of motivation among the lecturers of institutions. Such risks were avoided thanks to taking the above measures here.

In addition, there were no opportunities for company engineers to appear as guest trainers at the training institutes, however, if such opportunities are created in future, it will be necessary to build a system for recording and sharing the training contents in each module among the trainers.

3-2 Utilization and Sharing of Visual Teaching Materials

At public ITIs, the trainees and sometimes even the trainers lack English ability. Therefore, in order to encourage intuitive understanding, visual teaching materials (photographs, illustrations, videos) were actively introduced to the classroom training.

At ITI North Chennai (Mint), since there were no projectors or PCs, measures were adopted according to the environment, for example, colour materials were printed and distributed and the institute's OHP (black and white) was used (The experts explained and requested that TNSDC share data with other ITIs). However, public ITIs generally do not have projectors, PC or colour printers for displaying visual resources in classrooms. In such an environment, there is still room to examine other methods for sharing visual teaching materials according to the current conditions of ITIs: for example, using OHP sheets, printing out and filing materials and distributing them to other institutes, compiling sets of teaching manuals for trainers who haven't received ToT, and so on.



▲ OHP projection test of materials prepared by experts (ITI North Chennai (Mint))



▲ OHP sheets of safely archived experts' materials (Mint)



▲ Graphical explanation of welding principles using a projector (PCFCT)

3-3 Utilization of Tamil Interpreting

Tamil interpreter was recruited to assist communication with the trainers and trainees who had limited English ability. The interpreter especially played an important role during monitoring of the pilot lessons (mock lessons) and when requesting jig and parts processing to materials and equipment suppliers and ITI trainers who couldn't understand English. Also, when attending the company recruitment interviews for institute graduates in companies, it was necessary to take short-hand notes of the interviews that were conducted in Tamil, so having the interpreter present made it possible to record and analyse the meeting contents in detail.

Actually, when teaching while looking at objects such as equipment and processing parts, etc., it is not unusual for training to be conducted with the minimum conversational ability on both sides in company settings and ODA settings (senior volunteers, technical cooperation projects, etc.), however, when it comes to teaching safety knowledge, indirect work, soft skills and discipline, it is clearly far more efficient to teach using the local language. In this field, local understanding is realized more through having local groups or education institutes that have a certain degree of know-how conduct lessons with the Japanese experts offering assistance, rather than having the Japanese experts directly teach with the help of an interpreter.

3-4 Support for Publicity of Institutes based on Public and Private Networking

A wide range of stakeholders have been approached via the Program activities, for example, TNSDC, company groups (JCCIC & AIEMA), JETRO, training institutes, etc. As well as mutually introducing these various agencies that were not aware of each other, the Program supported mutual introductions and publicizing their activities.

It was initially intended to conduct a collaboration activity in terms of offering publicity on companies and training institutes to young people in the Chennai area, however, due to the limited scale of activities for introducing graduates from the training institutes, the relationship between companies and the training institutes did not become so intimate as to develop collaboration in the area of publicity. Having said that, the publicity collaboration support in terms of helping the different parties “know each other” was effective as preparation for later collaboration. From April 2016, officials from the training institutes were actively invited to attend meetings held with companies, and a several visits by companies to the training institutes were coordinated. In addition, the experts introduced the training institutes and TNSDC at meetings of the JCCIC and JETRO.

Moreover, as was mentioned in the table in Section 2-3-3, the experts cooperated in conducting publicity and sending invitations to Japanese companies to attend the largest machine tool exhibition (ACMEE, staged by AIEMA) in the southern India, and they also advertised AIEMA to the Japanese community. As a result, JETRO has formed a close relationship with AIEMA, and officials visit each other to give invitations and explanations for each organisation’s events and missions.

As a result of these activities, awareness of the Program and mutual understanding among stakeholders were deepened, however, in order for direct liaisons to increase without the intervention of the experts, there is still not enough time or opportunities for especially companies and training institutes to build and sustain trust relations via recruitment. Accordingly, for the immediate future, it is necessary for the Program to act as a bridge in encouraging recruitment and collaborating with CSR activities between Japanese companies and the training institutes.

Meanwhile, there have been issues regarding the desire for communication on the side of the training institutes. For example, some of the training institutes have not appointed dedicated officers for liaising with companies, and others have spent so much time and effort trying to attract consignments

of in-company training that they have scared the companies away. Accordingly, there is some room for improvement in guidance on the side of the training institutes regarding collaboration with companies.

3-5 Arrangement of Contact Permission Letters between State-run ITIs and Japanese Companies

Concerning factory tours and company recruitment interviews, even in cases where consent was smoothly attained from companies with mediation by the experts, little progress was subsequently made when the experts were not in India, even though the experts tried to remotely follow-up activities by email, etc.

In order to address this situation, the experts obtained a letter of approval (Appendix E) from the (former) Managing Director of TNSDC allowing Japanese companies to liaise directly with each public ITIs without having to obtain permission from TNSDC. Until then, it had been necessary for the public ITIs to obtain permission from TNSDC in order to collaborate with CSR activities such as arranging inspection tours and recruitment tours of Japanese companies. This measure was taken in negotiation with TNSDC in order to enable the public ITIs to avoid losing opportunities due to clerical procedures. However, this has been insufficient to essentially overcome the basic problem for the following reasons: public relations functions (vis a vis companies) on the side of public ITIs are weak, there are not many cases where personnel departments in companies have strong motivation to collaborate with the public ITIs.

Incidentally, the MD that issued the said letter was replaced, but it has been confirmed with the principal of ITI North Chennai (Mint) that the letter is still effective under the new MD. Actually, since the days required to coordinate factory visits have been greatly reduced as a result of showing this letter, doubtless it will prove useful from now on.

3-6 Ideas in Recruiting Trainees

During the Program implementation period, it was difficult to respond to requests from Japanese companies for female workers and diploma-holding human resources under the current composition of courses and trainees at the three partner institutes. As young people are drifting away from manufacturing in the Chennai area, these human resources are especially in short supply, and some companies are recruiting female and diploma-holding human resources from cities as far as 400 kilometres away from Chennai (Madurai, Coimbatore, etc.). Looking forward, even if new hubs are established in the Chennai area (see Chapter 4), it is possible that trainee recruitment will become an issue.

In the Program, measures to address the issue of trainee recruitment were taken as far as possible within the current TNSDC scheme. While advancing the on-site work, it was found that private institutes often admit and conduct re-education for graduates of ITIs and diploma colleges; for

example, AIEMA Technology Centre has succeeded in assembling jobless young people from provincial areas by advertising for trainees (by placing fliers at bus stops, house letter slots, etc.) in and around Vellore (located approximately 120 kilometres from the centre of Chennai) and so on. Vellore is one of the towns that Japanese companies in the Oragadam area dispatch commuter buses to, and it is interesting to see that most of the human resources introduced by this institute (see Section 2-3-1) are diploma holders who are employed by companies in the Oragadam area. (Conversely, introductions of human resources in the Sri City direction do not result in employment. Incidentally, the PCFCT Walajah centre is also situated close to Vellore).

In the case of AIEMA Technology Centre, since orders from TNSDC focus on the total number of trainees regardless of gender, it has only been after summer 2016 that it has made full-fledged efforts to recruit female trainees. Accordingly, the publicity, know-how and setup for gathering female trainees are still being assembled (for example, addressing the concerns of families about sending their daughters to male-dominated learning environments, preparing facilities in training institutes that are amenable to female trainees and so on) and there are still latent needs to be addressed (the same is true at the two other institutes).



▲ A female trainee at graduation ceremony (centre right, AIEMA)



▲ Trainee recruitment flier for AIEMA CNC course



▲ ITI Mint welding course female trainer and trainee (centre)

4. Recommendations

4-1. State Policies, Government of Japan’s Support Policy, and Establishment of New Training Hubs

4-1-1 Plans of Tamil Nadu

According to TNSDC officers at the end of October 2016, the state government has decided on a public and private collaboration policy of establishing training hubs through collaborating with private sector companies, etc. in a scheme whereby the state provides land and buildings (existing education and training institutes, etc.) and the private sector conducts operation of the new training institute. The curriculums at these new training hubs will not comprise nationally uniform lesson contents and terms, however, the operators will be allowed to set their own contents. These new training institutes will be developed as CoE (Centres of Excellence; TNSDC calls “Apex Centre”), and they will be encouraged to collaborate with multiple provincial training institutes (Regional Centres: RC) with a view to enhancing the training, etc. of provincial training institutes trainers and young people.

4-1-2 Plans of the Government of Japan (Ministry of Economy, Trade and Industry)

In November 2016, METI announced a policy to support skill development in manufacturing sector for 30,000 workers over 10 years, with a view to providing skilled workers with Japanese companies and contributing to “Make in India” and “Skill India” policies espoused by Prime Minister Mr. Modi’s administration through teaching Japanese disciplines and manufacturing skills to young Indian people. These contents were also discussed in the Japan-India summit meeting held in November 2016 and the Memorandum of Cooperation was concluded between the countries’ ministers. It can be said that the Program is compatible with these plans of METI in that it targets working-level human resources and young workers who are targeted for new recruitment.

