Republic of India
Ministry of Skill Development & Entrepreneurship

Collaboration Program with the Private Sector for Disseminating Japanese Technology for High-Precision Arc Welding in India
Final Report

August, 2016

Japan International Cooperation Agency (JICA)

Panasonic Welding Systems Co., Ltd.
Kurita Machinery Manufacturing Co., Ltd.

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Table of Contents

Abbreviation List

ATI	Advanced Training Institute
CII	Confederation of Indian Industry
DMIC	Delhi-Mumbai Industrial Corridor
GMAW	Gas Metal Arc Welding
IIT	Indian Institute of Technology
IIW	The Indian Institute of Welding
JIS	Japanese Industrial Standards
JISC	Japanese Industrial Standards Committee
JWES	The Japan Welding Engineering Society
JWRI	Joining and Welding Research Institute Osaka University
KANKEIREN	Kansai Economic Federation
MIGW	Metal Inert Gas Welding
MMSME	Ministry of Micro, Small & Medium Enterprises
MSDE	Ministry of Skill Development & Entrepreneurship
PWS	Panasonic Welding Systems Co., Ltd
PWSI	Panasonic Welding Systems India
SMAW	Shielded Metal Arc Welding
TIG	Tungsten Inert Gas Welding
WES	Welding Engineering Standard

Chapter 1: Background

1-1. Background

According to a report by the Kansai Economic Federation's India research group (for research conducted from March 9 to 15, 2014), sustainable economic growth is one of the major challenges for the country, as it faces growing urbanization and increasing population inflows into urban areas, and the country has set itself a goal of raising the percentage of the manufacturing industry in its GDP from 16% to 22% by 2022 and thereby creating 100 million new jobs.

However, the manufacturing industry is still in a developing phase as compared with the country's IT industry, which has grown to earn a reputation as "the world's service desk," as well as the insufficient social infrastructure. In order to develop the manufacturing industry, it is critical and imperative to foster personnel engaged in manufacturing.

Welding technology, which will be spread and promoted under this program, is the most important metal working technology for the industrial sectors which are required to assure long-term reliability, such as the construction of buildings, bridges and chemical plants, and the production of ships, vehicles and other transportation equipment.

According to information from the local JETRO office, there are several large enterprises which have their own training centers, but the scope of training is very much limited; the skill level of workers in general is still low and is far from being able to meet demands from the industry. Some regions are said to have no welding workers, and there are great expectations for welding education.

The Kansai Economic Federation's India research group

According to a survey of JICA India office in Tamil Nadu, the top priority to enhance the competitiveness of the manufacturing industry is early development of welding technicians.

Many Japanese companies with production bases in India suffer from low level welding skills and welding quality of local suppliers. So for their business continuity and to further their business expansion, they believe that the problem should be solved soon. And they are asking for corresponding measures conducted jointly in the public and private sectors.

We believe that the present program is appropriately timed and significant in helping the country to solve these issues, given the fact that in the Japan-India top-level meeting on September 1, 2014 the Japanese Prime Minister announced Japan's greater commitment to investment in India and that Prime Minister Modi asked for Japan's support in "education in manufacturing technologies" to take the country's manufacturing industry to a higher technological level.

On the other hand, for the Indian markets in rapid expansion, Panasonic Corporation established the Panasonic Techno Park in the Jhajjar suburb (near Gurgaon) in 2012. And so, Panasonic Welding Systems Co., Ltd. deploys a total service business, from the development, manufacture and sale of welding equipment to local welding engineer education. Panasonic aims to expand its business to the entire manufacturing industry, including local infrastructure-related companies.

Kurita Machinery Manufacturing Co., Ltd. founded Kurita Machinery Asia Pvt. Ltd in Ahmedabad as a production base covering the entire Asian region. Kurita has entrusted the parts production of core products to local suppliers. Furthermore, Kurita is working to expand to Asia as well as India by collaboration with such as the Ruchi Group of edible oil and the TATA group(Indian multinational conglomerate).

Although both companies (Panasonic Welding & Kurita Machinery) have already launched a local corporation, most of their sales destinations are local subsidiaries of existing business partners in Japan.

Local base of Panasonic Welding Systems in India

Kurita Machinery Asia Pvt. Ltd in Ahmedabad

1-2. Purpose

The purpose of this program is to promote the introduction of Japan's high-precision welding technology and equipment into India, and to enhance the level of manufacturing in India and contribute to its economic growth by fostering personnel with high-precision welding skills.

Welding is an indispensable fundamental technology for joining metal parts, and is considered to be of primary importance in all manufacturing sectors, such as construction work, machinery, cars, and ships.

Achieving the Indian government's goal of dramatically increasing the percentage of the manufacturing industry in its GDP, therefore, requires expanding the range of industrial products that can be produced within the country and enhancing their quality with higher levels of welding technology.

For example, the Indian government's "Vision 2020" provides for a heavy 14-trillion-rupee investment in the railway sector, including the import of Japan's world-leading Shinkansen, which is now being negotiated between the two governments. According to informed sources, local engineering personnel resources are far from being enough to achieve this goal in both qualitative and quantitative terms, and it is necessary to foster highly skilled engineers in a wide range of areas. This implies the strong possibility of this program being able to contribute to vehicle production which requires high levels of aluminum and stainless steel welding technology.

We also believe that the introduction of high-precision welding technology and concurrent human resources development will lead to quality improvement in all Indian products, the enhancement of the Indian brand, and an increase in the Indian manufacturing industry's competitive power as compared with other countries.

1-3. Overview of this project

1) Technology to be provided

This program will spread high-precision, high-reliability arc welding technology. We will spread and promote state-of-the-art technology and know-how compliant with Japanese Industrial Standards and other relevant standards, and raise awareness of the importance of quality-oriented manufacturing.

2) Selling points for the Indian side, and our objectives

1. Ensure that Indian government officials and technology instructors understand that high-performance welding equipment can lead to lower life-cycle costs despite its high initial cost, and allows them to manufacture products with high added value and improve their profit earning ability.

As a result, this leads to expanded introduction to India of Japanese products that have lost the competition with other countries products mainly by the initial cost comparison until now. And, it promotes the Japan brand penetration.

2. With the increasing use of intelligent welding machines, Japanese enterprises have improved and reformed many aspects of their operation, including energy efficiency, welding quality, workmanship control, and safety. The third objective is to promote the introduction of these advanced techniques into India in a manner tailored for the country's situation with gaining the understanding of Indian government officials, technology instructors, and site managers.

Then, Panasonic Welding Systems Co., Ltd., will expand its market share by customer-oriented total business development (operation in soft aspects including education of welding technicians and welding administrators, and rapid repair services) that are missing in the Indian market.
Furthermore, as a result, the welding quality in India will continuously increase. Moreover, we will achieve product quality improvement of Japanese companies that produce in India, such as Kurita Machinery Manufacturing Co., Ltd.

3) Activity overview

We have selected four main regions of India where the industrial sectors of construction, machinery, automobiles, ship building, and so on are expected to grow. We will hold seminars and demonstrations on Japan's advanced welding technology, and provide Indian government officials and so on with training courses in Japan about the technology as well as relevant major legal regulations, certification systems, safety and so on.

1-4. Work schedule

The implementation schedule of local activities and Japan accepted training of this project is shown in Figure 1-4.

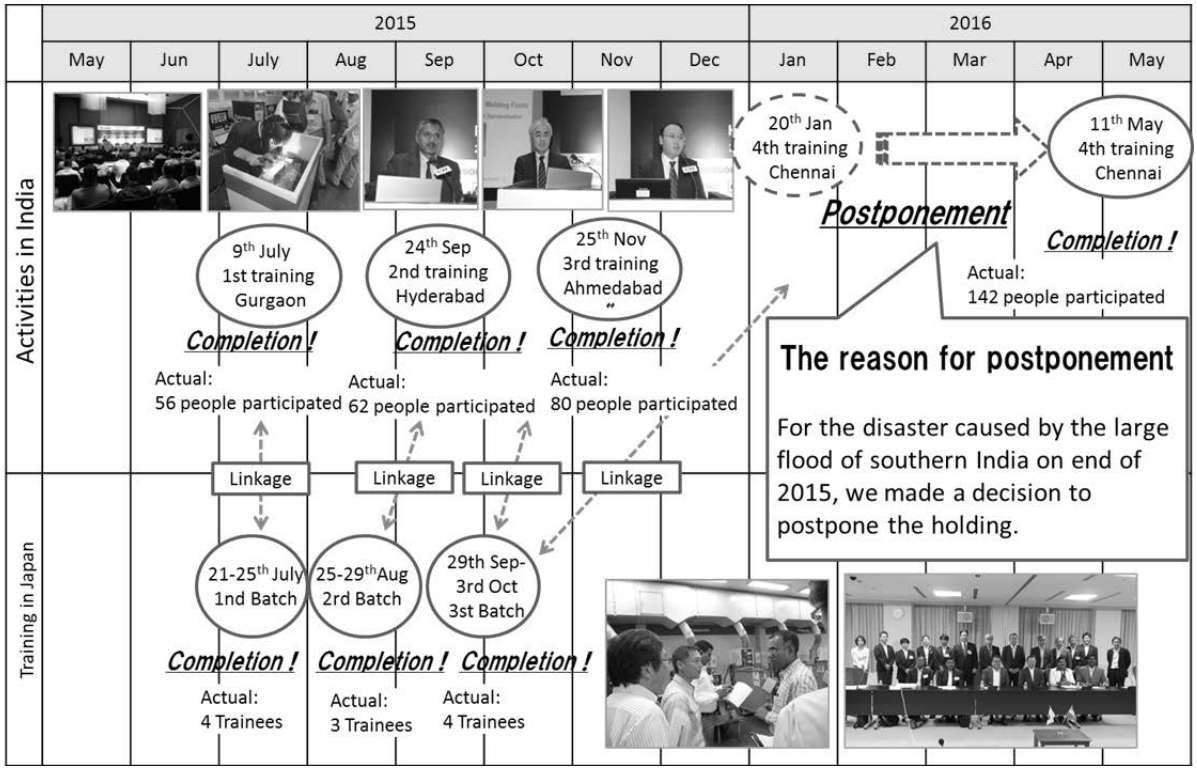


Chart1-4. Work schedule (Actual)

1-5. Implementing Organization

A system diagram of this project is shown in Figure 1-5a.

