

**TERMINAL EVALUATION REPORT (FINAL)**  
**ON**  
**THE THIRD COUNTRY TRAINING PROGRAM (TCTP) IN**  
**MECHATRONICS SYSTEMS TECHNOLOGY**

**PREPARED FOR : JAPAN INTERNATIONAL COOPERATION AGENCY**

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**DATE : 31 MARCH 2005**

## **LIST OF ABBREVIATIONS**

APEC	-	Asia Pacific Economic Cooperation
FY	-	Fiscal Year
JFY	-	Japanese Fiscal Year
JICA	-	Japan International Cooperation Agency
JSPP21	-	Japan-Singapore Partnership Program for the 21 <sup>st</sup> Century
MFA	-	Ministry of Foreign Affairs, Singapore
NYP	-	Nanyang Polytechnic
TCTP	-	Third Country Training Program

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## **ANNEX**

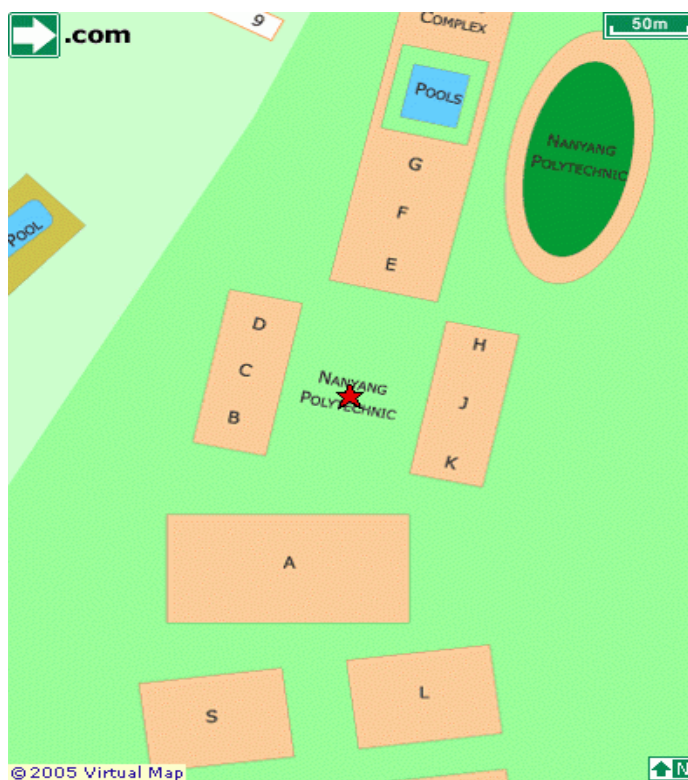
Annex A	Sample of questionnaire used in terminal evaluation
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Annex C	Result of questionnaire survey (verbatim comments)

## LOCATION MAP OF PROJECT

Figure 1: Map of Singapore



Figure 2: Location of training agency



**EXECUTIVE SUMMARY**

Table E1: Outline of the project

<b>1. Outline of the Project</b>	
<b>Country:</b> Singapore	<b>Project title:</b> Third Country Training Program (TCTP) in Mechatronics Systems Technology
<b>Issue/Sector:</b> Engineering / Information Technology	<b>Cooperation scheme:</b> Japan-Singapore Partnership Program for the 21 <sup>st</sup> Century (JSPP21)
<b>Division in charge:</b> Japan International Cooperation Agency (JICA); Technical Cooperation Directorate, Ministry of Foreign Affairs, Singapore	<b>Total cost:</b> S\$311,968.01 <b>Cost per participant:</b> S\$5,999.39 <b>Share of Japan' contribution:</b> 50%
<b>Period of Cooperation</b>	<b>(R/D):</b> JFY2001 JFY2002 JFY2003
	<b>(Extension):</b> Not Applicable <b>(F/U):</b> Not Applicable
<b>Partner Country's Implementing Organization:</b>	Nanyang Polytechnic (NYP)
<b>Supporting Organization in Japan:</b>	Not Applicable
<b>Related Cooperation</b>	Not Applicable

## **2. Background of the Project**

The Governments of Japan and Singapore have assisted developing countries under the Japan-Singapore Partnership Program (JSPP) since 1994. In 1997 both Governments started the Japan-Singapore Partnership Program for the 21<sup>st</sup> Century (JSPP21) based on equal partnership. This cooperation program comprises of training courses and seminars conducted in Singapore and Japan and the dispatching of experts to recipient countries.

The training course in Mechatronics Systems Technology is one such course conducted under the TCTP. The course has been conducted for a total of 9 runs from JFY 1995 to JFY 2003. This evaluation is focused for the 3 runs from JFY 2001 to JFY 2003 to provide feedback for the future courses.

## **3. Project Overview**

### **a. Outputs of the Training Program**

- (i) The objective of the course is to provide the participants with the essential application knowledge and skills in the various mechatronics technologies.

### **b. At the end of the course, the participants are expected to:**

- (i) Acquire the knowledge and skills in machine system elements and peripherals for automation.
- (ii) Acquire the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology.
- (iii) Acquire the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product

design.

- (iv) Acquire the knowledge and skills in pneumatic applications.
- (v) Acquire the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems.
- (vi) Acquire the knowledge and skills in Borderless Access and Monitoring Manufacturing System (BAMMS).
- (vii) Acquire the knowledge and skills in industrial robotics and automated assembly technology.
- (viii) Acquire the knowledge and skills in machine vision technology and their applications.
- (ix) Acquire the knowledge and skills in Communications and Networking technology.
- (x) Acquire the knowledge in the latest developments in mechatronics.

The above 10 objectives of the course form the 10 criteria by which the achievement of the outputs of the course is determined.