4-1-3 Comparison of Public ITIs and Private Training Institutes and Direction of JICA Cooperation

In the Program, activities were conducted both in public institutes (ITIs) and private institutes. Since there is a great variation in terms of scale, contents of courses, equipment environment, etc. within each of these categories, it is difficult to make simple comparisons between public sector (state-run) vs. private sector. However, as reference, the following results can be obtained from conducting comparative analysis of the three institutes that were targeted by activities in the Program.

Table 23 Comparison of Public Institutes (ITIs) and Private Institutes

Comparison Item	Public ITIs	Private Institutes
Training period	<ul style="list-style-type: none"> - One or two years (it varies depending on the course). There are two terms: from August to February, and from March to July. The recruitment season is summer only. - Judging based on the criteria of Japanese training institutes, ITI curriculums allow for around one month of practical training (in case of welding). - The fields, periods and scales differ according to each training institutes, but short-term courses (120h~800h) are also implemented. 	<ul style="list-style-type: none"> - In order to increase turnover, short-term courses (one month~) are mainly implemented. Accordingly, there are as many recruitment seasons as the number of short-term courses.
Scale (number of trainees)	<ul style="list-style-type: none"> - Generally speaking, there are more trainees (and trainers) per class than in private institutes. 	<ul style="list-style-type: none"> - Due to limited practical training space, there are fewer trainees than at ITIs, however, there are still at least twice as many trainees as at training environments in Japan. (E.g. there are 30 trainees per class at AIEMA technology Centre).
Scale (area)	<ul style="list-style-type: none"> - Generally speaking, scale is much larger than in private institutes. 	<ul style="list-style-type: none"> - Due to investment cost considerations, practical training spaces are small-scale in many cases.
Level and enthusiasm of trainers	<ul style="list-style-type: none"> - There are some trainers who lack motivation concerning on-site improvements and learning of new knowledge. - There is a wide variation in skill and English ability. The average English ability of trainers is, generally speaking, inferior to that in private institutes. 	<ul style="list-style-type: none"> - Generally speaking, motivation levels are high. However, young trainers are sometimes inferior to their ITI trainers in terms of experience and skill.
Curriculum	<ul style="list-style-type: none"> - National uniform teaching materials are prescribed. - Depending on the lecturer, there were some cases where old versions of teaching materials or unique teaching materials were used. 	<ul style="list-style-type: none"> - The private institutes set their own curriculums, however, since these comply with the regulations of external agencies (NSQF, etc.), they are not totally free.
Equipment environment	<ul style="list-style-type: none"> - Equipment comprises old models in small quantities. However, some priority institutes have purchased CNC machine tools and new equipment. 	<ul style="list-style-type: none"> - They have more equipment and more flexible budgets than state-run ITIs. On the other hand, since investment effect-recovery plans are more severe, decision-making concerning investment is not always fast.
Budget situation	<ul style="list-style-type: none"> - Budgets are small. Education expendable items and safety apparatus that are stipulated as having been purchased in official documents are either in short supply or are stored away in storerooms. As a result, they are not made available to trainees at all. 	<ul style="list-style-type: none"> - Investment is mainly directed towards equipment, however, without the guidance of the Japanese experts, there would not have been sufficient investment in safety equipment.
Relations with Japanese companies	<ul style="list-style-type: none"> - Mint has no record of providing graduates to Japanese companies. (There are other ITIs that have produced recruits). 	<ul style="list-style-type: none"> - Some training institutes have produced new recruits, however, such outputs are sporadic.

As is indicated in the above table, not all private training institutes are necessarily better than public ITIs; and this is especially so in terms of the technology and experience of trainers, safety awareness, etc. (There was a case where one trainer of advanced age dropped out from the ToT in a private training institute). Meanwhile, private institutes are at an advantage in producing human resources for Japanese companies because short-term courses can introduce graduates flexibly, while private courses are smaller than ITI courses, and private institutes' motivation to make improvements to curriculums and equipment is bigger than state-run ITIs. Accordingly, when examining deployment of the Program in future, emphasis should continue to be given to collaboration with the private training institutes.

However, when considering macro development issues that go beyond the aspect of company collaboration, considering that most trainees at public ITIs are young people from low-income households, it is not appropriate to exclude public ITIs from targets of technical assistance simply on the grounds that they are less efficient in terms of developing human resources and collaborating with companies. The approach to state-run ITIs and ITI trainees is an important item when considering a unique JICA cooperation strategy compared to the aforementioned (4-1-2) plans of METI¹⁴. For example, assuming the TNSDC scheme, state-run ITI short-term courses that were previously not considered have now become targets for the consignment of training, and there is room to consider support for short-term courses that entail equipment, trainers and motivation on the side of training institutes¹⁵. Moreover, it is possible under the current scheme to accept ITI graduates to undergo short-term training (re-training) at private institutes that are consigned by TNSDC. In addition to this, it is worth considering accepting ToT and trainee practical training from state-run ITIs at the new training hubs.

4-2 Expansion and Continuation of the Current Scheme

In the event where cooperation is provided from preparatory survey through to actual launch of the new training hubs, it needs certain amount of duration to implement the equipment procurement support, formulation of short-term curriculums, preparations for ToT and collaboration with companies, etc. as a preparation stage. These activities can be implemented as an extension to the current JICA Program, however, this will need to include re-examination of fields other than welding and metal work that are based on company needs (in particular the soft skills field described in Section 4-4 and the painting and forklift fields, etc. for which there are relatively high needs) and the support

¹⁴ In materials of the METI, JIM trainees are described as “young rural poor people having difficulty advancing to university due to home economic circumstances will be selected if they have potential.” Accordingly, when the JIM scheme is actually implemented, it is likely that training will aim at development of “new workers who are candidate team leaders” rather than “team leaders” (it is not feasible for new recruits to immediately be appointed as team leaders). In this respect, it is possible that JIM will overlap with the training targets (workers) of the existing JICA cooperation, however, since the entirely new JIM has been established as an initiative for overcoming dysfunction of the state-run ITI system, the existing ITIs are effectively outside the scope of the METI policy.

¹⁵ For example, according to ITI Mint welding trainers, consideration is being conducted on the initiation of a resistance welding course as a short-term advanced course from next year.

institutes (women's training institutes deployed as RC and so on) and the introduction and continuation of ToT.

4-3 Responding to Demand for Diverse Human Resources

At the end of October 2016, TNSDC explained the state policy concerning efforts to promote employment of unemployed young people also targeting graduates of technical colleges and universities. As was mentioned in Section 3-6, since the TNSDC scheme had conventionally functioned as a re-training policy for young holders of degrees and completion certificates, it may be possible to respond to the broad human resources needs (ITI graduates, diploma holders and other highly educated persons, females, etc.) of Japanese companies while adhering to the state policy through creating success stories of trainee recruitment focused on provincial dwellers, highly educated persons, women and so on, who had been poorly served within the framework of the TNSDC scheme in the Chennai area until now.

In this case, it would be possible to strengthen recruitment of trainees from provincial areas by existing institutes (training providers) in the Chennai area and support ToT and job mediation for outstanding provincial training institutes under the current TNSDC scheme. Concerning the strengthening of trainee recruitment, as the JICA cooperation, more than ToT and introduction of graduates to Japanese companies, there is a greater need to assist strengthening of operating setups at each training institute. It would be more efficient to implement such support at private institutes and new PPP-operated institutes rather than at existing state-run ITIs.

Moreover, in particular, the system being considered by Tamil Nadu state also makes it possible to conduct training of trainers and trainees from regional training hubs (RC) at the headquarters training hub (AC), and it would be possible to respond to diverse human resources needs through selecting and strengthening the operating capacity of outstanding RC (provincial women's training institutes, diploma colleges, etc.).

4-4 Examination of Private Sector Collaboration Exceeding Recruitment Support

As was mentioned in Section 2-3-3, if it is assumed that regular discussions are needed between TNSDC and Japanese companies, it would be in cases where both sides demand to coordinate needs concerning policy, legislation, administrative procedures, etc. going beyond immediate recruitment in each company. For the Program, which provided technical assistance to industrial trainings centred on ToT and employment/recruitment support (as a primary activity of public and private collaboration), policy, legislation, administrative procedures, etc. were out of its scope.

However, for example, in the case where support is given for launch of a PPP-operated institute by the state, a working group will be established whereby discussions can be held with the state and local companies concerning the in-factory practical training systems (e.g. dual working system) that are convenient for the companies, coordination with the existing Craftsman Training Scheme,

Government Apprenticeship systems, etc.¹⁶, compatibility with labour and employment legislation. Such experiments in new in-factory practical training systems go beyond the limits of simple industrial training support and overlap with recruitment and labour management support for the local companies (For example, in the case where a new in-factory practical training system is utilized, it will be necessary to decide the legal definition and handling of wages, etc. of the in-factory practical trainees). Moreover, while holding periodic discussions between the Japanese companies and local administration, it would be possible to start from negotiations on the in-factory practical training system and develop it into a forum for exchanging opinions and making appeals concerning labour legislation, state ordinances and so on. In order to heighten the involvement of companies in JICA-supported private sector collaboration activities, greater incentives must be provided for the companies, and the idea of building new hubs is significant as an opportunity for exploring this area too¹⁷.