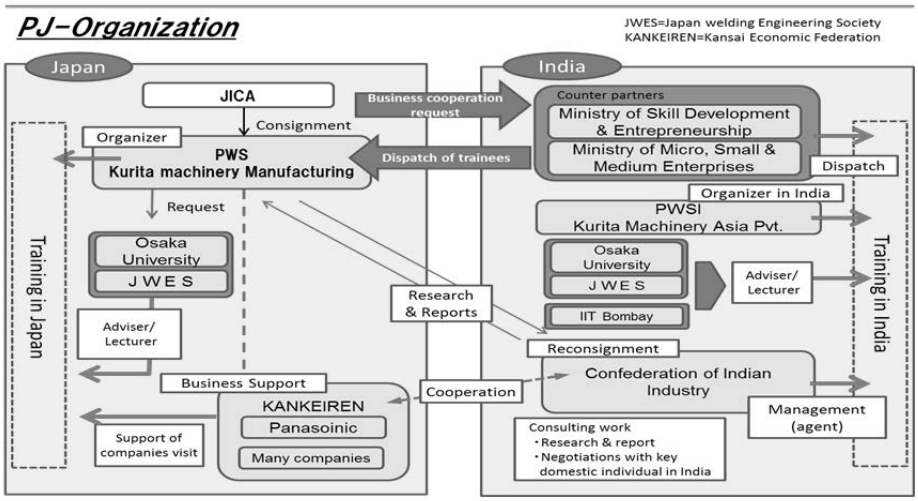


Chart1-5a. PJ-Organization

Proposing corporations (Contractor):

Panasonic Welding Systems Co., Ltd. (representative company)

Kurita Machinery Manufacturing Co., Ltd. (joint venture)

Implementing organizations of the counterpart:

Ministry of Skill Development & Entrepreneurship

Ministry of Micro, Small & Medium Enterprises

Cooperating Institutes:

Confederation of Indian Industry (Reconsignment)

Indian Institute of Technology Bombay

Kansai Economic Federation (KANKEIREN) and participating companies

The Japan Welding Engineering Society

Joining and Welding Research Institute, Osaka University

Chapter 2: Implementation result of training in Japan

2-1. Details of training in Japan - Overview

1) Purpose:

1. Learn the need for high precision arc welding technology promotion aimed at the Indian manufacturing industry development. Understand what we should be aiming for.
2. Learn about Japan's competitive high-quality welding technology, including the importance of welding quality control, legal regulations, certification systems, and safety education; and visit enterprises with industry-leading initiatives in this area to gain hands-on knowledge. Learn the importance of the efforts of the administrative side.

2) Training item:

1. Keynote seminar “Introduction to the Science and Technology of Welding”
: Importance of improving the level of welding technology for India’s manufacturing competitiveness.
2. Seminar “Quality Management in the Welding Field - Personnel Qualification and Standardization”
: Learn the need for a quality management system in India that is in accordance with JIS and international standards. Establish an ideal form for development and strengthen of human resource development system.
3. Introduction of advanced techniques and products related to arc welding, laser welding, and robot welding.
: Specifically image established state-of-the-art welding technology introduction
4. The tour of the ※Technical Center in PWS.
: Site tours of welding quality management system. Learn the reference case to be carried out in India.

※Technical Center = Facilities for the exhibition and the construction demonstration and the training.

5. Inspection tours: It is linked to training in India (Gurgaon in Haryana, Ahmedabad in Gujarat, Hyderabad in Andhra Pradesh, Chennai inTamilnadu). Learn examples of high-precision arc welding technology introduction and welding quality control in the main industry of each region.

3) Period (Actual) :

1st Batch : 21th July-25th July 2015

2nd Batch : 25th Aug-29th Aug 2015

3rd Batch : 29th Sep-3rd Oct 2015

*Process: Mon & Tue: Moving day, Wed-Fri: Keynote & Inspection tours, Sat: Return home

4) Number of participants (Actual) :

1st Batch : 4 participants (Administrative officers 2, Company workers 2)

2nd Batch : 3 participants (Administrative officer 1, Company workers 2)

3rd Batch : 4 participants (Administrative officers 3, Company worker 1)

2-2. Detailed report of 1st Batch

1) Period 21st July-25th July 2015

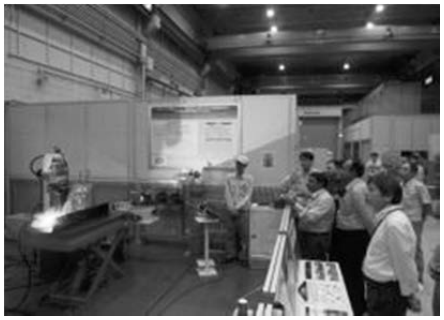
2) List of trainees

	Name	Affiliation / Position	
1	YUVARAJ CHINNAIYAN	Administrative officer	MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEUESHIP ADVANCED TRAINING INSTITUTE, DGT, CHENNAI DEPUTY DIRECTOR OF TRAINING
2	DEBASIS PANI	Administrative officer	MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP ADVANCED TRAINING INSTITUTE KOLKATA TRAINING OFFICER
3	DEVENDRA GUPTA	Company workers	HERO MOTO CORP LTD SUPPLIER QUALITY ASSURANCE AGM
4	CHANDER MOHAN SINGH RAWAT	Company workers	JAY BHART MARUTI LIMITED HEAD OF MANUFACTURING

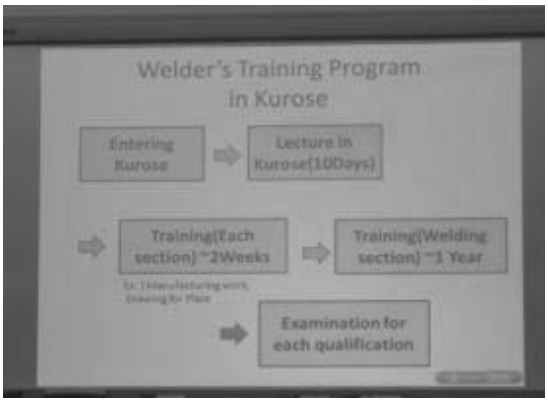
3) Curriculum (Implementation Report)

Date and time		21st July, 2015
Guidance, social gathering	PIC	KANKEIREN / General Manager Kobayashi PWS / President Takahashi Panasonic / Secretary's office Kambara Panasonic / Secretary's office Yonesaki PWS / Suma
	Location	Panasonic Resort Osaka
	Activity contents	Guidance, social gathering and exchange of opinions

Date and time		22nd July, 2015 / AM
Seminars and laboratory tour	PIC	Lecturer: JWRI / Professor Manabu Tanaka Lecturer: JWES / Masaharu Sato Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Joining and Welding Research Institute Osaka University
	Activity contents	1) JWRI Keynote seminar: Introduction to Science and Technology of Welding  2) Tour of the Joining and Welding Research Institute  3) JWES seminar : Quality Management in the Welding Field - Personnel Qualification and Standardization - 

Date and time		22nd July, 2015 / PM
Seminars and PWS tour	PIC	Lecturer: PWS / Director Nobuhiko Muraoka Lecturer: PWS / Shigeru Yonemori Lecturer: PWS / Yukinori Hirota Explainer: PWS Technical Center/ Kenji Kubo, Takahiro Miyazaki Explainer: PWS Toyonaka factory/ Keiji Ikeya Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	PWS
	Activity contents	1) Seminar “Introducing PWS's latest technology”: Introducing the latest technology and products involving arc welding, laser welding, and robotic welding.   2) Technical Center tour (introducing the skill training site and the latest equipment) -Overview of welding skill training and introduction of our latest equipment -Demonstration and observation   Demonstration of the full digital welding Demonstration of the welding robot 3) Toyonaka factory production line tour

Date and time		23rd July, 2015 / AM
Company inspection (1) Kurita Machinery Manufacturing	PIC	Explainer: Kurita Machinery Manufacturing / President Kurita, Kinue Sato, Katumi Uchida Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Kurita Machinery Manufacturing
	Activity contents	-Overview of the filter press business & Factory tour -Description of efforts how to improve the quality of welding, etc.  

Date and time		23rd July, 2015 / PM
Company inspection(2) Kurose Chemical Equipment Co., Ltd	PIC	Explainer: Kurose Chemical Equipment Co., Ltd / President Kawamoto, Shigeru Yamashita, Shingo Kasai Attendee: Kurita Machinery Manufacturing / President Kurita Attendee: PWS / Rikio Suma
	Location	Kurose Chemical Equipment Co., Ltd
	Activity contents	-Overview of the spiral heat exchanger -Lecture about Kurose's way of nurturing the welding operatives. -Tour of the high quality welding work in a variety of material such as aluminum and stainless steel.    Human resource development

Date and time		23th July, 2015 / PM
Company inspection (3) Daihatsu Motor Co., Ltd.	PIC	Explainer: Daihatsu Motor Co., Ltd. / Satoru Yoshino Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Daihatsu Motor Co., Ltd.
	Activity contents	-Inspection of automobile production process (Such as welding technology of automobile production) - The idea of making things of Daihatsu   

Date and time		24th July, 2015 / AM
Company inspection(4) Keihan Electric Railway Co., Ltd.	PIC	Explainer: Keihan Electric Railway Co., Ltd. / Tsuyoshi Niga, Yasushi Sakai Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Nobuhiko Muraoka, Rikio Suma
	Location	Keihan Electric Railway Co., Ltd.
	Activity contents	-The maintenance and repair of railway vehicles (the way of quality management including welding)  

Date and time		24th July, 2015 / PM
Company inspection(5) ShinMaywa Industries, Ltd.	PIC	Explainer: ShinMaywa Industries, Ltd. Aircraft Division/ President Koji Fukai, Kazumasa Tsurumura, Hiroaki Amo, Shin Watanabe Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Nobuhiko Muraoka, Rikio Suma
	Location	ShinMaywa Industries, Ltd.
	Activity contents	-Flying boat and other production (the importance of welding quality)  

Date and time		25th July, 2015 / AM
The final meeting	PIC	Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Panasonic Resort Osaka
	Activity contents	Fill in the feedback sheet, and discussion.

4) Implementation report (Opinion of Contractor)

(A) Result analysis and feedback for next action

Two learning objectives were achieved with somewhat trial and error. Their understanding level of the need for high precision arc welding technology was determined to have increased. And also, their understanding level of the need for the importance of welding quality control, legal regulations, certification systems, and safety education, is determined to have increased.

And, after Mr. YUVARAJ,ATI returned home in India, He sent a thanks letter to us.

This time, we found one important fact: Trainees who were selected in India were aware of the issues and had sufficient expertise. For this reason, we have determined that it is desirable to improve the curriculum to more advanced content, to be more practical with the next batches.