#### 4. Inputs

- a. Japanese side :

Table E2: Inputs from Japanese side

<b>Inputs: Japanese side</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
Short-term Experts	Mr. Kazuo Muto	Mr. Shuji Nishino	N.A.
Training expense	38,872.52	43,140.00	42,415.09
Others	49,545.50	84,400.00	53,594.90
Total Cost (S\$)	88,418.02	127,540.00	96,009.99
Total Cost (Yen)	2,998,000	4,500,000	3,080,000

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

- b. Singapore side:

Table E3: Inputs from Singapore side

<b>Inputs: Singapore side</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
Short-term Experts	N.A.	N.A.	N.A.
Training expense	38,872.52	43,140.00	42,415.09
Others	49,545.50	84,400.00	53,594.90
Total Cost (S\$)	88,418.02	127,540.00	96,009.99
Total Cost (Yen)	2,998,000	4,500,000	3,080,000

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

## II. EVALUATION TEAM

1. Members of Evaluation Team

- a. Tay Eng Wah (Researcher / Supervisor)
- b. Peter Lim (Consultant)

- c. Steven Yeong (Researcher)
- d. Ronnie Kow (Assistant Researcher)

2. Period of Evaluation

The period of the evaluation is from 15 November 2004 to 31 March 2005.

3. Type of Evaluation

Terminal

**III. ACHIEVEMENT OF THE TRAINING PROGRAM**

- 1. The number of participants produced by the 3 runs of the training program is appended in Table E4.

Table E4: Number of participants from invited countries

Country	1 <sup>st</sup> run	2 <sup>nd</sup> run	3 <sup>rd</sup> run	Total
Bangladesh	2	2	-	4
Bhutan	1	2	-	3
Cambodia	-	2	2	4
China	1	-	2	3
Fiji	1	-	1	2
Indonesia	2	-	-	2
India	2	-	-	2
Laos	1	1	1	3
Maldives	2	2	-	4
Malaysia	1	-	-	1
Mauritius	-	-	-	-
Mongolia	-	2	1	3
Myanmar	-	-	2	2
Nepal	-	-	1	1
Papua New Guinea	-	-	3	3
Philippines	2	1	2	5
Sri Lanka	-	3	-	3
Thailand	-	1	1	2
Vietnam	-	2	3	5
Total	15	18	19	52

2. The course has achieved its purpose of providing the participants with the essential application knowledge and skills in the various mechatronics technologies

#### **IV. RESULTS OF EVALUATION**

1. Evaluation results

- a. Analysis on the Achievement in terms of Outputs.

As of 15 March 2005, a total of 24 out of 52 ex-participants responded to the survey. This represents a total response rate of 46.2%. It should be noted that the analysis of the findings is limited by the relatively low response rate.

From the response gathered, it is concluded that the course has achieved its objective of providing the participants with the essential application knowledge and skills in the various mechatronics technologies. This is validated by the feedback of the ex-participants who responded to the survey, where all 24 ex-participants (100%) indicated that the course has achieved the above objective. This conclusion is also attained by the successful achievement of output based on the 10 criteria, and the majority of promoting factors versus inhibiting factors.

- b. Relevance

- (i) The evaluation team concluded that the knowledge or skills learnt in the course are relevant to the development needs and policies of the ex-participants countries. This is validated by the feedback of the ex-participants, where 14 out of 24 ex-participants (58.4%) who responded to the survey rated the above to be between 51% to 100%. 9 out of 24 ex-participants (37.5%) rated the above to be between 26% to 50%. The 9 ex-participants are from

Maldives, Philippines, Indonesia, Mongolia, Bhutan, Vietnam and Cambodia. 1 ex-participant (4.2%) did not comment. He is from Fiji.

- (ii) The evaluation team also concluded that the training was the best way to transfer knowledge and skills to the ex-participants' countries. This is validated by the feedback of the ex-participants, where all 24 of them (100%) who responded to the survey indicated that the training the best way to transfer knowledge and skills to their countries.

## 2. Factors promoting sustainability and impact

- a. The following are the factors concerning to planning which promoted the sustainability and impact of the course:

- (i) The appropriate setting of the objectives for the course.
- (ii) The appropriate requirements for application for the course.
- (iii) The appropriateness of the countries involved for the course.

- b. The following are the factors concerning the implementation process which promoted the sustainability and impact of the course:

- (i) The willingness of the participants to participate in the course.
- (ii) The appropriate text / materials that were provided for the course.

- (iii) The clarity of the lecturers who taught in the course.
- (iv) The appropriate equipment and facilities used for conducting the course.
- (v) The appropriate administration and management of the course.
- (vi) The appropriate visits conducted to other organizations during the course.
- (vii) The appropriate hands-on practical training conducted during the course.

### 3. Factors inhibiting sustainability and impact

- a. The following are the factors which inhibited the sustainability and impact of the course:
  - (i) Negative feedback on the inhibiting factors was provided by only a minority of the ex-participants (25% or less). The ex-participants pointed out 3 factors which may inhibit the sustainability and impact of the course. JICA and MFA Singapore should examine the need to address the following inhibiting factors to improve the course.
  - (ii) From the 24 ex-participants who responded to the survey, 8 of them (33.3%) had indicated that the curriculum of the course was too advanced, while 1 of them (4.2%) had indicated that it was too simple. JICA and MFA Singapore should pay more attention to the selection of the applicants to ensure that all participants are adequately knowledgeable in the field of mechatronics systems technology.

- (iii) From the 24 ex-participants who responded to the survey, 16 of them (66.7%) had indicated that the duration of the course is too short. JICA and MFA Singapore should examine the need to formulate new programs which are focused on specific mechatronics systems technology
- (iv) From the 24 ex-participants who responded to the survey, 3 of them (12.5%) had indicated that the course did not have enough theory, while 5 of them (20.8%) had indicated that it did not have enough practical. JICA and MFA Singapore, together with NYP, should examine whether or not there is a need to balance the number of theory and practical lessons.

#### 4. Conclusion

It is concluded by the evaluation team that the course has successfully achieved its output and purpose. This conclusion was attained after the analysis of the achievement of output based on the 10 criteria, and the majority of promoting factors over the number of inhibiting factors. JICA and MFA Singapore should continue to conduct the same course in the next FY. However, for future courses after the next FY, both agencies should examine whether it should formulate new programs which are focused on specific mechatronics systems technology. If the same number of topics is required to be covered, JICA and MFA Singapore should consider extending the duration of the course.