When the expert in charge of public and private networks took part in the discussions in the HR and IR group of the JCCIC, judging from the agenda and contents discussed, rather than simply recruitment, greater emphasis was placed on labour affairs management following recruitment. Thus, an effective means of deepening collaboration with Japanese companies may be to make contact with them concerning HR issues in the field of labour affairs going beyond recruitment support.

4-5 Support for Soft Skills Training

From the time of the data collection survey (2014), the most commonly expressed training needs by Japanese companies were related to language (Japanese or English) and soft skills including 5S and Kaizen. Similar results were obtained when a renewed needs survey was conducted in September to November, 2016, while the petition made by the JCCIC in November 2016 also contained a request for enhancement of soft skills (greetings, punctuality, safety awareness).

In 2014, officials on the Japanese side were talking about soft skills training in the programmes of the Overseas Human Resources and Industry Development Association (HIDA), and attention was subsequently directed to only manufacturing skills (welding and metal work) in the Program. However, it has been found that several actors (industrial groups, associations, private sector groups, etc.) have already conducted consulting on 5S and Kaizen to a fairly advanced level for managers of individual companies, and there are cases where some Japanese companies receive such local consulting services. Meanwhile, it has been found from hearings with Japanese companies that any effective training are

¹⁶ In India, long-term in-factory practical training is officially regarded as a means of linking training with employment, and there are many companies that utilize the apprenticeship, etc. system as a form of employment. However, maybe due to the complex nature of rules and procedures, there seems to be a variation between Japanese companies in terms of their understanding.

¹⁷ In the case where approaches go as far as dual training combining in-factory practical training and lessons in training institutes, it will be necessary for the training institutes and factories to be located close to each other, however, because the existing partner institutes are not situated in the industrial parks that are home to Japanese companies, this is stated based on the idea of construction of a new training hub.

not implemented on the level of trainees at training institutes (industrial training institutes, polytechnics, etc.). Accordingly, this reaffirms the fact that there are large needs for industrial training support in this field.

Judging from needs on the side of the companies, it is necessary to support development and operation of a training curriculum comprising manufacturing and soft skills (including language) as a set. In this case, rather than offering guidance on 5S and Kaizen to middle managers, if contents such as, for example, 2S (Sort and Set in order), safety education, discipline, group work, culture of Japanese companies, etc. are implemented for workers, etc., it will be possible to discriminate from the existing training that is geared to top and middle managers. Concerning language (Japanese and English) too, there are a certain degree of training needs in private companies, however, it would also be possible to compile a language training curriculum in combination with, for example, soft skills training¹⁸.



▲ Trainees being made to remove weeds as punishment for being late (ITI North Chennai (Mint))



▲ ITI official textbooks on soft skills (“Employability Skills”)



▲ Periodic inspection sheet affixed to a conventional lathe (PCFCT Walajah)

Moreover, the soft skills teaching materials that are currently used at training institutes cover such things as leadership, communication, etc. concerning business and entrepreneurship in general, while English conversation, PC skills, etc. are added to this in public ITIs. On the other hand, since coverage of fields in the production area, for example, 5S, safety and discipline, is weak, it is necessary to revise the soft skills teaching materials used at training institutes with more focus on production settings. Accordingly, it is necessary to investigate and narrow down the soft skill items that are in high demand in production plants, prepare teaching materials to cover these, actually operate ToT and courses in training institutes, and verify the effects.

4-6 Continuation and New Development of Training Provider Support and Utilization

As was mentioned in Section 2-2-4, further assistance and monitoring will be required in some of the courses at the training institutes supported in the Program. In addition to this follow-up, due to the extent of demand for human resources in the welding field especially, it will be necessary to further develop and implement ToT at TNSDC-consigned welding training institutes. On the other hand, in

¹⁸ This is according to comments from a local organisation that implements soft skills and Japanese language training for Japanese companies. Combinations of soft skills and production technology will differ according to each technology field. Eventually, it will be necessary to have curriculums that combine cross-field soft skills (basics) and field-unique soft skills (applied).

the metal work field, since each company’s demand for workers is not as big as in the welding field, it should be possible to respond to this by continuing follow-up at the three current institutes.

Concerning soft skills, at all three institutes, a technical assistance is required for reviewing the overall curriculums and teaching plans, while in the case of the private institutes, it is needed to revise the teaching materials, etc. One idea is to select some training providers out of local experienced organisations and training institutes, etc. and to compile curriculums that correspond to the needs of Japanese companies and context of Indian society. Upon doing that, the training effect can be heightened and the workload of Japanese experts can be reduced by having these providers conduct some of the ToT in the local Tamil language.

Apart from welding, metal work and soft skills, other skill areas such as painting and forklifts operation are of high needs. First, these fields will be surveyed in the existing training institutes; then, if outstanding institutes are found, courses will be certified as TNSDC-consigned courses and the ToT will be started. However, since it is forecast that there will be a high need to strengthen soft skills training at training institutes in these fields, it may be more realistic to begin with soft skills training before ToT in these other skills.

4-7 Deployment of Activities in Sri City

In the case of the TNIPP/TNSDC scheme, activities in Sri City on the state border with Andhra Pradesh cannot be directly deployed. However, when hearings were conducted with a number of companies in Sri City in autumn 2016, the fields containing the highest needs were soft skills, discipline, language (Japanese and English), etc. Accordingly, as was mentioned in Section 4-4, it should be possible to introduce the local soft skills training organisations and training institutes that cooperated with the Program in Chennai to Sri City industrial park so that they can arrange courses for companies in Sri City and respond to the immediate needs of the Japanese companies there.



▲ Sri City industrial park business building (from the Website)



▲ Town near the industrial park (Andhra Pradesh state)



▲ ITI Tada School near the industrial park (Andhra Pradesh state)

Moreover, according to the official of TNSDC, it would be possible to launch a PPP hub utilizing land and buildings owned by the state government on the Tamil Nadu side of the state border close to Sri City. The Japanese companies here have training needs in various production technology fields such as

welding, metal work, painting, injection moulding, dies, etc., however, since there are many small and medium companies here, it would be necessary to have a training institute system that can respond to minor and sporadic demands for human resources in numerous fields. In this respect, it is desirable to launch a training hub where basic principles and soft skills can be definitely taught on a small scale, and where young people from provincial parts (RC) of Tamil Nadu can be sent.

4-8 Support for the TNSDC Portal Site

TNSDC is developing Web portal service and strengthening the job portal functions with searching pages for TNSDC consigned courses and job seekers (graduates) of TNSDC courses and enabling companies to post help-wanted information free of charge. As of November 2016, since the job seekers search keys didn't include the items of age, academic history, sex, etc. that are regarded as important by Japanese companies, the public and private network expert requested the IT officer of TNSDC to set such search keys. Moreover, to create a system that personnel managers of Japanese companies regard useful, layout, system stability, security, information updating frequency, completeness, etc. should be treated carefully.

Following completion of the job portal system, the most important thing is to build a setup for continuously inputting and displaying a certain amount of fresh job offers and job seeker information. Currently, however, only one young IT staff member of TNSDC is collaborating with an outsourced system company on its development so that there are doubts as to whether or not truly effective information can be input (On pointing out this issue to the TNSDC officials, they said that they would input course information themselves, however, it will be difficult for TNSDC to register new job seeking information while deleting the old information, etc.). There would be some need to dispatch an expert regarding such operating issues, who will visit companies and training institutes in collaboration with TNSDC officials, while it will be desirable to expand the manpower of TNSDC for this additional task.

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APPENDIX A:
LIST OF TNSDC TRAINING COURSES
(AS OF THE END OF OCTOBER 2016)

Appendix A: List of TNSDC Training Courses (As of the End of October 2016)

Tamil Nadu Skill Development Corporation- Ongoing Status

Sl. No	Name of the training provider	Course offered	Venue of the programme	Training period	No. of trainees	Timing
1.	CIPET- Chennai	Plastics Processing Technology (PPT)	TVK Industrial Estate, Guindy, Chennai 600032 Tel. No.	02.05.2016 - 01.11.2016	28	9am to 5 pm
		Plastics Processing Machine Operator (PPMO)	044-2224701-06 lines Mob: 9360098600 /9677123895	02.05.2016 -1.11.2016	19	9am to 5 pm
		Injection Moulding Machine Operator (IMMO)		26.07.2016 -7.01.2017	125	9am to 5 pm
2.	CIDC	Electrician	CIDC Training Centre, SLS Complex, 11/25 Main Road, Sethiyathoppu, Cuddalore District-608702	9.9.16-12.11.16	25	9 am to 5 pm
		MASON	CIDC Training Centre,Panchayat Union Primary School,Then Krishnapuram, Bhuvanagiri Taluk,Krishnapuram, Cuddalore DISTRICT-608602,COORDINATOR :9791658941	3.08.2016-4.10.2016	40	9 am to 2 pm
		MASON	CIDC Training Centre, Womens Welfare Association Building, Keezhaiyur Village, Kongarapattu, Gingee Taluk, Villpuram-604306 7667828295	26.8.16-27.10.16	40	9 am to 2 pm
		MASON	CIDC TRAINING CENTRE, PANCHAYAT Service centre Building, Nallampally, Jarugu Panshayat, Dharmapuri-636807 9952033200	1.8.16-3.10.16	39	7 am to 12 pm
		ELECTRICIAN	CIDC Training Centre SLS Complex, No.11/25, Cuddalore	12.9.16-12.11.16	30	9 am to 2 pm