(B) Willingness, motivation, attitude and level of understanding of students

All four trainees were excellent. They were highly motivated and had a high level of expertise regarding welding and human resource development. They studied with a very enthusiastic attitude throughout the whole curriculum. Osaka University Professor Tanaka and the responders of each company also had the same opinion.

2-3. Detailed report of 2nd Batch

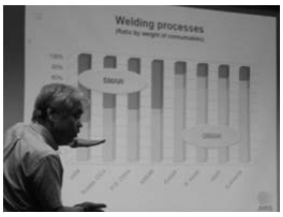
1) Period 25th Aug-29th Aug, 2015

2) List of trainees

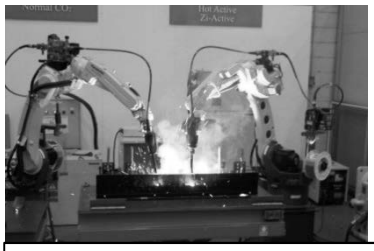
	Name	Affiliation / Position	
1	KUMARAVEL MURUGESAN	Administrative officer	MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP FOREMEN TRAINING INSTITUTE, BANGALORE DEPUTY DIRECTOR OF TRAINING
2	DANNIE MATHEW	Company worker	TECH-SHARP ENGINEERS PVT, LIMITED, CHENNAI. PROJECT DIRECTOR
3	BABU RAO NUTALAPATI	Company worker	PES ENGINEERS PVT.LTD. PROJECT MANAGEMENT DEPARTMENT DEPUTY GENERAL MANAGER(PROJECTS)

3) Curriculum (Implementation Report)

Date and time		25th Aug, 2015
Guidance, social gathering	PIC	KANKEIREN / Director Ueda, General Manager Kobayashi PWS / President Takahashi Panasonic / Secretary's office Yonesaki PWS / Suma
	Location	Hotel Hankyu Expo Park
	Activity contents	Guidance, social gathering and exchange of opinions 

Date and time		27th Aug, 2015 / AM
Seminars and laboratory tour	PIC	Lecturer: JWRI / Professor Manabu Tanaka, Associate professor Tutumi Lecturer: JWES / Masaharu Sato Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / President Takahashi, Rikio Suma
	Location	Joining and Welding Research Institute Osaka University
	Activity contents	1) JWRI Keynote seminar: Introduction to Science and Technology of Welding 2) JWES seminar : Quality Management in Welding Field - Personnel Qualification and Standardization - 3) Tour of the Joining and Welding Research Institute   

Date and time		27th Aug, 2015 / PM
Seminars and PWS tour	PIC	Lecturer: PWS / Director Nobuhiko Muraoka, Shigeki Yonemori, Tsuyoshi Kitaguchi, Yukinori Hirota Explainer: PWS Technical Center/ Kenji Kubo, Daiki Yuzawa Attendee: PWS / Rikio Suma
	Location	PWS
	Activity contents	1) Seminar “Introducing PWS's latest technology”: Introducing the latest technology and products involving arc welding, laser welding, and robotic welding. 2) Technical Center tour (introducing the skill training site and the latest equipment) -Overview of welding skill training and introduction of our latest equipment -Demonstration and observation   Tour of the welding skills education and certification facility

		 Demonstration of full digital welding  Demonstration of robot welding

Date and time		26th Aug, 2015 / AM
Company inspection(1) Kurita Machinery Manufacturing	PIC	Explainer: Kurita Machinery Manufacturing / President Kurira, Kinue Sato, Katsumi Uchida Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Kurita Machinery Manufacturing
	Activity contents	-Overview of the filter press business & Factory tour -Description of efforts how to improve the quality of welding, etc. Quality comparison of welding outsourced between in India and Japan  

Date and time		26th Aug, 2015 / PM
Company inspection(2) Kurose Chemical Equipment Co., Ltd.	PIC	Explainer: Kurose Chemical Equipment Co., Ltd / President Kawamoto, Shigeru Yamashita, Shingo Kasai Attendee: Kurita Machinery Manufacturing / President Kurira Attendee: Panasonic / Takahiro Yonesaki & PWS / Rikio Suma
	Location	Kurose Chemical Equipment Co., Ltd.
	Activity contents	-Overview of the spiral heat exchanger -Lecture about Kurose's way of nurturing the welding operatives. -Tour of the high quality welding work in a variety of material such as aluminum and stainless steel.   

Date and time		26th Aug, 2015 / PM
Company inspection(3) Iwatani Corporation R&D Center	PIC	Explainer: Iwatani R&D Center /Dupty manager Yoshifumi Yoshida, Akiko Endo Attendee: PWS / Rikio Suma
	Location	Iwatani Corporation R&D Center
	Activity contents	-Description Overview of Iwatani Corporation R&D Center -Lecture about the relationship of the shielding gas and welding quality -Welding demonstration (Low sputtering welding with argon, etc.)   

Date and time		28th Aug, 2015 / PM
Company inspection(4) Konoike Construction Co., Ltd.	PIC	Explainer: Konoike Construction Co., Ltd. / Noriyoshi Inoue, Atsushi Enami, Akihisa Okuda, Yasunori Kouhara Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Konoike Construction Co., Ltd.
	Activity contents	Learning the importance of the advanced welding technology and welding quality assurance in the construction industry.  

Date and time		28th Aug, 2015 / AM
Company inspection(4) Takenaka Corporation	PIC	Explainer: Takenaka Corporation / Executive Managing Officer Shiro Toyomasu, Kouji Hashimoto, Takahisa Terada, Susumu Matsuo, Syujirou Furuno, Kazushi Aihara Attendee: Panasonic / Katsuhiko Kambara, Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Takenaka Corporation (Training center/ Hyogo Prefecture Kawanishi) Gamba football stadium (Construction site)
	Activity contents	1) Tour of the Takenaka Practical technology Training Center “Omoi.”   Actually visited the classroom 2) Tour of Training Center "Takumi" for “Looking, Touching, and Realizing”. Explanation of the importance of weld quality.  Reproduced a building construction site in reality  Training for distinguish between good and bad welding

Date and time		29th Aug, 2015
The final meeting	PIC	Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Hotel Hankyu Expo Park
	Activity contents	Fill in the feedback sheet, and discussion.

4) Implementation report (Opinion of Contractor)

(A) Result analysis and feedback for subsequent action

1. Achievement

The trainees this time were not as interested in robot welding as the trainees from the first session of training in Japan. Because this time the trainees were from the construction and infrastructure industry in southern India, they showed a different reaction from the people in the automotive industry. As a result, the following was found.

The construction industry and infrastructure industry, which account for a large volume of welding demand in India, still continue to use manual welding. In addition, they do not understand the need for semi-automatic welding and robot welding that has been increasing in advanced manufacturing countries. The present situation became clear. Data of seminar materials of Mr. Sato (JWES), has proven that there is a very high proportion of hand welding in India compared to other countries.

It was found that there is a need to investigate the level of understanding of high-precision arc welding technology in middle & south India or in the construction industry, infrastructure industry and power industry.

2. Feedback for subsequent action

This trainees had a high learning motivation and a high level of expertise in welding and human resource development. But, their many questions and discussions focused on their own business. They did not discuss strengthening manufacturing capabilities of India as a whole with a wide field of view.
We will devise a program of training in Japan.

(B) Willingness, motivation, attitude, and level of understanding of students

The three trainees were excellent. They had a high learning motivation and high level of expertise in welding and human resource development. In particular, they learned very well the mechanism of human resource development at companies they visited.

2-4. Detailed report of 3rd Batch

1) Period 29th Sep-3rd Oct, 2015

2) List of trainees

	Name	Affiliation / Position	
1	MAHAJIAN JAGDISH BABAN	Administrative officer	MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP CENTRAL TRAINING INSTITUTE, CHENNAI VOCATIONAL INSTRUCTOR
2	R.B. WARUDEW	Administrative officer	MINISTRY OF SKILL DEVELOPMENT &ENTREPRENEURSHIP ADVANCED TRAINING INSTITUTE, MUMBAI VOCATIONAL INSTRUCTOR
3	B. NARASIMHA PRASAD	Administrative officer	MINISTRY OF SKILL DEVELOPMENT &ENTREPRENEURSHIP ADVANCED TRAINING INSTITUTE, HYDERABAD VOCATIONAL INSTRUCTOR
4	VENKATESWARAN RAMAN PAYYALORE	Company worker	WELDING RESEARCH INSTITUTE, BHARAT HEAVY ELECTRICALS LIMITED DEPUTY MANAGER

3) Curriculum (Implementation Report)

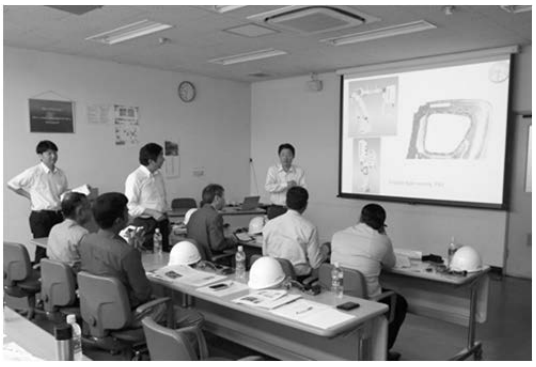
Date and time		29th Sep, 2015
Guidance	PIC	Panasonic / Secretary's office Yonesaki PWS / Suma
	Location	Panasonic Resort Osaka
	Activity contents	Guidance

Date and time		30th Sep, 2015 / AM
Seminars and laboratory tour	PIC	Lecturer: JWRI / Professor Manabu Tanaka, Associate professor Tutumi Lecturer: JWES / Masaharu Sato Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / President Takahashi, Rikio Suma
	Location	Joining and Welding Research Institute Osaka University
	Activity contents	1) JWRI Keynote seminar: Introduction to Science and Technology of Welding 2) JWES seminar: Quality Management in the Welding Field - Personnel Qualification and Standardization - 3) Tour of the Joining and Welding Research Institute 

Date and time		30th Sep, 2015 / PM
Joint meeting	Attendee	Consul general of India (T. Armstrong Changsan), JICA Kansai, Kansai Economic Federation, JWRI, JWES, Kawasaki Heavy Industries, Ltd., Kurita Machinery Manufacturing, Panasonic, PWS, PWSI Total 22 persons
	Location	Conference room in Kansai Economic Federation
	Activity contents	We had a summary meeting about our past activities, and had discussion on what Japan and India should do for welding quality in India.  T. Armstrong Changsan JICA: Yasunori Onishi KANKEIREN: Masayuki Matsushita

<table>
<tr><td colspan="2">Date and time</td><td>1st Oct, 2015 / PM</td></tr>
<tr><td rowspan="3">Seminars and PWS tour</td><td>PIC</td><td>Lecturer: PWS / Director Shigeru Eguchi, Shigeki Yonemori,
Takeshi Kitaguchi, Yukinori Hirota
Explainer: PWS Technical Center/ Kenji Kubo, Daiki Yuzawa
Attendee: PWSI / Toshihide Takahashi
Attendee: PWS / Rikio Suma</td></tr>
<tr><td>Location</td><td>PWS</td></tr>
<tr><td>Activity contents</td><td>1) Seminar “Introducing PWS's latest technology”:
Introducing the latest technology and products involving arc welding, laser welding, and robotic welding.
2) Technical Center tour (introducing the skill training site and the latest equipment)
-Overview of welding skill training and introduction of our latest equipment
-Demonstration and observation
3) Toyonaka factory production line tour
 
 
Tour of the welding skills education and certification facility
 
Demonstration of full digital welding
 
Demonstration of robotic welding</td></tr>
</table>

Date and time		1st Oct, 2015 / AM
Company inspection (1) Iwatani Corporation R&D Center	PIC	Explainer: Iwatani R&D Center /Dupty manager Yoshifumi Yoshida, Akiko Endo Attendee: PWSI / Toshihide Takahashi Attendee: PWS / Rikio Suma
	Location	Iwatani Corporation R&D Center
	Activity contents	-Description Overview of Iwatani Corporation R&D Center -Lecture about the relationship of the shielding gas and welding quality -Welding demonstration (Low sputtering welding with argon, etc.)  