#### 5. Recommendations

- a. As a short course to provide the participants with the essential application knowledge and skills in the various mechatronics technologies, it is concluded by the evaluation team that the course has successfully achieved its output and purpose.
- b. However, for future courses after the next FY, JICA and MFA

Singapore should consider developing new programs which are focused specific mechatronics systems technology.

- c. As a short term solution to address the feedback from the ex-participants, JICA and MFA Singapore should examine if they have the resources to extend the duration of the course to 4 weeks. The extension of the duration to 4 weeks would allow NYP to have more time to cover the introductory topics in mechatronics systems technology in greater depth, and allow for more theory / practical lessons and site visits.
- d. JICA and MFA Singapore should also consider developing different programs which focus on technical and business issues. The technical program would have a greater technical emphasis which would cater for engineers and engineering practitioners. The business program would have a greater emphasis on the business and industrial applicability, and the cost-benefit analysis of mechatronics systems technology, and would cater for managers and decision makers.
- e. As part of developing new programs in mechatronics, JICA and MFA Singapore should also consider the possibility of developing an industrial automation program to help some of the targeted countries start their industrialization process. This program would be focused on basic tools for industrial automation, instead of advanced topics like industrial robotics.

## 6. Lessons Learned

### Lessons learnt regarding the situations in the evaluated countries and sectors

- a. JICA and MFA Singapore should examine developing new programs focused on specific mechatronics systems technology which can be applied to the long-term development needs of the

participants and their countries.

- b. Some of the more advanced topics in mechatronics system technology e.g. the use of industrial robots may not be useful for the participants and their countries.
- c. On the other hand, new programs such as one focused on basic tools for industrial automation may be more useful for the participants and their countries.

#### Lessons learnt regarding project management

- a. JICA and MFA Singapore should consider providing reference list / reference materials to the participants during the course so that participants can choose to either acquire or use them when they return to their countries. The provision should be subjected to the copyright of the materials.
- b. JICA and MFA Singapore should consider conducting a post-course evaluation 3 to 6 months after the end of the course. This would allow participants to have time to either implement some of the knowledge acquired during the training, or discuss with their colleagues, the skills and knowledge taught in the course.
- c. As a follow-up to the course, JICA and MFA Singapore should also consider creating a forum / alumni group for ex-participants to come together to share ideas and look for solutions in mechatronics systems technology.
- d. JICA and MFA Singapore should also consider providing ex-participants with reference materials and free software on mechatronics systems technology after they have returned to their countries. These may be provided in the form of a CD-ROM. The provision should be subjected to the copyright of the materials.



7. Follow-up Situation

- a. JICA and MFA Singapore should continue to conduct the same course in the next FY. However, for future courses after the next FY, JICA and MFA Singapore should consider developing new programs which are focused specific mechatronics systems technology.
- b. As a short term solution to address the feedback from the ex-participants, JICA and MFA Singapore should examine extending the duration of the course to 4 weeks to address the feedback of the ex-participants. 16 out of 24 ex-participants who responded to the survey (66.7%) indicated that the duration of the course was too short.
- c. JICA and MFA Singapore should also consider developing different programs which focus on technical and business issues. One would have a greater technical emphasis which would cater for engineers and engineering practitioners. The other would have a greater emphasis on the business and industrial applicability, and the cost-benefit analysis of mechatronics systems technology. This would cater for managers and decision makers.

## **CHAPTER I            OUTLINE OF EVALUATION STUDY**

### **1.     Objectives of Evaluation Study**

The main objective of the study is to provide feedback on the lessons and recommendations obtained to serve the subsequent identification, planning and implementation of future Third Country Training Programs (TCTPs). Therefore, the scope of work for the study covered:

- a.     The review and evaluation of the appropriateness and effectiveness of the training course.
- b.     The analysis of the positive and negative factors and their implications which may have influenced the appropriateness and effectiveness of the training course.
- c.     The identification of the lessons and recommendations for future training courses.

### **2.     Members of Evaluation Study Team**

The evaluation study team consists of the following members assigned with the respective roles and responsibilities.

- a.     Tay Eng Wah (Researcher / Supervisor)
- b.     Peter Lim (Consultant)
- c.     Steven Yeong (Researcher)
- d.     Ronnie Kow (Assistant Researcher)

### **3.     Period of Evaluation Study**

The period of the evaluation was from 15 November 2004 to 31 March

2005.

#### **4. Methodology of Evaluation Study**

The methodology of the evaluation study consists of the following:

- a. Literature survey: The materials which were used for the purpose of this evaluation study included the general Information (G.I.) brochures of the training program, and the course materials which were used to instruct the participants.
- b. Direct Measurement: A survey form designed for the ex-participants was formulated in consultation with JICA Singapore. The survey form was sent to the ex-participants via post, fax or email. Ex-participants were asked to respond to the survey through three rounds of reminders through post, fax or email.
- c. Key Informant Interviews: A survey form designed for the organizers of the course was formulated in consultation with JICA Singapore. The feedback of the organizers and the trainers at the Nanyang Polytechnic was obtained from them through a face-to-face meeting held on 13 January 2005.

## **CHAPTER II            OUTLINE OF EVALUATED PROJECT**

### **1.     Background of Project**

The Official Development Assistance (ODA) of Japan began in 1954 to assist developing countries in their socio-economic development. Japan's provision of economic cooperation is based on the concept of "humanitarian and morel considerations" and "the recognition of interdependence among nations" Since its establishment in 1974, the Japan International Cooperation Agency (JICA) has been extending technical cooperation in human resources development to developing countries for their nation building as part of Japan's ODA programs. JICA's activities take various forms such as dispatching experts and volunteers to developing countries. Also, JICA accepts participants from those countries for technical training in Japan. Some of the key areas of training are Agriculture, Forestry, & Fisheries, Public Health & Medicine, Education, Planning & Administration, Mining and Industry.