			main road, Sethiyathoppu, Cuddalore			
		ELECTRICIAN	CIDC Training Centre Govt Elementary School, Kollampatti, Sunathampatti post, Ghandarvakottai, 9500992535	12.9.16- 14.11.16	37	8 am to 1 pm
		ELECTRICIAN	CIDC Training Centre,NO:47, South Street, Thiruthurai Poondi, Thiruvarur District, Coordinator 9042186061,	12.9.16 - 15.11.16	40	8 am to 1 pm
		ELECTRICIAN	CIDC Training Centre,NO:47, South Street, Thiruthurai Poondi,Thiruvarur District, Coordinator 9042186061,	12.9.16 - 15.11.16	40	9 am to 2 pm
		ELECTRICIAN	CIDC Training Centre,NO:54D,Peral Perimimal Complex, RK Palayam Road,Mannargudi,Tiru varur District, Coordinator 9042186061,	12.9.16 - 15.11.16	40	9 am to 2 pm
3.	G.M Shiptech	Plumbing Assistant	G.M Shiptech Training Pvt Ltd, 2/392A, Mambakkam Road, Medavakkam, Chennai-600 100	12.9.16- 26.10.16	56	8.30 am to 5.30 pm
		Electrical House Wiring		12.9.16- 26.10.16	45	8.30 am to 5.30 pm
4.	NSIC	Prototyping Manager(G.O 204) (G.O204)	NSIC Technical Service Centre, B-24, Guindy Industrial Estate, Ekkaduthangal, Chennai-600 032	8.8.16- 14.10.16	33	9.30 am to 4 pm
		CNC Turning (G.O 34)		8.8.16- 7.10.16	4	9.30 am to 4 pm
		CNC Milling(G.O 34)		8.8.16- 7.10.16	5	9.30 am to 4 pm
		CNC Production Operator(G. O 34)		11.7.16- 7.10.16	1	9.30 am to 4 pm

		Servicing UPS & Inverter(G.O 34)		8.8.16-7.11.16	3	9.30 am to 4 pm
5.	Ramakrishna Mission Vidyalaya	Plumber – General – II	Ramakrishna Mission Vidyalaya, Mettupalayam road, Periyanaickenpalayam, Sri Ramakrishna Vidyalaya Post Coimbatore-641 020	17.8.16-20.10.16	8	9 am to 4.30 pm
6.	TVS	BFSI	TVS Training and Service Ltd, Technical Training Centre, Plot No. 7/9A, 7/9B, 7/9C, MTH Road, Ambattur Industrial Estate, Ambattur, Chennai-600058	31.8.16-5.10.16	32	9 am to 5 pm
				7.9.16-11.10.16	35	9 am to 5 pm
7.	ECIL	Certificate course in Financial Accounting	Electronic corporation of India Ltd ECIT Centre, No.8 Karpagambal nagar, Mylapore, Chennai-4	10.8.16-10.11.16	120	10 am to 1 pm
				26.9.16-25.11.16	80	2 pm to 5 pm
8	FDDI	Skiving	FDDI Arakkonam Training Centre, 40/38, Thasildar street, Opp. Ramakrishna kalyanamandapam, Arakkonam.	24.9.16-23.10.16	30	9 am to 4.30 pm
9	National Film Development Corporation	AVID – Digital Non Linear Editing	National Film Development Corporation Ltd. (A Government of India Enterprise) Behind Moolapalayalam BSNL Exchange, Pilliyar Kovil Street, NGGO Nagar, Avail Poondurai Road, Moolapalayalam, Erode – 638 002 (Opp. Munnayappan Kovil) Phone: 0424 - 2280030	9.9.16-8.10.16	4	10 am -5pm
		Digital Videography		19.09.2016 -18.10.2016	50	10 am-1 pm 2 pm-5 pm
		FCP – Digital Non Linear Editing		19.09.2016 -18.10.2016	15	10 am-1 pm 2 pm-5 pm
		Multimedia		9.9.16-8.10.16	10	10 am -5pm
				9.9.16-8.10.16	6	10 am-1 pm

				19.09.2016 -18.10.2016	25	2 pm - 5 pm
		Digital Still Photography		9.9.16- 8.10.16	6	10 am -5pm
				19.09.2016 -18.10.2016	25	10 am - 1 pm
10	AIEMA	Milling	Ambatture Industrial Estate Manufacture Association. ATC road, Ambatture Industrial Estate, Chennai-58 M-9884077542	29.8.16- 4.10.16	27	2 am-5 pm
11	Directorate of Distance Education, TANUVAS	Poultry Vaccinator	Department of Poultry Science, VCRI, Namakkal	1.9.16- 7.10.16	30	10 am to 5 pm
12	Institute of Road Transport	LMV	IRT LMV Driver Training Centre, 100 Feet Road,Taramani, Chennai - 600 113. M-9025027979	6.9.16- 14.10.16	20	10 am to 4 pm
Institute of Road and Transport Technology, Vasavi College post, Chitode, Erode- 638316			6.9.16- 14.10.16	22	10 am to 4 pm	
IRT Driver Training Centre, TNSTC, Periyamilaguparai Trichy-620 001			6.9.16- 14.10.16	22	10 am to 4 pm	
13	TamilNadu sericulture Training Institute	Silkworm rearing training	TamilNadu sericulture Training Institute, Hosur M-7598790135	12.9.16- 28.10.16 (4 Days training)	480	9 am to 5 pm
14	COINDIA	CNC Miller	340-342, Avaramapalayam Road, K.R.Puram, Coimbatore-641006 Contact No: 0422-4273775, 9791900725	29.8.16 - 25.11.16	30	9 am to 5 pm
				15.9.16- 10.12.16	20	9 am to 5 pm
15	ICT Academy	BFSI	PRIST university, Pallam Thanjavur Main Campus, Thanjavur-613 403	19.9.16- 20.10.16	50	Mon- Sat (8.30 am - 4.00 pm

16	Institute of Road Transport	HMV	The Institute of Road Transport, Driver Training Wing, Gummidipundi – 601 201. 9444113231	01.08.16 - 21.10.16	104	6 am to 1 pm	
			Heavy Vehicle Driver Training Centre, Tamil Nadu State Transport Corporation (Villupuram)Ltd, Vellore Region, Rangapuram, Vellore – 632 009. 9486939166			01.08. 16 - 21.10. 16	41
17	Women Development Corporation	Tailoring	Sri Arunachala Educational Trust, Housing Board Complex, Arani, Thiruvannamalai	23.07.16 - 13.10.16	30	10 am to 5 pm	
18	NIELIT CHENNAI	Certificate Course In Professional Networking	NIELIT CHENNAI, NO, 25 , ISTE COMPLEX, GANDHI MANDAPAM ROAD , CHENNAI-600025 (OPPOSITE TO ANNA CENTENARY LIBRARY)	9/8/2016 to 14/10/2016	35	09 Am - 2 Pm	
		Certificate Course In Professional Networking				31	2 Pm to 6.30 Pm
		Certificate Course in Web Design using dreamweaver				16	09 Am -02 Pm
		Certificate Course in Electronics packaging				10	9.30 Am- 5.30
		Certificate Course in Embedded System Software and Design				18	8.30 Am - 1.30 Pm
		Certificate Course in Embedded System Software and Design-			19	1.30 Pm to 6.30 Pm	
19	Govt ITI(W), Cuddalore	Cutting and Tailoring (Sewing Technology)	Govt ITI(W), Semmendamam, Cuddalore-1	01.09.2016 - 12.01.2017	30	5.00 pm to 8.00 pm	

	GOVT. I.T.I(W) PULLAMBADI	Tailor (Basic Sewing Operator)	THAPPAI ROAD PULLAMBADI(PO) LALGUDI(TK) TRICHY(DT) PIN : 621 711.	01.09.2016 - 29.11.2016	60	4.00 pm to 7.00 pm
	Govt. ITI, Ulundurpet	Accounting Asistant Used Tally	Govt. ITI, Trichy Trunk Road, Ulundurpet, Villupuram. Dt.	16.08.2016 - 13.01.2017	30	Monday - Friday : 4.00P m to 7.00P m Saturday: 9.00A m to 4.00P m
	GOVT. I.T.I NAGAPATTINAM	Arc and Gas Welder	GOVT. I.T.I NAGAPATTINAM	16.08.2016 - 13.01.2017	20	4.00 pm to 7.00 pm
	Government Industrial Training Institute - Thanjavur	Helper Electrician Level-I	No. 1 , Vallam Road, Thanjavur - 613 007	06.09.2016 - 10.06.2017	30	4.00 pm to 7.00 pm
20	Govt. ITI Tiruchendur	CO2 Welder	Govt. ITI, Veerapandian Pattinam, Tiruchendur-04639-242253	3.08.16	27	4.15p m- 7.15 pm
	Govt. ITI Pettai Tirunelveli	Welder Repair & Maintenance	Konam Nagercoil	6.9.16- 5.6.17	12	4 pm- 7.30 pm
	IMC of ITI Nagercoil	Basic Arc and Gas Welder	Govt ITI, Virudhunagar-04562-252382	31.8.16- 31.1.17	20	4pm-7 pm
	Govt ITI, Virudhunagar	Basic Fitting	Govt ITI, Virudhunagar Ph-04562-252382	26.9.16	15	5.30 pm- 8.30 pm
21	Mehta Institute of Career Training Pvt Ltd	Basic Automotive Service and repair Adv L 3	No.399/2C, Vipasana road, Palathadalam village, Thirumudivakkam Chennai-600 044	20.7.16- 30.11.16	75	9.30 am - 5.30 pm
		Basic car servicing		20.7.16- 30.11.16	75	9.30 am - 5.30 pm
		Repair and Overhauling of chasis system (LMV and HMV)		20.7.16- 10.10.16	75	9.30 am - 5.30 pm