Date and time		2nd Oct , 2015 / AM
Company inspection(2) Kawasaki Heavy Industries, Ltd.	PIC	Explainer: Kawasaki Heavy Industries, Ltd. / Dr. Eng. Hideki Hiramatsu, etc. Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Kawasaki Heavy Industries, Ltd. (Harima factory)
	Activity contents	Introduction of welding technology in Kawasaki Heavy Industries (History, education system, such as research and development) Introduction of "Takumi Juku (Skills Education Center)" Visit of Harima factory (shield, boiler, LNG related)   Welding training area

Date and time		2nd Oct, 2015 / PM
Company inspection(3) Hitachi Zosen Corporation	PIC	Explainer: Hitachi Zosen Corporation / Ph.D. Kazuhiro Fukumoto, GM Akihiro Nagai Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Hitachi Zosen Corporation
	Activity contents	Learning of best practices of welding quality improvement in the plant and construction industry.  

Date and time		3rd Oct, 2015
The final meeting	PIC	Attendee: Panasonic / Takahiro Yonesaki Attendee: PWS / Rikio Suma
	Location	Panasonic Resort Osaka
	Activity contents	Fill in the feedback sheet, and discussion.

4) Implementation report (Opinion of Contractor)

In the third batch of Japan-accepted training, we chose three young members as trainees to become administrative officials. Instead, we did choose a super-specialist among private sector representatives. He was a doctor of the Welding Research Institute, BHARAT HEAVY ELECTRICALS LIMITED.

Because in India manual welding is the mainstream, even the welding instructors have little knowledge of semi-automatic welding and robotic welding. However, because this doctor was able to support three administrative officers, three young administrative officials were able to understand the importance of high-precision arc welding technology.

And, previous trainees' questions and discussions had focused on their own business only. Participation of the welding doctor made it possible to discuss strengthening manufacturing capabilities of India from a wider field of view.

2-5. Outcome of training in Japan

1) Result analysis and feedback for future work

(A) Achievement: Increased understanding of trainees about high-precision arc welding technology.

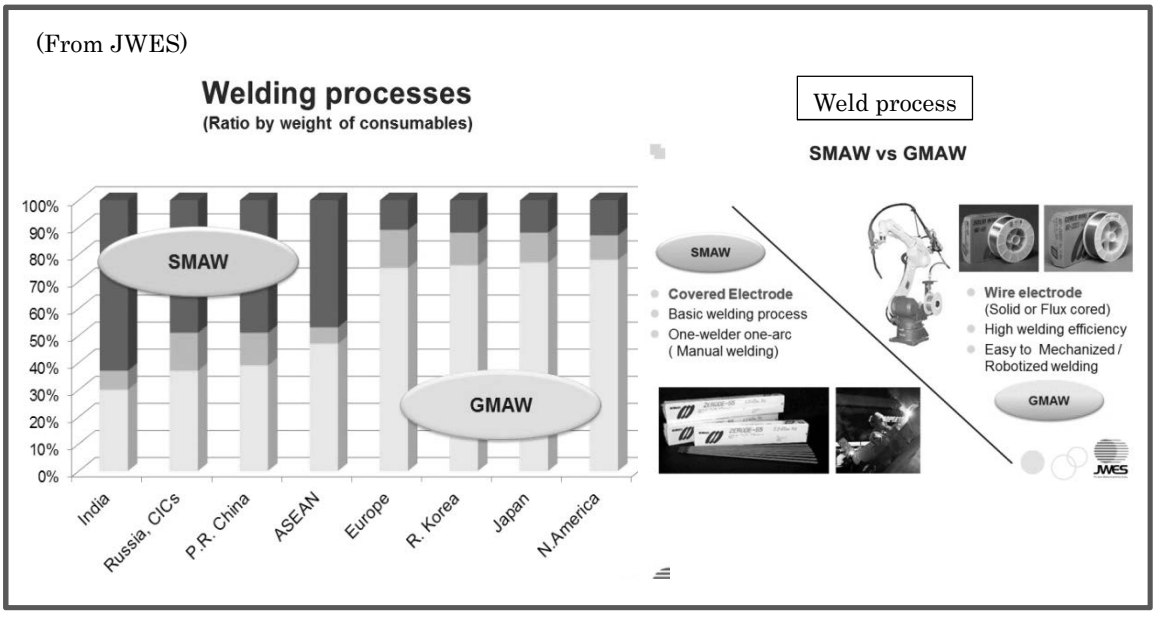
We analyzed the meetings, the questionnaires to trainees, and the comments of the Japanese instructors. The result indicated such outcomes as the following.

■The trainees were able to understand the challenges for welding quality improvement in India:

Please check the seminar materials (Figure below) of Mr. Sato lecturer (JWES). About the welding methods in India, manual welding (SMAW) method has a high percentage. Even now, the transition to semi-automatic welding (GMAW) has been very gradual.

Regarding this point, India is very different compared to the advanced manufacturing industry countries such as Japan and China.

(From JWES)



India is in a disadvantageous situation with respect to welding quality compared to other countries. The reasons that India has not migrated to the semi-automatic welding (GMAW) were found in this training. The reasons are as follows.

1. Members of the welding field in India do not know about high-quality welding.
2. Many management side members have the lack of understanding about the value brought by high-quality welding.

To the biggest challenge of the above, we believe that all 11 trainees were able to understand by this training.

■The trainees were allowed to improve their own understanding level of the high-precision arc welding technology through the training in Japan:

Their trainees obtained a concrete image of introducing high-precision arc welding technology and understood the benefits brought by high-precision arc welding technology. These were results by the lectures of JWRI and JWES, by the technology demonstration of PWS and by the tours of companies.

■They learned and were able to understand about the importance of welding quality control, legal regulations, and certification systems in Japan:

They were able to understand about the way of Japan's personnel certification system of welding and its big effect by lectures of JWES and by company visits. In India, when each company carried out welding human resources education, criteria for evaluating the learning level and criteria for absolute evaluation of the individual's skills have not been standardized. Many of the trainees said that it takes a lot of time in India to realize the development and dissemination of the personnel certification system. However, they won a valid hint.

(B) About the possibility expansion of high-precision arc welding technology promotion for the future:

Many of the Japanese members also (JWES or KANKEREN) had the same opinion that takes a lot of time in India to realize the development and dissemination of the personnel certification system. But, some of the training participants had a positive opinion. For example, a member of ATI said he wanted cooperation with activities in India of this project and PWSI. But, he did not have a concrete idea for cooperation. However, we can expect it in the future.

Trainees from the private sector (especially in the automotive industry) were more aggressive than the government side. For example, soon after they returned home, Hero Motocorp ordered paid seminars and demonstration sessions for supplier companies and himself to PWSI. If a lot of other companies carry out such activities, India will be able to achieve great development.

(C) Effect on the business of the project contractor:

If the welding equipment market in India improves, business opportunities of PWS and other Japanese welding equipment companies will expand.

In the field of semi-automatic welding (GMAW) and robotic welding machines, companies such as PWS have highly competitive power. In this Japanese training, we were able to make opportunities to spread the semi-automatic welding and robotic welding.

PWS was able to strengthen the relationship with private companies which participated in the training. For example, Hero Motocorp has ordered to PWSI the paid seminars and demonstration sessions for supplier companies and itself.

In the wake of this business, also there is an example that a welding training school with the administrative side purchased state-of-the-art welding machines made by PWS.

In this way, this was a valid opportunity for PWS and PWSI. In addition, we would like to expand the business for each of the companies in construction industries, infrastructure industries and power-related industries, and automobile and motorcycle industries.

Next, we describe effect on the business of Kurita Machinery Manufacturing Co., Ltd.

Kurita Machinery Manufacturing has a production base in Ahmedabad and has entrusted the parts production of core products to local suppliers. But, their India supplier has a low level of weld quality. So, to maintain the quality of the filter press to be produced in India, it has become the big problem of Kurita Machinery Manufacturing.

This training in Japan, albeit indirectly, we believe leads to opportunity to improve the weld quality level of suppliers for India local production company of Kurita Machinery Manufacturing.

*Additional Information: In the local training in Ahmedabad which was held in November, Kurita Machinery Manufacturing invited his existing supplier (business partner) and many peripheral companies to carry out awareness raising and direct guidance for the weld quality level improvement.

2) Request matters from the trainees to Japan

We record two useful opinions that may become the tips after the project.

1. Deputy Director of ATI Chennai, said that they hoped for collaboration proposals that utilize each training venue of its jurisdiction area with Japan sides.
2. They asked for opportunities to regularly learn the skills and knowledge of the latest Japanese welding technology and equipment for Indian welding instructors (training officers).

3) Summary of Joint meeting (30th Sep, 2015 / PM)

Theme: Proposals for high precision arc welding technology promotion in India in the future after the completion of this project.

In 3rd Batch, Kansai Economic Federation has organized a joint meeting. Trainee members, JICA, India Consul General, Kansai Economic Federation and its associated companies, JWRI, JWES, etc. attended. We had a discussion about the summary of business so far. And also we had a discussion about India’s current status and challenges, and the possibility of cooperation from Kansai or Japan for promoting high-precision arc welding technology in India.

In this meeting, Mr. Takahashi (president of PWSI) opined as follows.