The Governments of Japan and Singapore have assisted developing countries under the Japan-Singapore Partnership Program (JSPP) since 1994. In 1997, both governments started the Japan-Singapore Partnership Program for the 21<sup>st</sup> century (JSPP21) based on equal partnership. This cooperation program comprises of training courses and seminars conducted in Singapore and Japan and the dispatching of experts to recipient countries.

The training course in Mechatronics Systems Technology is one such course conducted under the Third-Country Training Program (TCTP). Since 1995, the course has been successfully running for the ninth time on an annual basis. This evaluation is focused for the 3 runs from JFY 2001 to JFY 2003 to provide feedback for the future courses. A previous evaluation had already been conducted for the first 4 runs of the course from JFY 1995 to JFY 1999.

## 2. Summary of Initial Plan of Project (Cooperation Content)

a. The course title is the Mechatronics Systems Technology Training Course under the Third Country Training Program in Singapore.

b. The course has been conducted for a total of 3 runs from the year 2001 to 2003. The number of participants in each run of the course is as follows:

Year 2001	-	15
Year 2002	-	18
Year 2003	-	19

c. The duration of training in each run of the course is as follows:

Year 2001	-	3 weeks
Year 2002	-	3 weeks
Year 2003	-	3 weeks

d. The period of cooperation was from Japan Fiscal Year (JFY) 2001 to JFY 2003. This is a total of 3 years.

## 3. Requirements for Application

The requirements for application to the TCTP are as follows:

a. Level of knowledge / technique which participants are expected to have: Applicants should possess a diploma or bachelor degree at a polytechnic or college / university in Electronic or Mechanical Engineering.

b. Desirable current positions/duties: The applicants are expected to be government officials. They should also be technical managers, development and application engineers of

mechatronics-related institutions of the government or head/senior lecturers of mechatronics-related department of the technical education, institute (polytechnic, college, university) of the government.

- c. Years of experience in the sector / issue in question: Applicants are required to have at least 5 years experience in mechatronics-related technologies.
- d. Age limit: Applicants are expected to be between 25 and 50 years of age.
- e. Target countries: The list of invited countries for this course are: Bangladesh, Cambodia, Peoples Republic of China, East Timor, Fiji, India, Indonesia, Lao PDR, Maldives, Mauritius, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam.
- f. Other requirements: The applicants must be nominated by their respective governments. They are expected to be proficient in English and in good health to complete the course. Applicants are expected to be experienced with minimum computer operations.

#### **4. Output of the Training Program**

The objective of the course is to provide the participants with the essential application knowledge and skills in the various mechatronics technologies.

- a. At the end of the course, the participants are expected to:
  - (i) Acquire the knowledge and skills in machine system elements and peripherals for automation.

- (ii) Acquire the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology.
- (iii) Acquire the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product design.
- (iv) Acquire the knowledge and skills in pneumatic applications.
- (v) Acquire the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems.
- (vi) Acquire the knowledge and skills in Borderless Access and Monitoring Manufacturing System (BAMMS).
- (vii) Acquire the knowledge and skills in industrial robotics and automated assembly technology.
- (viii) Acquire the knowledge and skills in machine vision technology and their applications.
- (ix) Acquire the knowledge and skills in Communications and Networking technology.
- (x) Acquire the knowledge in the latest developments in mechatronics.

Table 1: Output of the training program

No.	Output	Criteria	Means of Verification	Description of Criteria
1.	Acquired the essential application knowledge and skills in the various mechatronics technologies.	Criteria 1: Participants are expected to acquire the knowledge and skills in machine system elements and peripherals for automation (10%).	<p>a. Questionnaire survey at terminal evaluation (self-evaluation by the ex-participants)</p> <p>b. Feedback of course organizer / trainer(s)</p>	<p>a. 8 out of 24 ex-participants (33.3%) who responded to the survey indicated that the course has achieved the said criteria. 16 out of 24 of them (66.7%) indicated that the course has partly achieved the said criteria.</p> <p>b. Likewise, the trainers at NYP also believed that the course has achieved the said criteria.</p>
		Criteria 2: Participants are expected to acquire the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology (10%).	As above	<p>a. 7 out of 24 ex-participants (29.2%) who responded to the survey indicated that the course has achieved the said criteria. 17 out of 24 of them (70.8%) indicated that the course has partly achieved the said criteria.</p> <p>b. Likewise, the trainers at NYP also believed that the course has achieved the said criteria.</p>



No.	Output	Criteria	Means of Verification	Description of Criteria
		<p>Criteria 3: Participants are expected to acquire the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product design (10%).</p>	<p>As above</p>	<p>a. 4 out of 24 ex-participants (16.7%) who responded to the survey indicated that the course has achieved the said criteria. 14 out of 24 of them (58.3%) indicated that the course has partly achieved the said criteria. However, 6 out of 24 of them (25.0%) indicated that the course did not achieve the said criteria. Of these 6 ex-participants, 4 of them were from the third run of the course. It should be noted that CAD was not taught in the third run of the course.</p> <p>b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.</p>
		<p>Criteria 4: Participants are expected to acquire the knowledge and skills in pneumatic applications (10%).</p>	<p>As above</p>	<p>a. 14 out of 24 ex-participants (58.3%) who responded to the survey indicated that the course has achieved the said criteria. 8 out of 24 of them (33.3%) indicated that the course has partly achieved the said criteria. However, 2</p>

No.	Output	Criteria	Means of Verification	Description of Criteria
				<p>out of 24 of them (8.3%) indicated that the course did not achieve the said criteria.</p> <p>b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.</p>
		<p>Criteria 5: Participants are expected to acquire the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems (10%).</p>	<p>As above</p>	<p>a. 11 out of 24 ex-participants (45.8%) who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them (50.0%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria.</p> <p>b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.</p>
		<p>Criteria 6: Participants are expected to acquire the knowledge and skills in</p>	<p>As above</p>	<p>a. 4 out of 24 ex-participants (16.7%) who responded to the survey indicated that the</p>