		Repair of Auto electrical, electronic and AC system		20.7.16-10.10.16	100	9.30 am - 5.30 pm
22	ATDC	PM	Handloom Weavers co-op Society Bulilding, (Dye House 1 st floor) Kamarajar colony, Ammapet, Salem -636003 M-9894023045	7.9.16-9.12.16	33	10 am -2 pm
		SMO	Pennagram main road, Kumarasamypet, Dharmapuri-636 701 M-9940830290	7.9.16-8.12.16	20	10 am to 2 pm
		SMO	R.K Industries Unit IV, 39 Children Home street, Urappakkam-603210	7.9.16-22.10.16	25	9 am-6 pm
		SMO	The Weavers Co-op Society Building, Jeeve Nagar, Emaneshwaram, Paramakudi-226224	9.9.16-	29	9 am-6 pm
		EMO	Sir C,V Raman Street, Rajaji puram, Thiruvallur-602001 M-9840225472	10.9.16-28.11.16	50	10 am -2.30 pm

APPENDIX B:
LIST OF TRAINERS WHO JOINED TOT

Appendix B: List OF Trainers who Joined TOT

● Trainers who joined ToT (end of March 2016 ~)

No.	Training institute	Subject in charge	Name	ToT fields	Remarks: age, teaching experience (TE), working experience in industry (WE)	Attending history		
						3rd trip	4th trip	5th trip
1	ITI Mint	Welding	S.G.Rarthn	Arc welding + Spot welding	55, 32 years (TE), 3 years (WE) * as of Sep. 2016	✓		
2	ITI Mint	Welding	S.Hindunathan	Arc welding + Spot welding	53, 16 years (TE), 0 (WE) * as of Sep. 2016	✓	✓	✓
3	ITI Mint	Welding	A.Duraikaannt	Arc welding + Spot welding	56, 6 (TE), 11 (WE) * as of Sep. 2016	✓	✓	✓
4	ITI Mint	Welding	A.E.Nallathambi	Arc welding + Spot welding	48, 6(TE), 6 (WE) * as of Sep. 2016	✓	✓	✓
5	ITI Mint	Welding	J.Asumtha	Arc welding + Spot welding	Age/TE/WE: not confirmed *female			✓
6	ITI Mint	Turning	T. Sumathi	Metal work	35, 5 (TE), 2 (WE) * as of Aug. 2016 *female	✓	✓	✓
7	ITI Mint	Turning	D. Basil	Metal work	47, 2 (TE), 25 (WE) * as of Aug. 2016	✓	✓	✓
8	ITI Mint	Fitter	N. Ravichandran	Only 5S and safety	50, 15 (TE), 3 (WE) * as of May 2016	✓		
9	ITI Mint	Fitter	S. Baladhandayuthapani	Only 5S and safety	46, 6 (TE), 7 (WE) * as of May 2016	✓		
10	ITI Mint	Machinist	R. Kumaresan	Only 5S and safety	49, 21 (TE), 2 (WE) * as of May 2016	✓		
11	ITI Mint	Turning	P. Mary Merija	Metal work	40, 2 (TE), 8 (WE) * as of Aug. 2016 *female	✓	✓	
12	ITI Mint	Machinist	C. Rama Rrishnan	Only 5S and safety	52, 16 (TE), 12 (WE) * as of May 2016	✓		
13	ITI Mint	Turning	D. Johendiran	Metal work	50, 16 (TE), 10 (WE) * as of Aug. 2016	✓	✓	
14	ITI Mint	Electrician	K. Mohandass	Only 5S and safety	49, 15 (TE), 6 (WE) * as of May 2016	✓		
15	ITI Mint	Fitter	M. Panjan	Only 5S and safety	52, 25 (TE), 5 (WE) * as of May 2016	✓		
16	ITI Mint	Fitter	S. Arokia Samy	Only 5S and safety	57, 33 (TE)m 1 (WE) * as of May 2016	✓		
17	ITI Mint	Training officer/ Job placement	K. Guna Sekaran	Metal work	53(?), 21 (? ,TE), 12 (? , WE) * as of Aug. 2016	✓	✓	
18	ITI Mint	Turning	S. Chezhan	Metal work	50, 25 (TE), 3 (WE) * as of Aug. 2016	✓	✓	
19	ITI Mint	Turning	D. Vijayan	Metal work	51, 21 (TE), 1 (WE) * as of Aug. 2016	✓	✓	
20	ITI Mint	Turning	M. Srinivasan	Only 5S and safety	52, 25 (TE), 5 (WE) * as of May. 2016	✓		
21	ITI Mint	Fitter	K. Sampath	Only 5S and safety	51, 21 (TE), 5 (WE) * as of May 2016	✓		
22	ITI Mint	Fitter	V. Srinivasan	Metal work	45, 15 (TE), 10 (WE) * as of Aug. 2016	✓	✓	
23	ITI Mint	Turning	D. Selvi	Metal work	36, 1 (TE), 10 (WE) * as of Aug. 2016 *female	✓	✓	
24	ITI Mint	Fitter	K. Muthu pand	Only 5S and safety	49, 15 (TE), 12 (WE) * as of May 2016	✓		
25	ITI Mint	Turning	P. Logu	Metal work	48 * as of Aug. 2016		✓	
26	AIEMA	CNC Milling & Turning	Shanmugam	Metal work	Late 30s * chief of AIEMA machining courses	✓		
27	AIEMA	CNC Milling	R. K.Sugan	Metal work	24, 1 (TE), 3 (WE) * as of Aug. 2016	✓	✓	
28	AIEMA	CNC Turning	C. Tamilselvan	Metal work	24 * as of Aug. 2016	✓	✓	
29	PCFCT Walajah Centre	Automotive	R. Paventhan	Metal wok + Arc welding + Spot welding	25 * as of Aug. 2016 *attended welding ToT fom 4th trip. (only observed gas welding in 3rd trip.) Attended 5S in 5th trip.	✓	✓	✓

No.	Training institute	Subject in charge	Name	ToT fields	Remarks: age, teaching experience (TE), working experience in industry (WE)	Attending history		
						3rd trip	4th trip	5th trip
30	PCFCT Walajah Centre	Machining/ Centre Head	A. Arulthambi	Metal wok + Arc welding	42, 18 (WE) * as of Aug. 2016, only observed gas welding in 3rd trip.	✓	✓	
31	PCFCT Walajah Centre	Logistics	Sanjeev Prakash	Arc welding	*only observed gas welding in 3rd trip.	✓		
32	PCFCT Walajah Centre	Logistics	Kishor Kumar.K	Only 5S and safety	26, 4 (TE) * as of Dec. 2016			✓
33	PCFCT Head Office	Machining	G. Niidimani	Metal wok + Arc welding + Spot welding	67, * as of Aug. 2016, attended only welding ToT in 4th and 5th tips	✓	✓	✓
34	PCFCT Head Office	Welding	Rajagopal	Arc welding + Spot welding	25, * as of Aug. 2016 *attended welding ToT fom 4th trip. (only observed gas welding in 3rd trip.)	✓	✓	✓
35	PCFCT Head Office	Automotive	G. Selvakumar	Metal wok + Arc welding + Spot welding	28, * as of Aug. 2016, *attended only welding and 5S&safety ToT fom 4th trip. (only attended welding ToT in 3rd trip.)	✓	✓	✓
36	PCFCT Head Office	Automotive	R. Nagasubramanian	Metal work	69 * as of Aug. 2016	✓	✓	✓
37	PCFCT Head Office	Automotive	R.Suresh Babu	Metal work	70 * as of Aug. 2016, team leader of PCFCT Chennai centre	✓	✓	✓
Number of total attendants in each tip						34	22	13

Note 1: "Spot welding" ToT was conducted only in the 5th trip.

Note 2: Trainers only trained gas welding are also counted into trainers who took "Arc welding" ToT.