<The view of Mr. Takahashi>

For manufacturing expansion, improvement of vocational technology is very important.
For this purpose, at first it is important to have the vision. In other words, top management should show the goal that should be achieved clearly at first.
For example, in order to improve welding precision, it is necessary to clarify the levels that you seek in results of the welding. For that purpose, it is fundamental to know the international standards for "good" or "bad" of the welding.
In addition, if you seek the best output, you must know the "good tool" that support the skills, along with skill improvement. And, the managers and the chief administrator are to understand it first. By that, the vision becomes clearer.

So, then, it comes out a clear demand of skill improvement in the employer side. Therefore, it becomes possible to recover for the preceding investment to educational institutions, also to increase employment of welding skills graduates, and to increase workers of field work.

As a view of this project contractor, the majority of India's management and welding site members does not explicitly recognize the "good" and "bad" of the welding. And, in India, we presumed there to be still lack of understanding with respect to the "good things" in the tool.

So, further activities of high-precision arc welding technology promotion should proceed from this point of view.

Chapter 3:Implementation result of Activities in India

3-1. Details of Activities in India - Overview

1) Activity overview

Welding seminars in four locations in India, introducing the latest technology trends and holding demonstrations of welding technology.

Give seminars on Japan's state-of-the-art welding technology, including sample cases which may be helpful in raising the technological capabilities of India's small and medium-sized enterprises.

(A) Venues and scheduled times

1st session:	Gurgaon (Haryana)
	Thursday July 9, 2015
2nd session:	Hyderabad (Andhra Pradesh)
	Thursday September 24, 2015
3rd session:	Ahmedabad (Gujarat)
	Wednesday November 25, 2015
4th session:	Chennai (Tamil Nadu)
	Wednesday May 11, 2016

(B) Planned number of participants: 60-80 each session (total of 300)

(C) Covered industry: Construction, machinery, automobile, ship building, and all other manufacturing sectors

(D) Subject to be learned

1. Learn the need for high-precision arc welding technology promotion aimed at the Indian manufacturing industry development. And to recognize the specific goals to be achieved.
2. Learn about the importance of welding quality control, legal and regulatory, certification, safety education, etc., in addition to the practical technique.
3. Establish a concrete image of the introduction of state-of-the-art technology for the manufacturing level up, by the demonstration in consideration of the welding method and welding material required by many in major industries around each held area.

(E) Curriculum

1. Seminar “The importance of high-precision arc welding technology”:

Explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.

2. Seminar “Quality Management in Welding Field - Personnel Qualification and Standardization”:

3. Welding technology demonstration: Hold demonstrations on themes selected for each location according to conditions of manufacturing industry in the region (Gurgaon, Hyderabad, Ahmedabad, Chennai).

These will be run with the purpose of being able to make proposals directly meeting local industry needs, taking into account the welding methods and materials required in that region.

As a result, participants can understand the necessity of introducing high-precision arc welding technology, which may lead to the establishment of ongoing win-win links with the participating companies after holding the seminars and demonstrations.

<Target of demonstrations in each locations>

1st session: Gurgaon (Haryana)

Automotive (2-wheelers, 4-wheelers)

* High quality, high efficiency MIG welding and robotic welding

2nd session: Hyderabad (Andhra Pradesh)

Project (Thermal power plant, Pipeline, Steel plant)

Power (Boiler, Turbine)

* High quality TIG welding, stainless steel, MMA (manual metal arc)

3rd session: Ahmedabad (Gujarat)

Process equipment (Petro-chemical, Food)

- Power (Boiler, Turbine, Heat Exchanger)

Metal fabrication

* Stainless steel, TIG

(* High quality, high efficiency MIG welding and robotic welding)

4th session: Chennai (Tamil Nadu)

Automotive (2-wheelers, 4-wheelers), Construction equipment

* High quality, high efficiency MIG welding and robotic welding

* High deposition welding

3-2. Implementation report of 1st session: Training in Gurgaon (Haryana)

1) Date: Thursday July 9, 2015

2) Location: Gurgaon (Haryana)

-Seminar Venue:

Crowne Plaza Hotel Gurgaon

-Demonstration Venue:

PWSI (Jhajjar)

3) Curriculum and schedule:

Time	Item (Seminar, etc.)	
09:00-10:20	Guests registration	
10:25-10:30	Opening Remarks (CII)	Mr. Mukesh Kumar Gupta stated that Hon'ble, 2015 / PM Modi's focus on Make in India and Skilling India aims to increase India's production, productivity and global competitiveness. Japanese manufacturing techniques are regarded as influential practices and have been adopted in worldwide manufacturing operations and the best practices should be adopted by Indian Industry
10:30-10:35	Address (PWSI) Mr. Toshihide Takahashi	Inaugural Session being addressed by Mr. Takahashi, Managing Director, Panasonic Welding Systems India. He said that this initiative by Panasonic Welding Systems supports the government's vision of raising India's share of GDP from an existing 16% to 25% by the year 2022.
10:35-11:55	Lecture by Osaka University	Prof. Fumiyoshi Minami, Osaka University, spoke about the importance of high-precision arc welding technology, explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing
12:10-13:05	Lecture by JWES	Prof Masaharu Sato JWES spoke on Personnel Qualification and Standardization in the field of Advanced Welding technology
Lunch		

-15:30	Proceed for Panasonic Welding System India, Jhajjar	
15:30-15:50	Briefing and Instructions	
15:50-16:50	Presentation	PWSI Presentation, Factory Tour
	Demonstration	High precision Spatter-less Robotic Welding
		High quality MIG/TIG Welding
16:55-17:15	Feedback form filling up	
-18:30	Back to Hotel Crowne Plaza, Gurgaon	

4) Responders(External human resources, project workers, other responders)

Lecturers: Prof. Fumiyoshi Minami, JWRI

Lecturers: Mr. Masaharu Sato, JWES

Special Attendees: Mr. Mukesh Kumar Gupta
(Member, CII National Committee on Skill development)
Mr. Sunil Gupta
(Director, Ministry of Skill Development & Entrepreneurship)

Project Local chief: Mr. Toshihide Takahashi Managing Director PWSI

Other responders: 2 employees of PWS came from Japan.
Some employees of PWSI, and staff members of the CII.

5) Implementation detailed report & Opinions of Contractor

(A) Result analysis and feedback for subsequent action

-The number of participants: 56 (VS Planned value 70%)

We had a reservation for 85 trainees. But the number of participants was reduced by 30% due to heavy rain.

-Understanding level and reaction of the students about the lecture by JWRI Osaka University

Many of the participants understood the need for high-precision arc welding technology promotion. More than 50 percent have a positive evaluation by the questionnaire.

Lecture by Prof. Fumiyoshi Minami, Osaka University
Topic: Importance of High-Precision Arc Welding Technology

-Understanding level and Reaction of the students about lecture by JWES

Especially as a professional human resources education, twelve Industrial Training Institute (ITI) members participated this time. They all have a positive evaluation by the questionnaire.

India has not substantially standardized the personnel certification as a whole country. So, they found a problem with this. (From our interview)

Prof. Masaharu Sato JWES
Topic: Quality Management in Welding Field
-Personnel Qualification and Standardization

-Accomplishment report of the latest welding technology demonstration

This time, we have configured the demonstration in three steps below.

Step1: Understand the important point in the weld. And, understand the level of "good welding."

Step2: Understand the need to select a "good welding equipment" to complement the skills.

Step3: Learn the management in order to maintain a good condition.

In addition, because Haryana region is an integrated area of manufacturing of automobiles and motorcycles, we provided a program of high-quality and high-efficiency MIG welding and robotic welding demonstration.

Demonstration themes	Comments
Highlight the advantages of introducing robots both in the welding performance and in terms of costs.	-Use the demonstrations to highlight advantages for entry-level welders, improving efficiency and quality. -Demonstrate and introduce the world's latest welding robots for entry models for companies adopting robots for the first time.
Demonstrations of the ultimate spatter-less welders. (Robotic welding)	-Hold demonstrations geared for automobile plus two wheeler or vehicle parts, let participants see the lack of spatter, the high production efficiency gained, and the beauty of the finish. -Also introduce examples of use by Japanese manufacturers.
Demonstrations of energy saving, highly efficient inverter welders.	-Compare power consumption with thyristors and weldability using demonstrations. -Demonstrations for high speed operation by adding rapid welding wire feed functions. (Meeting needs in the automobile parts manufacturing frontlines)

By this time of the demonstration, more than 85% of the demonstration visitors understood the true meaning of the welding conditions, and they understand why it requires human resources training for the maintenance of quality (from analysis of feedback form).

Demonstration of full digital welding

Demonstration of robotic welding

(B) Willingness, motivation, attitude and level of understanding of students

Participants were major welding-related customers and government officials in the Delhi neighborhood. 56 visitors listened eagerly to two lectures in the morning. Many students had asked many questions even when the lecture ended. The two lectures were very well received.

<reference> lecturer's opinion

-Prof. Minami: “I had the anxiety of whether they can understand the difficult content but students learned with enthusiastic attitude from beginning to end. In addition, the demonstration was great. ”

-Mr. Sato: “They attended eagerly. They asked me a lot about my lectures.”

In the demonstration, we received many consultations and questions for welding. In addition we have received some inquiries and requests of business meetings from many visitors. After the demonstration of the end also, some of the visitors left the factory and requested more welding experiments from us. From beginning to end, it was a good reputation.

(C) Future approaches that take advantage of the results

With this training, welding-related major users and government officials in the vicinity of Delhi would enhance the understanding of the effect of high-precision arc welding technology introduction.

From some of companies and educators who participated, PWSI won the inquiries of welding construction consultation and educational counseling in PWSI Technical Center or business trip demonstrations. By corresponding to such demand, PWS and PWSI want to achieve a sales increase and the company's brand power improvement in India.

3-3. Implementation report of 2nd session: Training in Hyderabad (Andhra Pradesh)

1) Date: Thursday September 24, 2015

2) Location: Hyderabad (Andhra Pradesh)

-Seminar Venue & Demonstration Venue: Hotel Taj Deccan, Hyderabad

3) Curriculum and schedule:

Time	Item (Seminar, etc.)	
09:00-10:00	Guests registration	
10:05-10:10	Welcome speech by CII Mr. DSP Rao Vice President, Tecumseh Products India Pvt Limited	For India's high growth, I think that innovation is essential. One of the most important technologies in the infrastructure as a base is welding technology. This time, we will have a good opportunity to learn and to touch advanced technology.
10:10-10:15	Welcome Speech Mr. Toshihide Takahashi Managing Director PWSI	For production competitiveness improvement, there is a need for skill improvement and good tools. Panasonic can provide both in the welding field, I believe that we can contribute to improving India's manufacturing capabilities.