No.	Output	Criteria	Means of Verification	Description of Criteria
		Borderless Access and Monitoring Manufacturing System (BAMMS) (10%).		<p>course has achieved the said criteria. 14 out of 24 of them (58.3%) indicated that the course has partly achieved the said criteria. However, 6 out of 24 of them (25.0%) indicated that the course did not achieve the said criteria. Of these 6 ex-participants, 5 of them were from the second and third runs of the course. It should be noted that BAMMS was not taught in the second and third runs of the course.</p> <p>b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.</p>
		Criteria 7: Participants are expected to acquire the knowledge and skills in industrial robotics and automated assembly technology (10%).	As above	<p>a. 8 out of 24 ex-participants (33.3%) who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them (50.0%) indicated that the course has partly achieved the said criteria. However, 4 out of 24 of them (16.7%) indicated that the course did</p>

No.	Output	Criteria	Means of Verification	Description of Criteria
				not achieve the said criteria.  b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
		Criteria 8: Participants are expected to acquire the knowledge and skills in machine vision technology and their applications (10%).	As above	a. 9 out of 24 ex-participants (37.5%) who responded to the survey indicated that the course has achieved the said criteria. 13 out of 24 of them (54.2%) indicated that the course has partly achieved the said criteria. However, 2 out of 24 of them (8.3%) indicated that the course did not achieve the said criteria.  b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
		Criteria 9: Participants are expected to acquire the knowledge and skills in Communications and Networking technology. (10%).	As above	a. 11 out of 24 ex-participants (45.8%) who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them

No.	Output	Criteria	Means of Verification	Description of Criteria
				<p>(50%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria.</p> <p>b. Likewise, the trainers at NYP also believed that the course has achieved the said criteria.</p>
		<p>Criteria 10: Participants are expected to acquire the knowledge in the latest developments in mechatronics (10%).</p>	<p>As above</p>	<p>a. 14 out of 24 ex-participants (58.3%) who responded to the survey indicated that the course has achieved the said criteria. 9 out of 24 of them (37.5%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria.</p> <p>b. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.</p>

## 5. Curriculum

Table 2: Curriculum of the course

The following is the curriculum of the course based on the third run of the TCTP in Mechatronics Systems Technology.

Related Output	Topic of training	Method of training	Time allocation (hours)
Output No. 1	Tour of training facilities	Observation	3
	ITL concepts: Mechatronics Labs	Lecture	1.5
	Applications of Mechatronics Technology	Lecture	3
	Overview of Mechatronics	Lecture	3
	Mechatronics Technology: Trends and developments	Lecture	3
	Pneumatics Applications	Lecture	6
	PLC programming and applications	Lecture	13.5
	Computer control	Lecture	4.5
	Industrial robotics	Lecture	6
	Machine vision technology	Lecture	4.5
	Motion control	Lecture	3
	Communication and networking technology	Lecture	6
	Country Presentation	Meeting, discussion and presentation	1.5
	Field visit: Seiko Instruments (S) Pte Ltd	Observation	3
	Field visit: Matsushita Electronics (Components) (S) Pte Ltd	Observation	3

## 6. Training Institution

- a. The conduct of the training was assigned to the Nanyang Polytechnic (NYP).

- b. Nanyang Polytechnic was established in April 1992 to provide education and training to meet the increasing demands of the Singapore economy. It also provides customized training programs to meet the developmental needs of professionals from the local and international government agencies, industries and businesses. Its modern campus is well equipped with up-to-date facilities for quality education and training in engineering, information technology and infocomm technology, chemical and pharmaceutical technology, business management, life sciences, health science, pedagogy & educational development, English language and communication skills.
  
- c. Under its international program centre, NYP actively extends its programs and expertise to professionals in the Asia Pacific region. It supports the Singapore Ministry of Foreign Affairs in providing specially designed training programs under the Singapore Cooperation Program.
  
- d. These specialized programs range from educational development, engineering and infocomm technology to business management, communication skills and nursing specializations. Since 1993, NYP has conducted more than 270 international programs ranging from 1 to 12 weeks for more than 4,300 participants from some 43 countries.
  
- e. Participants benefit from a team of qualified lecturers who are experienced in their respective areas of expertise. As consultants and project development specialists, the team keeps in touch with the latest technological developments and market trends while making continual contribution to industry. NYP pride itself on providing carefully customized and professionally delivered training programs that give participants a balanced and total learning experience.

## **7. Revision from the Initial Plan**

- a. The TCTP in Mechatronics Systems Technology Training Course is conducted under the Japan-Singapore Partnership Program for the 21<sup>st</sup> Century (JSPP21). The objective of the course is to equip participants with the essential application knowledge and skills in the various mechatronics technology. There have not been any revisions to the objectives of course.



## **CHAPTER III      ACHIEVEMENTS OF THE TRAINING PROGRAM**

### **1.      Implementation Framework of Project**

The Governments of Japan and Singapore have assisted developing countries under the Japan-Singapore Partnership Program (JSPP) since 1994. In 1997 both Governments started the Japan-Singapore Partnership Program for the 21<sup>st</sup> Century (JSPP21) based on equal partnership. This cooperation program comprises of training courses and seminars conducted in Singapore and Japan and the dispatching of experts to recipient countries.

The training course in Mechatronics Systems Technology is one such course conducted under the TCTP. Since 1995, the course has been successfully run for the ninth time on an annual basis. This evaluation is focused for the 3 runs from JFY 2001 to JFY 2003.

The project resources, schedule and scope were defined by JICA and MFA Singapore. The objective of the course is to provide participants with the essential application knowledge and skills in the various mechatronics technologies. This is expected to be achieved through the delivery of a 3-week training program conducted in Singapore. The resources allocated for the course were funding provided by JICA and MFA Singapore, and the supply of trainers by JICA and the Nanyang Polytechnic.