Note 3: Trainers who took both training fields of "Metal work" and "5S & soft skills" are classified into "Metal work"

APPENDIX C:
MONITORING RESULT OF TOT

Appendix C: Monitoring Result of ToT

C-1. Welding

C-1-1. Arc Welding

Monitoring Sheet for Welding (Session1 of special training course concerning gas & arc) at ITI Mint

Date of monitoring : 09/09/2016

Monitored by : Hideaki Izumi

1) Name of trainer: Mr. S. Hindunathan

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Safety operation of gas & arc	Session 1	Introduction (mind of operation)	2	Good Points: - Instruction of safety goods was done. Improvement Points: - Significance of safety training must be instructed. - Caution (risk) of practical operation must be instructed.
		Basic knowledge & practical handling of apparatus	2	Good points: - Trainees repeated instruction aloud. - Instruction was conducted by using original goods (safety goods etc.) Improvement Points: - Lack of instruction about fundamental knowledge & principal mechanism of the welding.
		Demonstration of Cutting	3	Improvement Points: - Safety goods must be put on properly (please make a guidance for students) . - Handling & maintenance of apparatus must be instructed. - Students without safety goods must be apart from the working table to keep the suitable distance.
		Case study of injury	3	Improvement Points: - Hazard factors & accidents must be instructed with introducing trouble cases.
		Final Test	3	Improvement Points: - In practical skill training to manipulate torch, oral explanation must be necessary. - It's desirable for instructor to teach closely without panic.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

2) Name of trainer: Mr. A.E.Nallathambi

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Safety operation of gas & arc	Session 1	Introduction (mind of operation)	2	Good Points: - Instruction of risks of practical operation - Conducted Instruction with using original goods (safety goods, etc.) Improvement Points: - It's necessary to instruct safety hazards & necessity of safety goods.
		Basic knowledge & practical handling of apparatus	1	Good Points: - Instruction of fundamental knowledge & welding processes - Instruction by using original goods (weld joint)
		Demonstration of Cutting	2	Good Points: - Instruction of equipment (gas cylinder, torch, etc.) & how to handle them by using original goods Improvement Points: - It's desirable to instruct the maintenance of apparatus
		Case study of injury	2	Good Points: - Instruction of accident cases (backfire, explosion, etc.) Improvement Points: - It's necessary to instruct the intention to prevent hazards (removal of combustibles)
		Final Test	1	Good Points: - All of students put on the safety goods properly - In practical skill training of the manipulate of torch, oral explanation was also done - The ability of instruction was excellent

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

3) Name of trainer: Mr. A.Duraikaannt

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Safety operation of gas & arc	Session 1	Introduction (mind of operation)	2	Good Points: - Instruction of safety training was done. Improvement Points: - Significance of safety training must be instructed. - Caution (risk) of practical operation must be instructed.
		Basic knowledge & practical handling of apparatus	1	Good Points: - Instruction concerning fundamental knowledge of welding. - Trainees repeated instruction aloud.
		Demonstration of Cutting	2	Good Points: - Instruction of equipment (gas cylinder, torch, etc.) & how to handle them Improvement Points: - Safety goods must be put on properly (make a lead for students) by using original goods
		Case study of injury	2	Good Points: - Instruction concerning handling risk of gas cylinder & back fire of torch Improvement Points: - It's desirable to instruct concerning the accident cases
		Final Test	2	Good Points: - In practical skill training of manipulating torch, oral explanation was also done. Improvement Points: - It's desirable to instruct safety goods by using original goods; weld joints and so on.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Monitoring Sheet for Welding (special training course of MAG welding) at ITI MINT

Date of monitoring : 17/11/2016

Monitored by : Hideaki Izumi

1) Name of trainer: Mr. S. Hindunathan

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Skill training of MAG welding	Session 2	Basic knowledge of MAG welding	3	Good points: - Explanation of the mechanism of the MAG welding machine to the students (trainees). Improvement Points: - Guidance concerning wearing of safety guards was not sufficient - Concern for safety by students (trainee), including carrying (transporting) the test pieces is not sufficient.
		Bead on plate	4	Improvement Points: - The demonstrator, trainer himself, did not keep the dress code - Guidance was one way and the trainer did not make sure if the student (trainee) has understood or not. - The training procedure for evaluating the welding result (bead formation) of the students (trainees) was omitted.
		Horizontal fillet welding	4	Improvement Points: - He taught the wrong manner concerning the inclination of the welding torch. - The students were made to perform the welding without being explained about the aiming position and how to manipulate the electrode tip. - Training procedure for evaluating the welding result (bead formation) of the students (trainees) was omitted.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Note: In general, Mr. Hindunathan should take more time in training (guidance) so that the students can understand.

SAFETY FIRST must be always kept in mind so that the trainer will be a role model for the students (trainees).

The start and the end (crater)of the welding lesson need to be explained in detail.

2) Name of trainer: Mr. A.E.Nallathambi

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Skill training of MAG welding	Session 2	Basic knowledge of MAG welding	1	Good points: <ul style="list-style-type: none"> - He taught the students (trainees) the basics of safety and MAG welding well. - Guidance on wearing protective equipment was also perfect. - Also correctly taught the preparation and maintenance after the completion of the training.
		Bead on plate	2	Good points: <ul style="list-style-type: none"> - After his demonstration, he taught well the basics of MAG welding such as the inclination of welding torch and how to manipulate the electrode. - The students (trainees) grasped the conditions of each welding arc and he gave accurate instruction (guidance). Improvement Points: <ul style="list-style-type: none"> - After instructions were completed, had forgot the instructions for evaluating the welding result (bead).
		Horizontal fillet welding	2	Good points: <ul style="list-style-type: none"> - Before starting the welding, instructions on the proper cleaning of the necessary welds. - The students (trainee) grasped the conditions of each welding arc and he gave accurate instruction (guidance). Improvement Points: <ul style="list-style-type: none"> - After instructions were completed, had forgotten the instructions for evaluating the welding result (bead).

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Note: I was impressed with the politeness and good instructions that made students understand easily. The main points in manipulating welding electrode in MAG welding practice were instructed accurately to the students (trainees).

It would have been better if guidance about bead could be given to the students (trainees).

I want him to make good use of what was gained in this ToT in future.

3) Name of trainer: Mr. A.Duraikaannt

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Skill training of MAG welding	Session 2	Basic knowledge of MAG welding	3	Good points: <ul style="list-style-type: none"> - MAG welding method was explained to the students (trainees). - The students (trainees) repeat points aloud. Improvement Points: <ul style="list-style-type: none"> - There was lack of guidance such as wearing of safety protection equipment and MAG welding as a whole. - He did pay attention to students (trainees) who were not wearing masks.
		Bead on plate	3	Good points: <ul style="list-style-type: none"> - Teaching method of emphasizing on MAG welding to students (trainees) Improvement Points: <ul style="list-style-type: none"> - Lack of guidance on basic techniques, such as maintaining proper welding torch angle. - Basic guidance about procedure to evaluate the welding result (bead formation) was omitted.
		Horizontal fillet welding	4	Improvement Points: <ul style="list-style-type: none"> - Demonstration was omitted. - Kept continuing the instructions on his own, without paying attention to the students (trainees). - Guidance on basic techniques was lacking, such as maintaining proper welding torch angle and manipulation of welding electrode. - Guidance to evaluate welding result (bead formation) of the students (trainees) was omitted.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Note: In the whole, instruction was too fast. Should take more time for instruction so that students can understand well.

Since SAFETY is important, it should be explained in detail.

Teaching and guidance must be given by paying attention to the students (trainees) so that they will focus on the lesson. To watch other students' training is also a good training for students.

Must explain the start and end of the lesson in detail.

4) Name of trainer: J.Asumtha

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Skill training of MAG welding	Session 2	Basic knowledge of MAG welding	3	Good points: - Before starting class, necessity of cleaning the work space and others was explained. Points to be improved: - Lacking in terms of wearing protective gear. Ms. Asumtha was wearing sandals (no shoes). - Did not notice that the students (trainees) were not wearing masks. - Explanation of the basic knowledge of MAG welding was insufficient.
		Bead on plate	4	Points to be improved: - Was teaching with wrong welding torch angle. - She did not give guidance for the student (trainee) on manipulating the welding electrode. - Teaching how to evaluate the welding result (bead formation) of the student (trainee) was omitted.
		Horizontal fillet welding	2	Good point: - Basic guidance of welding torch angle was given. - All students were made to watch other trainees' arc. - Immediately after welding, bead was respectively evaluated for each student. Points to be improved: - There was no instructions given to procedures after completing the welding class.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Note: There is a handicap because she is a newly-enrolled instructor (from the 2nd ToT).

Practical guidance as well as teaching about Safety is mandatory in Welder Training.

Explanation about welding bead (case of fillet welding) is a good point.