10:15-11:45	Lecture by Prof. Amitava De	The importance of high-precision arc welding technology, explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.
Tea Break		
12:00-13:00	Lecture by JWES Prof. Masaharu Sato	Prof Masaharu Sato, JWES spoke on Personnel Qualification and Standardization in the field of Advanced Welding technology
Lunch		
14:00-14:15	Assemble for Demonstration	
14:15-14:30	Booth Wise Team division for Demo	
14:30-16:30	Demonstration for KR2, GY, MMA & AT3, TX3 machines	
Tea Break		
16:40-17:00	-Feedback form filling up -Closing Speech by Mr. Choudhury, CII	

4) Responders (External human resources, project workers, other responders)

Lecturers: Professor Amitava De, IIT Bombay

Lecturers: Mr. Masaharu Sato, JWES

Special Attendees: Mr. DSP Rao, CII Member & Vice President,
Tecumseh Products India Pvt. Ltd.
Sougata Roy Choudhury, Director- Skill Development, CII

Project Local chief: Mr. Toshihide Takahashi, Managing Director, PWSI

Project workers: Mr. Yukinori Hirota, PWS

Other responders: One employee of PWS came from Japan.
Some employees of PWSI, and staff members of the CII

5) Implementation detailed report & opinions of contractor

(A) Result analysis and feedback for next action

-The number of participants: 62 (VS Planned value 78%)

We had a reservation for 80-plus trainees. But, due to other local events planned, about 15 people were absent.

-Understanding level and Reaction of the students about lecture by Prof. Amitava De

Many of the participating members understood the need for high-precision arc welding technology promotion. More than 60 percent have a positive evaluation by the questionnaire.

On the other hand, there was also the request of more time.

Lecture by Prof. Amitava De IIT Bombay

-Understanding level and Reaction of the students about lecture by JWES

Participation of public institutions was low at around 15 percent. But, the seminar got a good evaluation on the results of the questionnaire. The theme of this seminar was "the need for a quality management system in welding, and development and strengthening of human resource development system."

This region has more interest in welding quality improvement than in automation. So, we think that they have higher demands on skills education. It was content that meet this locality (based on discussions with PWSI local employees).

Lecture by JWES Prof. Masaharu Sato

-Accomplishment report of the latest welding technology demonstration

Also this time, we have configured the demonstration in three steps below.

Step1: Understand the important point in the weld. And, understand the level of "good welding."

Step2: Understand the need to select "good welding equipment" to complement the skills.

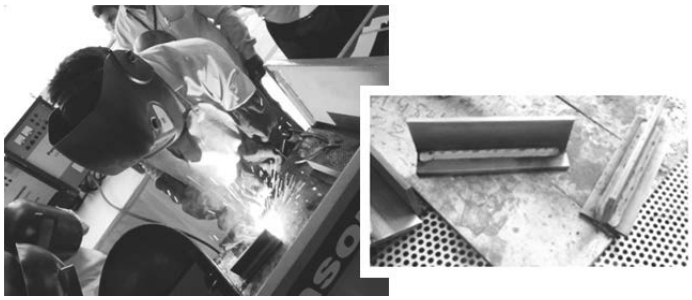
Step3: Learn the management in order to maintain a good condition.

In addition, because Andhra Pradesh region is an integrated area of manufacturing for projects (Thermal power plant, Pipeline, Steel plant) and Power (Boiler, Turbine), we provided a program

of high quality TIG welding (Tungsten Inert Gas Welding), stainless steel, and MMA (manual metal arc).

Demonstration themes	Comments
-Demonstrations of energy saving, highly efficient inverter welders.	-Compare power consumption with thyristors and weldability using demonstrations. -Demonstrations for high speed work by adding rapid welding wire feed functions.
-Demonstrations with high quality TIG welding and multi-use high performance welders.	-Demonstration of clear arc start with inverters and high precision TIG welding. -Demonstration of stable welding from medium-thick steel plate to pipes. (Background: arc welding is in use in many front line locations involving infrastructure and power in India)
-High deposition welding demonstrations	-Show welders enabling high deposition welding using relatively small diameter wires (Φ1.2).

By this time of the demonstration, more than 75% of the demonstration visitors understood the true meaning of the welding conditions, and why it requires human resources training for the maintenance of quality at the time. But there were many opinions more kinds of demonstrations program and more time for demonstrations were needed (from analysis of feedback form).



(B) Willingness, motivation, attitude and level of understanding of students

Participants were major welding-related users and government officials in Andhra Pradesh neighborhood. Visitors listened eagerly to Amitava De's lecture and Mr. Sato's lecture. Many students asked questions even when the lecture ended. The two lectures were very well received.

<reference> lecturer's opinion

-Prof. Amitava De: "The contents of the seminar followed the lecture of JERI Osaka University. And, in order to make seminars not difficult, I explained by using case-examples and videos. As a result, students understood well. There was many eager questions also. So, it was good."

-Mr. Sato: "By inserting a commentary tailored to the Indian circumstances. My seminar was more clear than the last time. I think we got a better reaction than previously."

Also, during the demonstration, we got many eager consultations and questions about welding from them.

Many of the visitors did not leave the venue after the demonstration ended. And they continued to the consultation and questions to PWSI personnel.

(C) Future approaches that take advantage of the results

As a result of realizing the participation of IIT from this time, it was possible to promote the cooperation of government, private sectors, and academic sectors in India. In the future, we recommend a study for the Indian manufacturing industry development between the government, private sectors (CII), and academic (IIT) sectors.

From some companies and educators participated, PWSI won the inquiries of demonstration of robotic welding, welding training and exhibition of welding machines. By corresponding to such a demand, PWS and PWSI want to achieve a sales increase and the company's brand power improvement in India.

3-4. Implementation report of 3rd session: Training in Ahmedabad (Gujarat)

1) Date: Wednesday November 25, 2015

2) Location: Ahmedabad (Gujarat)

-Seminar Venue: Hotel Novotel, Ahmedabad

-Demonstration Venue: Kurita Machinery, Ahmedabad (Kurita Machinery Manufacturing factory in India)

Seminar Venue: Hotel Novotel

Demonstration Venue: Kurita Machinery, Ahmedabad

Guest speech of
Mr. SANJAY PRASAD
Principal Secretary Labour and Employment Department
Government of Gujarat

3) Curriculum and schedule:

Time	Item (Seminar, etc.)	
09:00-10:00	Guest registration	
10:15-10:25	Welcome Address Mr. Samir J Shah (CII) Chairman	For India's high growth, I think that innovation is essential. One of the most important technologies in the infrastructure as a base is welding technology. This time, we will have a good opportunity to learn and to touch the advanced technology.
10:25-10:35	Address Mr. Toshihide Takahashi (PWSI)	Panasonic Welding Systems supports the government’s vision of raising India’s share of GDP from an existing 16% to 25% by the year 2022.
10:35-10:55	Special Address Mr. Sanjay Prasad. IAS	Mr. Sanjay Prasad in his address, invited industry to join hands with Government of Gujarat in its

	(Government of Gujarat)	various initiatives on skill development in the state. Mr. Prasad urged industry to encourage apprenticeship training and invite more candidates to join as apprentice trainees.
11:15-12:25	JWRI Lecturers Prof. Manabu Tanaka	He spoke about the importance of high-precision arc welding technology, explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.
12:25-12:30	Special speech Prof. Amitava De, IIT Bombay	He explained about the importance of precision in welding and discussed the latest technologies in arc welding.
Tea Break		
12:35-13:20	JWES Lecturers Mr. Masaharu Sato	He spoke on Personnel Qualification and Standardization in the field of Advanced Welding technology
Lunch		
14:10-14:20	Proceed for Kurita Machinery, Ahmedabad	
14:20-17:45	Welding Demonstration 1. High Precision Spatter less Robotic Welding 2. High Precision MIG/MAG Welding	
17:45-18:00	Feedback form filling up	

4) Responders (External human resources, project workers, other responders)

Lecturers: Professor Manabu Tanaka, JWRI

Lecturers: Mr. Masaharu Sato, JWES

Special Guest: Mr.Sanjay Prasad, IAS
Principal Secretary Labour and Employment Department
Government of Gujarat

Special Attendees: Prof. Amitava De, IIT Bombay
Samir J Shah (CII Gujarat State Panel on Skill Development)

Project Local chief: Mr. Toshihide Takahashi Managing Director PWSI

Project workers: Mr. Yukinori Hirota, PWS, Mr. Rikio Suma, PWS

Other responders: One employee of PWS came from Japan.
Some employees of PWSI, and staff members of the CII

5) Implementation detailed report & Opinions of Contractor

(A) Result analysis and feedback for subsequent action

-The number of participants: 80 (VS Planned value 133%)

In the planning stage, we had expected the participation of more than 60 people. But, the number of trainees was more than we had planned. Thirteen persons were from public institutions (educators) came and others from private organizations. Including the participants of the Indian government officials and local agencies, the total number of participants was 90, that is greater than that of the previous two activities.

This is the result that Gujarat government invited many organizations to participate actively in this training. This state government is highly motivated for human resource development.

On November 24th 2015 (a day before the training), a meeting to discuss our workshop was carried out in the Gujarat government building . It was a meeting convened by Mr. Sanjay Prasad, Principal Secretary (Labour & Employment Department, Government of Gujarat) and attended by PWSI(02 members), Gujarat government officials and Government Trainers (ATI/ITI's) ,CII, representatives from Industry and Indian Institute of Welding(IIW).

-Understanding level and Reaction of the students about the lectures

Lecturers	Seminar themes
JWRI Lecturers Prof. Manabu Tanaka	The importance of high-precision arc welding technology -The importance of high-precision arc welding technology. Explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.
JWES Lecturers Mr. Sato	Quality Management in Welding Field -Personnel Qualification and Standardization

JWRI Lecturer Prof. Manabu Tanaka

JWES Lecturer Mr. Sato

Special speech Prof. Amitava De, IIT Bombay

Many of the participating members understood the need for high-precision arc welding technology promotion. More than 70 percent had a positive evaluation by the questionnaire.

Noteworthy in the opinion from the students were the following two points.

1. Request for more such demonstrations and seminars.
2. Opinion that we should have more time for the question and answer session.

As a special opinion, they asked for lectures in Hindi as well as English.

This fact demonstrated that people of a wide range of layers expected this seminar, and attended it.

-Accomplishment report of the latest welding technology demonstration

Also this time, we configured the demonstration in three steps below.