All runs of the course have been conducted by the Nanyang Polytechnic.

## 2. Achievement in Terms of Activity

Table 3 below shows the number of participants for 3 runs of the training program from JFY 2001 to JFY 2003. It can be seen that there has been a steady increase of total number of participants from 15 in 2001 to 19 in 2003. This would attest to the popularity and usefulness of the training program. Mechatronics is a combination of electronics, computing technologies and mechanical engineering. These are skill sets which are not widespread among the invited countries. This would account for the relatively stable number of participants from JFY 2001 to JFY 2003. Nonetheless, mechatronics is an important element in the industrial and economic output for developing countries in their drive to increase productivity. Mechatronics also enable these countries to gain knowledge and technology transfer to improve their industrial infrastructure.

Table 3: Number of participants from invited countries

Country	1 <sup>st</sup> run	2 <sup>nd</sup> run	3 <sup>rd</sup> run	Total
Bangladesh	2	2	-	4
Bhutan	1	2	-	3
Cambodia	-	2	2	4
China	1	-	2	3
Fiji	1	-	1	2
Indonesia	2	-	-	2
India	2	-	-	2
Laos	1	1	1	3
Maldives	2	2	-	4
Malaysia	1	-	-	1
Mauritius	-	-	-	-
Mongolia	-	2	1	3
Myanmar	-	-	2	2
Nepal	-	-	1	1
Papua New Guinea	-	-	3	3
Philippines	2	1	2	5
Sri Lanka	-	3	-	3
Thailand	-	1	1	2
Vietnam	-	2	3	5
Total	15	18	19	52

### 3. Achievement in Terms of Output

- a. The course has achieved its purpose in terms of output.
- b. This is validated by the feedback of the ex-participants. All 24 ex-participants who responded to the survey indicated that the course has achieved its purpose of providing them with the essential application knowledge and skills in the various mechatronics technologies.

### 4. Achievement in Terms of Input

- a. The total costs of the training course (in local currency and Japanese Yen) broken down by year are appended in Table 4.

Table 4: Total costs of the training course

<b>Total costs</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total</b>
S\$	88,418.02	127,540.00	96,009.99	88,418.02
Yen	2,998,000	4,500,000	3,080,000	2,998,000

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

- b. The cost per participant (in local currency and Japanese Yen) broken down by year is as follows.

Table 5: Cost per participant

<b>Cost per participant</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>Total</b>
No. of participants	15	18	19	52
S\$	5,894.53	7,085.56	5,053.16	4,019.00
Yen	199,866.67	250,000.00	162,105.26	136,272.73

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

- c. The share of Japanese and Singapore contribution (in local currency and Japanese Yen) broken down by year is as follows.

(i) Japanese Side

**Table 6: Inputs from Japanese side**

<b>Inputs: Japanese side</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
Short-term Experts	Mr. Kazuo Muto	Mr. Shuji Nishino	N.A.
Training expense	38,872.52	43,140.00	42,415.09
Others	49,545.50	84,400.00	53,594.90
Total Cost (S\$)	88,418.02	127,540.00	96,009.99
Total Cost (Yen)	2,998,000	4,500,000	3,080,000

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

(ii) Singapore's Side

**Table 6: Inputs from Singapore side**

<b>Inputs: Singapore side</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
Short-term Experts	N.A.	N.A.	N.A.
Training expense	38,872.52	43,140.00	42,415.09
Others	49,545.50	84,400.00	53,594.90
Total Cost (S\$)	88,418.02	127,540.00	96,009.99
Total Cost (Yen)	2,998,000	4,500,000	3,080,000

N.A.: Not Applicable

Note: The exchange rates used are as follow: S\$1.00 = ¥67.82 (2001), ¥70.57 (2002) and ¥64.16 (2003).

## **CHAPTER IV            EVALUATION RESULTS**

### **1.     Analysis on Outputs**

The analysis of the outputs of the course was determined using the feedback obtained from the ex-participants and the trainers. Feedback from the ex-participants was obtained through a survey questionnaire. Feedback from the trainers was obtained through a face-to-face interview conducted on 13 January 2005.

- a.     Response rate of survey questionnaire: As of 15 March 2005, a total of 24 out of 52 ex-participants responded to the survey. This represents a total response rate of 46.2%. It should be noted that the analysis of the findings is limited by the relatively low response rate.
  
- b.     Output of course: All 24 ex-participants who responded to the survey indicated that the course has achieved its purpose of providing them with the essential application knowledge and skills in the various mechatronics technologies.
  
- c.     Criteria 1 – Acquire the knowledge and skills in machine system elements and peripherals for automation: 8 out of 24 ex-participants (33.3%) who responded to the survey indicated that the course has achieved the said criteria. 16 out of 24 of them (66.7%) indicated that the course has partly achieved the said criteria. Likewise, the trainers at NYP also believed that the course has achieved the said criteria.
  
- d.     Criteria 2 – Acquire the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology: 7 out of 24 ex-participants (29.2%) who responded to the survey indicated that the course has achieved the said criteria. 17 out of 24 of them (70.8%) indicated that the course has partly achieved the said criteria. Likewise, the trainers at

NYP also believed that the course has achieved the said criteria.

- e. Criteria 3 – Acquire the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product design: 4 out of 24 ex-participants (16.7%) who responded to the survey indicated that the course has achieved the said criteria. 14 out of 24 of them (58.3%) indicated that the course has partly achieved the said criteria. However, 6 out of 24 of them (25.0%) indicated that the course did not achieve the said criteria. Of these 6 ex-participants, 4 of them were from the third run of the course. It should be noted that CAD was not taught in the third run of the course. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
  
- f. Criteria 4 – Acquire the knowledge and skills in pneumatic applications: 14 out of 24 ex-participants (58.3%) who responded to the survey indicated that the course has achieved the said criteria. 8 out of 24 of them (33.3%) indicated that the course has partly achieved the said criteria. However, 2 out of 24 of them (8.3%) indicated that the course did not achieve the said criteria. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
  
- g. Criteria 5 – Acquire the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems: 11 out of 24 ex-participants (45.8%) who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them (50.0%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.