Monitoring Sheet for Welding (special training course of MAG welding) at PCFCT

Date of monitoring : 10/11/2016

Monitored by : Hideaki Izumi

1) Name of trainers:

(Theory) Main trainers - Mr. G.Selvakumar & Mr. G.Niidimani

(Welding Practice) Main trainer - Mr. G.Selvakumar, Assistant trainers – Mr. Rajagopal & Mr. R. Paventhan

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Safety operation of gas & arc	Session 1	Introduction (mind of operation)	1	Good points: - Explanation of objectives - Explanation of safety with PPT presentation - Instructions during the TOT were effective - Interaction with students for better understanding - Explanation of equipment using actual equipment parts in classroom
		Basic knowledge & practical handling of apparatus	1	
		Case study of injury	3	Improvement Points: - The use of individual protection gear (e.g. goggles, gloves) to avoid accidents (i.e. eye injury, burn injury) needs to be explained - Gas handling; More time should be spent for explaining the dangers (accidents, etc.) of gas in detail.
		Demonstration & practical instruction of cutting & welding	1	Good points: - Effectively explained how to wear protective gear - Standard flame: Explanation, demonstration and practice of torch firing method for each student.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

2) Name of trainers:

(Theory) Main trainer - Mr. G.Selvakumar

(Welding Practice) Main trainers - Mr. Rajagopal & Mr. Paventhan, Assistant trainers – Mr. G.Selvakumar & Mr. G.Niidimani

(Evaluation) Main trainer - Mr. G.Selvakumar, Assistant trainers – Mr. Rajagopal & Mr. R. Paventhan

Course Purpose	Course Module		Evaluation of Trainers (*)	Remarks
Skill training of MAG welding	Session 2	Basic knowledge of MAG welding (Safety)	2	Good points: - Structure of welding machine and names of various parts were explained for easy understanding to use the actual machine. - Important safety points were explained. Improvement Points: - During students were operating the grinder with gloves, trainer must care about their Safety.
		Bead on plate	1	Good points: - Adjusting suitable current & voltage was well explained during TOT. - Before instruction to trainees, the instructor demonstrated firstly.
		Fillet welding	2	Good points: - For students who welds for the first time, they were supported by instructor's hand. Improvement Points: - When one student is welding, other students around him are standing too closely. There should be more distant to keep their safety.
		Soundness test Inspection	1	Good points: - Promptly conducting of soundness test and evaluation of the welding skill. There was shortage of time, but it is better to do bead evaluation firstly and then carry out the soundness test.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

C-1-2. Spot Welding

Monitoring Sheet for Welding (Resistance welding basic course) at ITI Mint

Date of monitoring : 18/11/2016

Monitored by : Kazuyoshi Hasegawa

1) Name of trainer: Mr. S. Hindunathan

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	3	Improvement Points: - Need to tell more about the safety points to be observed in detail. - Insufficient knowledge on parameter setting. - Need to understand the operation control panel more clearly and teach students.
	Making test pieces; peel test and tensile shear test (practice)	2 (partly) or 3 (partly)	Sufficient knowledge on making of test pieces, thickness and dimension measurement.
	Evaluation testing	2	Improvement Points: - Shall take further training to do the current and pressure measurement by own self.
	Data analysis and evaluation	2	It would be good to training on excel sheets and data entry, graph creation etc.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

2) Name of trainer: Mr. A.E.Nallathambi

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	2	Improvement Points: - Has grasped the teaching points well. Better to learn units such as Mpa etc. - It would be good to acquire knowledge on electrical parameters and Joule's law etc.
	Making test pieces; peel test and tensile shear test (practice)	1	Grasped the teaching points well and explained to the students correctly.
	Evaluation testing	1	Improvement Points: - Shall take further training to do the current and pressure measurement by own self.
	Data analysis and evaluation	1	It would be good to training on excel sheets and data entry, graph creation etc.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

3) Name of trainer: A.Duraikaannt

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	2	Improvement Points: - Can take extra training on operation panel operation and learn to set Parameters by his own self.
	Making test pieces; peel test and tensile shear test (practice)	1	It would be good to take more training on peeling test and able to teach students with confidence.
	Evaluation testing	2	Improvement Points: - Shall take further training to do the current and pressure measurement by own self.
	Data analysis and evaluation	2	It would be good to training on excel sheets and data entry, graph creation etc.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

Monitoring Sheet for Welding (Resistance welding basic course) at PCFCT

Date of monitoring : 16/11/2016

Monitored by : Kazuyoshi Hasegawa

1) Name of trainer: Mr. G. Selvakumar

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	1	Improvement Points: - To enable good class room training, can study more about alternating current concepts, such as cycles, welding current calculations, impedance, etc.
	Making test pieces; peel test and tensile shear test (practice)	1	Improvement Points: - Nothing specific
	Evaluation testing	1	Improvement Points: - Nothing specific
	Data analysis and evaluation	1	Improvement Points: - Nothing specific. Out of self-interest can learn more about detailed data analysis applicable to resistance welding.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

2) Name of trainer: Mr. G. Niidimani

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	2	Improvement Points: - Can learn more about calculation of welding current, joules law. - Setting of machine parameters, a/c cycle time calculation, current calculations tec.
	Making test pieces; peel test and tensile shear test (practice)	2	Improvement Points: - Need to take training on peel test method. - Can learn more about the geometry of electrodes, its effect on welding conditions. - Optimum welding condition setting, performance monitoring, etc.
	Evaluation testing	2	Can take one more training on welding strength validation etc. Relationship between air pressure and welding output etc.
	Data analysis and evaluation	3	Improvement Points: - Plotting on excel sheets, graph creation. Welding condition monitoring over period.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

3) Name of trainer: Mr. Rajagopal

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	2	Improvement Points: - Has scope to learn more about the electrical aspects of resistance welding. - Setting of machine parameters, a/c cycle time calculation, current calculations etc.
	Making test pieces; peel test and tensile shear test (practice)	2	Improvement Points: - Can learn more about the geometry of electrodes, its effect on welding conditions. - Optimum welding condition setting, performance monitoring. - Relationship between air pressure and welding output etc.
	Evaluation testing	2	Improvement Points: - Learn more about validation and evaluation testing through online videos.
	Data analysis and evaluation	2	Improvement Points: - Plotting on excel sheets, graph creation. - Welding condition monitoring over period.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

4) Name of trainer: Mr. R. Paventhan

Course Purpose	Course Module	Evaluation of Trainers (*)	Remarks
Resistance welding basic course	Fundamentals of resistance welding	3	Improvement Points: - Shall learn the basics of resistance welding, resistance, current calculations. - Setting of machine parameters, a/c cycle time calculation, current calculations etc.
	Making test pieces; peel test and tensile shear test (practice)	2	Improvement Points: - Can learn more about the geometry of electrodes, its effect on welding conditions. - Optimum welding condition setting, performance monitoring. - Relationship between air pressure and welding output etc.
	Evaluation testing	3	Improvement Points: - Shall learn more about the basics of resistance welding validation and evaluation through online videos and from seniors at PCFCT.
	Data analysis and evaluation	3	Improvement Points: - Plotting on excel sheets, graph creation. - How to monitor welding conditions on continual basis.

(*) Evaluation of Trainers: 1: very good / 2: sufficient / 3: insufficient / 4: counter measure must be necessary

C-2. Metal Work

Monitoring Sheet for Machine Work at AIEMA

Date of monitoring : 07/09/2016

Monitored by : Masato Dohro

Name of trainer : Mr. R. K. Sugan

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
1. Keeping "Indirect Work of Machining"	Trainees' operation of "CNC lathe machine periodical checking sheet"	1	Trainee was able to perform inspection of machine referring to the pre-operation check the Periodical Check Sheet, without instructions from the trainer. (The trainee has to sign in the check-sheet)
	Trainees' operation of "CNC lathe machine work procedure sheet"	1	Trainee understands the content. Has learnt it in theory and practical classes in the beginning of the course.
	Trainees' operation of "CNC lathe machine operation sheet"	1	Trainee understands the content. Has learnt it in theory and practical classes in the beginning of the course.
	Review and guidance of soft skill syllabus (communication) Greeting	1	Trainee greeted and thanked the evaluating member. Exhibited polite behavior throughout the monitoring session.
2. Technical Work of Machining	How to consider efficient cutting procedure with CNC lathe	2	Trainee is able to enter the program. Understands basic programming. Not able recall the detailed name of tools.
	Improving work efficiency while using CNC lathe	2	Effectively used hammer instead of pipe for chuck change. Install the effective work table.
	Setting permission criteria to use CNC lathe	3 (Note:1)	The trainee was able to perform programming. Able to perform X-Y zero setting. Unable to resolve reference alarm. Unable to independently change the tool and set it. Not familiar with the machine operation.
	Appropriate measuring method while using calipers and micrometer	4 (Note:1)	One of the Trainee's did not know how to read the micrometer properly. Did not understand the proper use of Vernier and micrometer. Did not use the proper Vernier and Scale.

(*) Evaluation of Trainers: 1: Very good / 2: Sufficient / 3: Insufficient / 4: Counter measure is necessary

Note: 1) Not the fault of the trainer. The duration of the course module is short. Therefore, the trainee is not familiar with the machine.