Step1: Understand the important point in the weld and understand the level of "good welding."

Step2: Understand the need to select "good welding equipment" to complement the skills.

Step3: Learn the management in order to maintain a good condition.

Because Gujarat region is an integrated area of manufacturing of process equipment industry (Petro-chemical, Food), power (Boiler, Turbine, Heat Exchanger) and metal fabrication industry we provided a program of medium-thickness plate welding demonstration. In addition, intended for many students from automobile and motorcycle industry, We had also provided a program of high-quality and high-efficiency MIG welding and robotic welding demonstration for thin sheet metal.

Because Kurita Machinery factory site is large and we had sufficient time, we were able to provide a sufficient demonstration.

Participants tried the latest Demonstration of full digital welding

Demonstration of robotic welding

By this time of the demonstration more than 90% of the demonstration visitors understood the true meaning of the welding conditions, and they understand why it requires human resources training for the maintenance of quality.

Because it was able to secure a wide space by utilizing the space of the factory, the robot operator showed a demonstration to students in detail and interactively. Despite not yet using the robot, many of the visitors highly evaluated the demonstration of robotic welding.

(B) Willingness, motivation, attitude and level of understanding of students

Participants were major welding-related users and government officials in Gujarat neighborhood. Visitors listened eagerly to Prof. Manabu Tanaka's lecture and Mr. Sato's lecture. Many Students asked questions even after the lecture ended. The two lectures were very well received.

In particular, we felt the high expectations and motivation for this project from Gujarat state government and their academic side, that was different from previous trainings.

<reference> lecturer's opinion

-Prof. Manabu Tanaka, JWRI:

"I was surprised at the large number of visitors. Their reaction to my lecture was also good. I felt the enthusiasm that they want to raise the level of welding skills."

-Mr. Sato, JWES:

"At this venue, it seems there were many people who had no knowledge of the international standards and certification system of welding. And, Government side had recommended many organizations to participate in this seminar. From that sense, it has a high significance as a lot of people were taking this lecture."

-Prof. Amitava DE, IIT:

"Now, in India the stick welding process (SMAW) is the main. There was no problem in India. So, until now, it had not been converted to high-precision welding and high-quality welding in India.

But, from now, Inspection criteria of the weld at the metal processing industry will be strict in India also. In particular, when incoming work from overseas, Indian manufacturing industries should pass on the higher inspection standards.

The future construction site of welding will ask for high welding standards. There will be no tomorrow in the Indian manufacturing industry if not corresponding to it.

In the wake of this workshop, India should work for change."

Also, during the demonstration, we got many eager consultations and questions about welding.

Because it was possible to secure a wide space by utilizing the space of the factory, many of the visitors highly evaluated the demonstration of robotic welding.

(C) Reaction of the Gujarat government

Willingness of the Gujarat government was also surprisingly high.

24th November (the day before), the meeting to discuss our workshop was carried out in the Gujarat government building. It was a meeting that gathered 20 government officials and several civilians and school officials (Mr. SANJAY PRASAD Principal Secretary Labour and Employment Department Government of Gujarat had convened).

At the request of SANJAY PRASAD State Department of Labor Secretary, four promoting members of this training who are staffs of PWS, PWSI and CII also attended the meeting.

For Gujarat manufacturing development, in this meeting, they agreed that they should rush to skill improvement and the expansion of the welding technicians number in this meeting. To that end, they agreed they should grow a lot of high-level leaders.

Mr. SANJAY PRASAD (Principal Secretary) had requested to us to provide more activities like this project. Although we reported to him that this India high-precision arc welding technology promotion business is completed in this year, we had promised to reflect his request (as a serious opinion of the Indian side) in the final report to the JICA.

(D) Future approaches that take advantage of the results

<For India's development>

This time, the three instructors and the key persons of PWS and PWSI had a forum for discussion. And, they agreed to the following comments of Prof. Amitava De.

1. Just now, the turning point in India is coming for welding quality improvement.
2. To the measures, support of government agencies and public institutions is mandatory.
   It is also important to develop a variety of certification systems related to welding in order to establish a unified licensing system.
3. Support from Japan, such as this project, is also important. (Such as a request from the Gujarat government)

<For the business of the contractor>

Contractor shall want activities linked to their business results.

Kurita Machinery Manufacturing factory in India convened also its own supplier to this welding seminar training, aiming at making the suppliers understand the importance of improving their welding quality.

PWS & PWSI are aiming to "grade-up of the Indian welding market" through the promotion of this project. We believe that the expansion of the high-profit models sales opportunities is gradually progressing.

3-5. Implementation report of 4th session: Training in Chennai (Tamil Nadu)

1) Date: Wednesday May 11, 2016

2) Location: Chennai (Tamil Nadu)

-Seminar Venue: Hotel HILTON, GUINDY,

-Demonstration Venue: ATI (Advanced Training Institute)

Seminar Venue:
Hotel HILTON, GUINDY

Demonstration Venue: ATI

Guest speech of Mr. Kumar Jayant, IAS
Principal Secretary to Government /Labour and
Employment Department Government of Tamil Nadu

3) Curriculum and schedule:

Time	Item (Seminar, etc.)	
09:00-10:00	Guest registration	
10:00-10:05	Lamp Lighting	
10:05-10:10	Welcome Address N.V.Venkatasubramanian (CII)	For India's high growth, I think that innovation is essential. One of the most important technologies in the infrastructure as a base is a welding technology. This time, we will have a good opportunity to learn and to touch the advanced technology.

10:10-10:20	Address Mr. Toshihide Takahashi (PWSI)	For the production competitiveness improvement, there is a need for skill improvement and good tools. Panasonic can provide both in the welding field, I believe that we can contribute to improving India's manufacturing capabilities.
10:20-10:30	Address Mr. Masaaski Kawamura (JICA Indian Office)	In recent years JICA has been dedicated to the development of the Indian manufacturing industry. For example, we have started industrial human resource development business by the "Tamil Nadu Investment Promotion Program." JICA want to continue to cooperate in the future to the public-private partnership scheme such as this.
10:30-10:45	Inaugural Address Mr. Kumar Jayant, IAS Principal Secretary to Government / Labour and Employment Department Government of Tamil Nadu	For Tamil Nadu state supporting the manufacturing industry from the side of the skills. He announced expectations of further Japanese cooperation, and welcomed for this activity.
10:45-10:50	Orientation	Seminar overview
Tea Break		
11:00-12:10	IIT Lecturers Prof. Amitava De	The importance of high-precision arc welding technology, explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.
12:10-13:10	JWES Lecturers Mr. Masaharu Sato	Prof. Masaharu Sato, JWES spoke on Personnel Qualification and Standardization in the field of Advanced Welding technology
13:10-13:15	Reporting Mr. C.Yuvaraj ATI Chennnai	As Japan trainee representative, he reported the training results. Appealed the need of early quality improvement by introducing high precision arc welding technology of Japan.
Lunch		

14:00-14:10	Orientation	Description of demonstration procedures
14:10-17:00	Proceed for Demonstration Venue in ATI.	
	Welding Demonstration 1. High Precision Spatterless Robotic Welding 2. High Precision MIG/MAG Welding, etc.	
17:00-17:30	Thanks giving, etc.	Feedback fill up by trainee, etc.

4) Responders (External human resources, project workers, other responders)

Lecturers: Professor Amitava De, IIT Bombay

Lecturers: Mr. Masaharu Sato, JWES

Special Guest: Mr. Kumar Jayant, IAS Principal Secretary to Government
Labour and Employment Department Government of Tamil Nadu

Special Attendees: Mr. Masaaki Kawamura, JICA India office
N.V. Venkatasubramanian (CII Delhi)
C.Yuvaraj (CII Chennai)

Project Local chief: Mr. Toshihide Takahashi, PWSI

Project workers: Mr. Yukinori Hirota, PWS
Mr. Rikio Suma, PWS

Other responders: One employee of PWS came from Japan.
Some employees of PWSI, and Staff members of the CII.

5) Implementation detailed report & opinions of contractor

(A) Result analysis and feedback for next action

-The number of participants: 142 (VS Planned value 178%)

In the planning stage, we had expected the participation of more than 80 people. But, more trainees than we had planned participated. From public institutions (educators of ATI / ITI) 21 persons came, and from other private organizations 90 people (company) and 31 people (specialized school) came. Including the participants of the Indian government officials and local agency, the total number of participants was more than 150. These are numbers greater than the previous three times activity significantly.

Chennai is the central hub area of the Indian business of Japanese companies and other foreign companies. So, a lot of people gathered in the meeting with the aim of such a manufacturing improvement.

-Understanding level and reaction of the students about the lectures

Lecturers	Seminar themes
IIT Lecturer Prof. Amitava De	The Importance of High-Precision Arc Welding Technology -The Importance of High-Precision Arc Welding Technology. Explanation with examples on the importance of raising the level of welding technology to boost India's competitiveness in manufacturing.
JWES Lecturer Mr. Sato	Quality Management in Welding Field -Personnel Qualification and Standardization

IIT Lecturer Prof. Amitava De

JWES Lecturer Mr. Sato

142 audiences (record number)

Many of the participating members understood the need for high-precision arc welding technology promotion. More than 90 percent had a positive evaluation by the questionnaire. This is a higher ratio than the results of the past three times of local activity.

As part of the opinion of the questionnaire, the education and training students wanted seminars on human resources education. On the other hand, the company officials and the actual welding technicians wished for more information on specific welding equipment and technology. There was a lot of demand from each student.

JICA India training at this time was targeted to cover all India . And we covered 4 major industrial towns ,however If we can hold the same type of seminar regularly in future with contents

corresponding to the requirement of local industry ,it will support to upgrade the skill and technology level to a great extent..

In the analysis results of the questionnaire about the seminar, many of the respondents wrote that they want to attend such lectures in the future. And also many of the respondents requested a full day of demonstration training.

The question-and-answer session after the lecture was also very active. Because there were many questions, the seminar time was insufficient. In particular, there were many questions about the lecture about the importance of welding technology level increase of Professor Amitava DE. In the questionnaire, there were many comments that much more time was needed for questions and answers. So, it can be said that was a more enthusiastic attitude than ever.

-Accomplishment report of the latest welding technology demonstration

Demonstration themes	Comments
Highlight the advantages of introducing robots both in the welding frontlines and in terms of costs.	-Use the demonstrations to highlight advantages for entry-level welders, improving efficiency and quality. -Demonstrate and introduce the world's latest welding robots for entry models for companies adopting robots for the first time.
Demonstrations of the latest spatter-less welders. (Robotic welding)	-Hold demonstrations geared for automobiles plus two wheelers or vehicle parts, let participants see the lack of spatter, the high production efficiency gained, and the beauty of the finish. -Also introduce examples of use by Japanese manufacturers.
Demonstrations of energy saving, highly efficient inverter welders.	-Compare power consumption with thyristors and weldability using demonstrations. -Demonstrations for high speed operation by adding rapid welding wire feed functions. (Meeting needs in the automobile parts manufacturing frontlines)

Also this time, we configured the demonstration in the three steps below.