- h. Criteria 6 – Acquire the knowledge and skills in Borderless Access and Monitoring Manufacturing System (BAMMS): 4 out of 24 ex-participants (16.7%) who responded to the survey indicated that the course has achieved the said criteria. 14 out of 24 of them (58.3%) indicated that the course has partly achieved the said criteria. However, 6 out of 24 of them (25.0%) indicated that the course did not achieve the said criteria. Of these 6 ex-participants, 5 of them were from the second and third runs of the course. It should be noted that BAMMS was not taught in the second and third runs of the course. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
- i. Criteria 7 – Acquire the knowledge and skills in industrial robotics and automated assembly technology: 8 out of 24 ex-participants (33.3%) who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them (50.0%) indicated that the course has partly achieved the said criteria. However, 4 out of 24 of them (16.7%) indicated that the course did not achieve the said criteria. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
- j. Criteria 8 – Acquire the knowledge and skills in machine vision technology and their applications: 9 out of 24 ex-participants (37.5%) who responded to the survey indicated that the course has achieved the said criteria. 13 out of 24 of them (54.2%) indicated that the course has partly achieved the said criteria. However, 2 out of 24 of them (8.3%) indicated that the course did not achieve the said criteria. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.
- k. Criteria 9 – Acquire the knowledge and skills in Communications and Networking technology: 11 out of 24 ex-participants (45.8%)

who responded to the survey indicated that the course has achieved the said criteria. 12 out of 24 of them (50%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria. Likewise, the trainers at NYP also believed that the course has achieved the said criteria.

- I. Criteria 10 – Acquire the knowledge in the latest developments in mechatronics: 14 out of 24 ex-participants (58.3%) who responded to the survey indicated that the course has achieved the said criteria. 9 out of 24 of them (37.5%) indicated that the course has partly achieved the said criteria. However, 1 out of 24 of them (4.2%) indicated that the course did not achieve the said criteria. The trainers at NYP agreed with the majority of the ex-participants, and believed that the course has achieved the said criteria.

## **2. Promoting and Inhibiting Factors**

The following are the factors promoting / inhibiting the achievements of the objectives and outputs of the course. The factors were rated by the ex-participants and the trainers of the course.

- a. Setting of the objectives for the course: 19 out of 24 ex-participants (79.2%) who responded to the survey rated the above to be just right. 5 out of 24 of them (20.8%) rated it to be too advanced. The 5 ex-participants who indicated that the course was too advanced are from Maldives, Indonesia, Bhutan and Nepal. The trainers at NYP agreed with the majority of the ex-participants, and rated it to be just right.
- b. Requirements for application for the course: 22 out of 24 ex-participants (91.7%) who responded to the survey rated the above to be just right. 1 out of 24 of them (4.2%) rated it to be too strict. 1 out of 24 of them (4.2%) did not comment. The



trainers at NYP agreed with the majority of the ex-participants, and rated it to be just right.

- c. Willingness of the participants for the course: 10 out of 24 ex-participants (41.7%) who responded to the survey rated the above to be very good. 11 out of 24 of them (45.8%) rated it to be good. 3 out of 24 of them (12.5%) rated it to be fair. The trainers at NYP rated it to be very good.
  
- d. Curriculum of the course: 15 out of 24 ex-participants (62.5%) who responded to the survey rated the above to be just right. 8 out of 24 of them (33.3%) rated it to be too advanced. 1 ex-participant (4.2%) rated it to be too simple. The 8 ex-participants who indicated that the course was too advanced are from Nepal, Maldives, Brunei, Mongolia, Bhutan, Vietnam and Cambodia. The 1 ex-participant who indicated that the course was too simple is from Indonesia. The trainers at NYP agreed with the majority of the ex-participants, and rated it to be just right.
  
- e. Appropriateness of the countries involved for the course: 13 out of 24 ex-participants (54.2%) who responded to the survey rated the above to be appropriate. 9 out of 24 of them (37.5%) rated it to be very appropriate. 2 out of 24 of them (8.3%) rated it to be not appropriate. The trainers at NYP agreed with the majority of the ex-participants, and rated it to be appropriate.
  
- f. Duration of the course: 8 out of 24 ex-participants (33.3%) who responded to the survey rated the above to be just right. 16 out of 24 of them (66.7%) rated it to be too short. The trainers at NYP rated it to be just right.
  
- g. Text / materials that were provided for the course: 19 out of 24 ex-participants (79.2%) who responded to the survey rated the above to be just right. 1 out of 24 of them (4.2%) rated it to be too much. 4 out of 24 of them (16.7%) rated it to be too little.

The trainers at NYP agreed with the majority of the ex-participants, and rated it to be just right.

- h. Clarity of the lecturers who taught in the course: 13 out of 24 ex-participants (54.2%) who responded to the survey rated the above to be very clear. 11 out of 24 of them (45.8%) rated it to be clear. The trainers at NYP agreed with the majority of the ex-participants, and rated it to be clear.
- i. Equipment and facilities used for conducting the course: 16 out of 24 ex-participants (66.7%) who responded to the survey rated the above to be very good. 6 out of 24 of them (25.0%) rated it to be good. 2 out of 24 of them (8.3%) rated it to be fair. The trainers at NYP rated it to be very good.
- j. Administration and management of the course: 17 out of 24 ex-participants (70.8%) who responded to the survey rated the above to be very good. 7 out of 24 of them (29.2%) rated it to be good. The trainers at NYP rated it to be very good.
- k. Visits conducted to other organizations during the course: 16 out of 24 ex-participants (66.7%) who responded to the survey rated the above to be very good. 7 out of 24 of them (29.2%) rated it to be good. 1 out of 24 of them (4.2%) rated it to be fair. The trainers at NYP rated it to be very good.
- l. Hands-on practical training conducted during the course: 10 out of 24 ex-participants (41.7%) who responded to the survey rated the above to be very good. 10 out of 24 of them (41.7%) rated it to be good. 4 out of 24 of them (16.7%) rated it to be fair. The trainers at NYP rated it to be very good.
- m. Treatment of subjects taught in the course: 16 out of 24 ex-participants (66.7%) who responded to the survey rated the above to be just right. 3 out of 24 of them (12.5%) rated it to

have not enough theory. 5 out of 24 of them (20.8%) rated it to have not enough practical. The trainers at NYP rated it to be just right.