Monitoring Sheet for Machine Work at ITI MINT

Date of monitoring : 24/11/2016

Monitored by : Masato Dohro

1) Name of trainer: Ms. T. Sumathi

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
1. Keeping "Indirect Work of Machining"	Trainees' operation of lathe machine periodical checking sheet"	1	Daily inspection of equipment is being conducted using the inspection checklist. Not missed out.
	Specification of evaluation criteria	-	Evaluation is carried out appropriately.
2. Technical Work of Machining	How to consider efficient cutting procedure using lathe	3	Name and function of each part of the lathe and the work procedure is understood. Able to properly sharpen the Cutting tool. Able to properly perform drill (Thinning) operation. <Reason for inadequate evaluation> Student was not familiar with the machine because as it is not the machine model he regularly uses. Therefore, the operation did not proceed smoothly and it was taking time.
	Improving work efficiency while using lathe	3	<Reason for inadequate evaluation> No effort is made to increase the efficiency of processing and reducing the working time. Tools, measuring instruments, cutting tool, etc. are not placed at the appropriate position on the work table.
	Appropriate measuring method while using calipers and micrometer	3	<Reason for inadequate evaluation> Appropriate dimension check is not done after completion of turning. Vernier /micrometer is not is handled carefully. Capable of correctly measuring the dimensions using the Vernier / micrometer.
	5S of lathe machine	3	<Reason for inadequate evaluation> Measuring instruments and tools on the work table are not arranged / organized. Guidance is not given for the removal of chips using the appropriate tool.
	Safety education of lathe machine	3	<Reason for inadequate evaluation> Protective glasses not worn. Work shoes are not used. Chips are touched by hand. Tried to touch rotating object. Appropriate work clothing for the operation are not worn.

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
	Improving lathe machine and machine area	2	<p>Appropriate lighting brightness without hindering the operation</p> <p>During the training, the equipment is operating normally and operation is being properly carried out.</p> <p>Equipment accuracy is normal during training.</p> <p>Process drawing is visible at the appropriate location during processing</p> <p>Kaizen is being implemented for using the appropriate tool type in the operation.</p> <p>Kaizen is implemented for the equipment for appropriate operation.</p>

(*) Evaluation of Trainers: 1: Very good / 2: Sufficient / 3: Insufficient / 4: Counter measure is necessary

2) Name of trainer: Mr. D.Basil

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
1. Keeping "Indirect Work of Machining"	Trainees' operation of lathe machine periodical checking sheet"	1	Daily inspection of equipment is being conducted using the inspection checklist. Not missed out.
	Specification of evaluation criteria	-	Evaluation is carried out appropriately.
2. Technical Work of Machining	How to consider efficient cutting procedure using lathe	2	Type, shape, part name, cutting edge angle, material and application of the cutting tool is understood. The relationship between the cutting tool and cutting condition (rotation speed, cutting speed, number of cutting, selection of appropriate cutting tool) and the material of the work piece is understood. Cutting process is appropriately done. Name and function of each part of the lathe and the work procedure is understood. Able to properly sharpen the Cutting tool. Able to properly perform drill (Thinning) operation. Appropriate tool type is used in the operation.
	Improving work efficiency while using lathe	2	Effort is made to improve the efficiency of processing and shorten the working time. Tools/ measuring instruments / Cutting tool, etc. are placed at the appropriate positions on the workbench. Required tools / measuring instruments / Cutting tool etc. are prepared before starting the process. Only the tools / Instruments /Cutting tools, which are necessary for the work are used.
	Appropriate measuring method while using calipers and micrometer	2	Able to properly measure the dimensions using Vernier / micrometer. The jaw is applied so that the Vernier is perpendicular to the axial direction of the cylinder. There is no unevenness in the movement of the slider. 0 point is matching When the outer jaw of the caliper is closed, no light passes through the outer jaw (no leakage of light). Vernier/ micrometer is carefully handled. Vernier/ micrometer is regularly maintained.

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
	5S of lathe machine	2	Measuring instruments/tools are regularly being cleaned. Instructions for handling Vernier / micrometer carefully. (Discipline) Measuring instruments / tools on the workbench are organized. After cutting, the chips are cleared, and the floor near the facility / equipment is cleaned. Students respond appropriately to the instruction and explanation of instructors. (Discipline) Gives instructions to clear the chips using the appropriate tool (Discipline)
	Safety education of lathe machine	3	< Reason for inadequate evaluation > Not wearing protective glasses. Not wearing appropriate work shoes for the operation. Not wearing appropriate work clothes for the operation
	Improving lathe machine and machine area	2	Appropriate lighting brightness without hindering the operation During the training, the equipment is operating normally and operation is being properly carried out. Equipment accuracy is normal during training. Process drawing is visible at the appropriate location during processing Kaizen is being implemented for using the appropriate tool type in the operation. Kaizen is implemented for the equipment for appropriate operation.

(*) Evaluation of Trainers: 1: Very good / 2: Sufficient / 3: Insufficient / 4: Counter measure is necessary

Monitoring Sheet for Machine Work at PCFCT

Date of monitoring : 02/12/2016

Monitored by : Masato Dohro

1) Name of trainer: Mr. A. Arul Thambi

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
1. Keeping "Indirect Work of Machining"	Trainee's operation of lathe machine "periodical checking sheet"	1	Inspection table is used and daily inspections of machine is being properly conducted. There are no missing entries.
	Trainees' operation of "Lathe safety operation sheet"		
	Trainees' operation of "Lathe maintenance record"		
	Trainee's operation of "Work procedure sheet"		
	Specification of evaluation criteria		
2. Technical Work of Machining	How to consider efficient cutting procedure using lathe machine	3	<Reason for inadequate evaluation> The relation between the cutting tool and cutting conditions (rotation speed / cutting speed / number of times of cutting / selection of appropriate cutting tool) and the material of the work piece is not fully understood. Setting up for cutting operation is not done properly. Grinding of the cutting tool cannot be properly done. Thinning (drill) work cannot be carried out properly. Not within the appropriate range of dimensional accuracy.
	Improving work efficiency while using lathe	2	Effort is being made to increase the work efficiency and to reduce the working time. Tools, measuring instruments, cutting tools, etc. are placed at the appropriate positions on the work table. Tools, measuring instruments, cutting tool, etc. are set before starting the operation. Tools / measuring instruments / cutting tool, which are not required for work are not used

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
	Appropriate measuring method while using calipers and micrometer	4	<Reason for inadequate evaluation> Movement of the slider is uneven. 0 point is not matching. When the outer jaws of the Vernier are in the closed state, light passes through (leakage of light). The quality of the micrometer is poor.
	5S education of lathe machine	1	Measuring instruments / tools of the work table are organized/arranged. After cutting, handling of chips, cleaning of the floor around the facility and equipment are being carried out. The student responds appropriately to the instructions and explanations of the instructor. (Discipline)
	Safety education of lathe machine	1	Protective glasses are worn. Work shoes are used during the operation. Chips are not touched by hand. Rotating objects are not touched. Appropriate work clothing during operation.
	Improving lathe machine and machine area	1	There is appropriate light brightness not interfering with the work. The process drawing is visible at the proper position during machining. Appropriate improvements in the work environment are being implemented. Work table is provided.

(*) Evaluation of Trainers: 1: Very good / 2: Sufficient / 3: Insufficient / 4: Counter measure is necessary

2) Name of trainer: Mr. R. Paventhan

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
1. Keeping "Indirect Work of Machining"	Trainee's operation of lathe machine "periodical checking sheet"	1	Inspection table is used and daily inspections of machine is being properly conducted. There are no missing entries.
	Trainees' operation of "Lathe safety operation sheet"		
	Trainees' operation of "Lathe maintenance record"		
	Trainee's operation of "Work procedure sheet"		
	Specification of evaluation criteria		
2. Technical Work of Machining	How to consider efficient cutting procedure using lathe machine	3	<Reason for inadequate evaluation> The relation between the cutting tool and cutting conditions (rotation speed / cutting speed / number of times of cutting / selection of appropriate cutting tool) and the material of the work piece is not fully understood. Setting up for cutting operation is not done properly. Grinding of the cutting tool cannot be properly done. Thinning (drill) work cannot be properly done. Not within the appropriate range of dimensional accuracy.
	Improving work efficiency while using lathe	2	Effort is being made to increase the work efficiency and to reduce the working time. Tools, measuring instruments, cutting tools, etc. are placed at the appropriate positions on the work table. Tools, measuring instruments, cutting tool, etc. are set before starting the operation. Tools / measuring instruments / cutting tool, which are not required for work are not used
	Appropriate measuring method while using calipers and micrometer	4	<Reason for inadequate evaluation> Movement of the slider is uneven. 0 point is not matching. When the outer jaws of the Vernier are in the closed state, light passes through (leakage of light). The quality of the micrometer is poor.

Course Purpose	Course Module	Evaluation of Trainer (*)	Remarks
	5S education of lathe machine	1	Measuring instruments / tools of the work table are organized/arranged. After cutting, handling of chips, cleaning of the floor around the facility and equipment are being carried out. The student responds appropriately to the instructions and explanations of the instructor. (Discipline)
	Safety education of lathe machine	1	Protective glasses are worn. Work shoes are used during the operation. Chips are not touched by hand. Rotating objects are not touched. Appropriate work clothing during operation.
	Improving lathe machine and machine area	1	There is appropriate light brightness not interfering with the work. The process drawing is visible at the proper position during machining. Appropriate improvements in the work environment are being implemented. Work table is provided.

(*) Evaluation of Trainers: 1: Very good / 2: Sufficient / 3: Insufficient / 4: Counter measure is necessary