Step1: Understand the important point in the weld. Understand the level of "good welding."

Step2: Understand the need to select "good welding equipment" to complement the skills.

Step3: Learn weld management in order to maintain a good condition.

Because Tamil Nadu region is an integrated area of manufacturing of automobiles and motorcycles, we provided a program of high-quality and high-efficiency MIG welding and robotic welding demonstration. In addition, intended for many students from the construction industry, heavy industry and vocational training institutions representatives, we also carried out demonstrations, such

as medium-thickness plate welding. So, we provided a demonstration to be directly linked to their needs.

Demonstration of full digital welding

Demonstration of robotic welding

By this time of the demonstration, more than 90% of the visitors were understood the true meaning of the welding conditions, and they understood why it requires human resources training for the maintenance of quality.

In the demonstration corner of the semi-automatic welding machine, several visitors experienced operating digital welding machine. They understood the difference between a digital welding machine and the Indian-made welding machine that has been used in their workplace by hands-on experience. They were very interested in the good weld finishing by sputtering reduction, and in easy operation for the welding conditions decision by the "welding Navi." They had experience that the labor saving can be achieved, and welding quality, safety and efficiency can be improved by the selection of the "good welding equipment."

In the corner of the robot welding, it was found that they had been very much interested in the comparison demonstration between the welding using normal robot welding and the Company's "Active-wire process technology." Compared to the conventional robot welding, "Active-wire process technology" hardly causes sputtering. Regarding this fact, automobile and motorcycle officials were surprised. Some person wrote a comment in the questionnaire that they immediately wanted to introduce our "Active-wire process technology" products in their factory.

In the analysis results of the questionnaire about the demonstration, many of the respondents wanted to attend such a demonstration training in the future again and again. The summary of their requests is as follows.

- ■Request a demonstration meeting at the rate of once a year, or once every six months.
- ■Request a full day of demonstration training. (Not satisfied with demonstration training of half a day.)
- ■Request a demonstration training for each industry (or each company)

  If possible, they want to request the demonstration in their own company and factories.

The number of opinions of the continuation requests for demonstration were overwhelmingly more than that from the lecture seminar in the first half. After completion of this project, We think that at least demonstration activities should be continued for early improvement of weld quality in India.

(B) Willingness, motivation, attitude and level of understanding of students

1. The willingness and motivation of the participants

Participants were people from welding-related companies, the vocational school and government agencies (ATI/ITI) in Tamil Nadu. The number of 142 people significantly above plan is the largest number of participants to date. And, it became a full house from a very early time before the scheduled start. We felt their great expectations.

2. Attitude and level of understanding of students

During the lecture, many students were listening while examining the description of the lecturer and always comparing to their daily experience. The question-and-answer session after the lecture was also very active. Because there were many questions, the seminar time was insufficient.

Also, during the demonstration, we got many eager consultations and questions about welding from them. There were many people who tried welding work by the semi-automatic welding machine by themselves, while receiving guidance from trainers. We felt the active attitude to learn.

According to the analysis of the questionnaire, we think that students correctly understand the gist of each topic.

(C) Reaction of the Tamil Nadu government

Mr. Kumar Jayant (IAS, Principal Secretary to Government /Labour and Employment Department Government of Tamil Nadu) attended this seminar. In his guest speech, he announced expectations of further Japanese cooperation about welding skill up in Tamil Nadu, and welcomed our activity. So, we guessed that this state government has a high motivation.

State of Tamil Nadu plans to build comprehensive education facilities for professional skills education. They likely will adopt as a top priority the welding skills in the education program. So, they are expecting Japan's support to the welding skills initiatives.

And, paid business "Development of industrial human resources in Tamil Nadu" by JICA is supporting their plan.

PWS and PWSI will continue to note the trend of "The development of industrial human resources in Tamil Nadu" by JICA in the future. After completion of this project, if possible, PWSI will make good cooperation with that JICA project.

Chapter 4: Implementation report of Summary Meeting in India

(Outcome of Program for promoting high-precision arc welding technology in India)

1) Date: 12th May, 2016

2) Venue: Meeting room in Hotel HILTON, GUINDY,

3) Participants:

Professor Amitava De, IIT Bombay
Mr. Masaaki Kawamura, JICA India office
Mr. Kazuyuki Ono, Kansai Economic Federation
Mr. Masaharu Sato, JWES
Mr. Sougata Roy Choudhury, Director- Skill Development, CII
Mr. Shashwat Shrivastava, Executive Officer-Skill Development, CII
Mr. Toshihide Takahashi, PWSI
Mr. Amrit Yoga, PWSI
Mr. Yukinori Hirota, PWS
Mr. Rikio Suma, PWS

4) Agenda and schedule:

Time	Agenda	Speaker & Presenter
10:00-10:05	Opening speech	Mr. Toshihide Takahashi, PWSI
10:05-10:15	Announcement of final report by CII	Mr. Sougata, CII Delhi.
10:15-11:30	Discussion about improvement in welding in India and collaborations in the future	All members

5) Discussion contents (Minutes of meeting)

-Opinion on the welding quality and human resource development in India

(Speakers are Mr. Sougata Roy Choudhury of CII and Prof. Amitava De of IIT):

The Indian welding market is large and also very likely to further expand. But, weld quality in India is very low compared to that in other developed countries. Hence, it is a major factor that prevents the direct investment from foreign companies and the further development of manufacturing.

All India and each state, as a priority initiative, are working on human resource development of the manufacturing industry. Welding human resource development has become a top priority in this area.

But, it does not proceed well in India. The biggest reasons are as follows.

1. Fundamentally, they do not know what high welding technology is.
2. Most Indian companies have no opportunity or mechanisms to know about high welding technology, with the exception of few large companies.
3. A systematic training program has not been established.

-Opinion about the outcome of this project

(Speakers are Mr. Sougata Roy Choudhury of CII, Prof. Amitava De of IIT, and Mr. Toshihide Takahashi of PWSI):

Eleven people from India participated in the training sessions in Japan. They learned the high welding technology in Japan, and the way of highly codified human resource development.

Before they went to Japan, they had the confidence to be able to develop the production by their own traditional technology and own traditional equipment. But, they were shocked by the very high level of foreign welding technology. By their own traditional technology and their own traditional equipment, and by way of their own traditional human resources education, they understood that it is not possible to win the competition with foreign companies. Because they understood that their way was wrong, as soon back from Japan, they were beginning the activities for the introduction of Japan's advanced technology to their own organization or company. For example, Hero Motocorp has ordered to PWSI the paid seminars and demonstration sessions for supplier companies and themselves.

At four workshops in India in Gurgaon, Hyderabad, Ahmedabad, and Chennai, total 340 students participated. To the people of wide range from the technical school to small and medium-sized enterprises, we were able to provide an opportunity to learn the same thing with training in Japan.

In conclusion, by this project, we were able to provide the opportunity to learn the level of "good welding," it was the biggest challenge in India, even though with limited area and duration.

-Opinion of CII for the future activities (Mr. Sougata Roy Choudhury of CII)

From now on, we must give the opportunity to know the high welding technology for wider regions, for the many more organizations and companies.

Of course, the India side has to make more effort. In addition, I would like to ask the continued cooperation from the Japan side.

Today, CII was preparing a specific petition. It is a plan to hold similar training like this in another four regions. Please refer to consider it.

-Opinion of Prof. Amitava De (IIT) for the future activities

In India we will soon be entering the era that requires a large amount skilled workers of welding.

So, I think that we should be changing the work of welding to "the high income work" and "the safe work." But, for the improvement of the work of welding, it is impossible to only rely on experience. For the level increase in welding it is always necessary to introduce new knowledge and technology.

We cannot go forward without it.

So, it is important to establish continually continuous mechanism that can provide new and correct information about welding. This is the first problem I think.

As Hero Motocorp's example, in the case of India, to keep old technology is useless. From now on, we must provide some training opportunities to learn that the new technology will bring benefits as well as the energy-saving, process improvement and performance improvement of the finished product itself. Training is required for the people management side, as well as welding workers in order not to hesitate a new investment.

From such a point of view, I agree with the above proposal of CII.

-Opinion of Mr. Kawamura (JICA India office) for the future activities

I have listened to the opinions of the CII and Prof. Amitava De with interest. And, I was able to understand the effect of seminars and demonstrations. I also wish to continue it. But, by the constraints of JICA rule, JICA cannot perform again the same seminar project (Private technology promotion business).

So, we want to make a counter-proposal. The first proposal is the activity that takes advantage of the features of ODA. Please plan to model the case of high-precision arc welding technology transfer in some limited location. So, as a result, there is a possibility that leads to orders for welding equipment. How about that?

The second proposal is a plan of the initiative in conjunction with the current JICA projects. The formation of new businesses in India takes a considerable amount of time. So, I recommend that you take advantage of the existing scheme (cooperation with JICA-related projects that are currently in progress); for example, a business called "Tamil Nadu Investment Promotion Program" and "CSM project (manufacturing executive training support project for comprehensive growth)." If you can promote while sharing information with relevant departments actively, it might be able to achieve the effect at the early stage.

On the other hand, the results about related welding standards will not appear immediately. So, it is important to continue to tenaciously enlighten related parties.

-Opinion of Mr. Takahashi (PWSI) for the future activities

Panasonic Welding Systems group agrees with the proposal of Mr. Kawamura.

Based on the information from Mr. Kawamura today, we will begin activities right away like, for example, exchanging information with the key players.

-Opinion of Mr. Sato (JWES) for the future activities

Important for welding are the 3-points of having good skills, the latest knowledge and high reliability. Only when these three elements are aligned, excellent welding can be realized.

In future work, the first thing that we should do is to clarify the target of education. Many of the layers, such as welding technicians and managers can be considered as a subject. There is a need to educate to all of the layers in India. But, we cannot do this all at once. If we determine priorities, efficiency will be increased.

-Opinion of Mr. Ono (Kansai Economic Federation) for the future activities

This project began when the Kansai Economic Federation delegation visited India in 2014. We are pleased to have an outcome in only two years.

Also after the completion of this project, we are aware that it is necessary to continue to have the activities of welding technology improvement in India. Kansai Economic Federation will continue to support it.