### **3. Relevance**

#### **a. Relevance of the reasons of setting the training program**

(i) The training program is evaluated to be necessary for the development needs and policies of the countries which have been invited to participate in this course. Mechatronics is a combination of electronics, computing technologies and mechanical engineering. The appropriate uses of mechatronics technologies would lead to cost-effective and high performance systems for the manufacturing industries. Developing countries will be able to benefit from the course through increased productivity, lower cost of production and increased industrial output.

(ii) Applicability of knowledge or skills learnt in the course to the development needs and policies in their countries: 4 out of 24 ex-participants (16.7%) who responded to the survey rated the above to be between 76% to 100%. 10 out of 24 of them (41.7%) rated it to be between 51% to 75%. 7 out of 24 of them (29.2%) rated it to be between 26% to 50%. These 7 ex-participants are from Maldives, Indonesia, Mongolia, Bhutan, Vietnam and Cambodia. 2 out of 24 of them (8.3%) rated it to be between 0% and 25%. These 2 ex-participants are from Philippines and Bhutan. 1 ex-participant (4.2%) did not comment. He is from Fiji.

(iii) On whether the training was the best way to transfer knowledge and skills to the ex-participants' countries: All

24 of the ex-participants (100%) who responded to the survey indicated that the training the best way to transfer knowledge and skills to their countries.

- (iv) On whether the course was meaningful in promoting networking and cooperation among developing countries: 23 out of 24 of the ex-participants (95.8%) who responded to the survey indicated that the training was meaningful in promoting networking and cooperation among developing countries. 1 ex-participant (4.2%) indicated that that the training was not meaningful in promoting networking and cooperation among developing countries.

b. Appropriateness of output setting and curriculum design

The setting of the output of the course was determined by JICA in consultation with MFA Singapore. The objective of the course is to provide participants with the essential application knowledge and skills in the various mechatronics technologies. Nanyang Polytechnic has designed the curriculum to meet the objective of the course. It is concluded by the evaluation team that the curriculum has been designed appropriately to meet the objective of the course.

c. Appropriateness of requirement for the applicants and selection

- (i) Applicants should possess a diploma or bachelor degree at a polytechnic or college / university in Electronic or Mechanical Engineering. It is appropriate that applicants are expected to have a degree or diploma in the above field so that they will be able to understand the mechatronics systems technology knowledge and skills taught in the course. This will also allow them to apply what they have learnt when they return to their countries.

- (ii) Applicants are expected to be government officials. They should also be technical managers, development and application engineers of mechatronics-related institutions of the government, or head / senior lecturers of mechatronics-related department of the technical education, institute (polytechnic, college, university) of the government: As can be seen from the above criteria, applicants are expected to be either government officials, or lecturers in tertiary institutions in their own countries. They are also expected to be knowledgeable to a certain extent in mechatronics. This first requirement is appropriate as government officials require the knowledge and skills in mechatronics before being able to address the development needs and policies in their countries. Likewise, the second requirement ensures that the knowledge and skills transferred will be sustainable in the developing countries through the efforts of the tertiary institutions.
- (iii) Applicants are expected to have at least 5 years experience in mechatronics-related technologies. This requirement is appropriate as it will allow the participants to have a good appreciation of what is being taught in the course.
- (iv) Applicants are expected to be between 25 and 50 years of age. This requirement is appropriate so that the participant will have enough time to apply what they have learnt to the development needs and policies in their countries. This will also ensure that the knowledge transferred to these countries is sustainable.
- (v) Applicants from the following countries were invited to apply for the course: Bangladesh, Cambodia, Peoples Republic of China, East Timor, Fiji, India, Indonesia, Lao

PDR, Maldives, Mauritius, Mongolia, Myanmar, Nepal, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam. This requirement is appropriate as the invited countries are all developing countries which are able to utilize mechatronics systems technology for their industrial development and production.

- (vi) Applicants must be nominated by their respective governments. They are expected to be proficient in English and in good health to complete the course. Applicants are expected to be experienced with minimum computer operations: All of the above requirements are appropriate. The requirement that applicants must be nominated by their respective governments is appropriate as the number of applicants may exceed the capacity of the course each year. This will allow their governments to identify suitable applicants who can benefit from the training. As English is the medium of instruction, it is also appropriate that applicants are proficient in English. As the training is three weeks long, it is appropriate that applicants are in good health to complete the training. Lastly, applicants with minimum knowledge of computer operations will allow them to better appreciate the IT aspects of the mechatronics training program.

d. Overall judgment on relevance

- (i) The training program is evaluated to have met the development needs and policies of the targeted countries. This is validated by the feedback of the ex-participants. 14 out of 24 of them (58.4%) who responded to the survey rated the applicability of the knowledge or skills learned to be between 51% and 100%.

#### 4. Conclusion

- a. Factors promoting the effects of the training program
  - (i) Setting of the objectives for the course: This is validated by the feedback of the ex-participants, where 19 out of 24 ex-participants (79.2%) who responded to the survey rated this to be just right.
  - (ii) The appropriate requirements for application for the course: This is validated by the feedback of the ex-participants, where 22 out of 24 ex-participants (91.7%) who responded to the survey rated this to be just right.
  - (iii) The willingness of the participants to participate in the course. This is validated by the feedback of the ex-participants, where 21 out of 24 ex-participants (87.5%) who responded to the survey rated this to be very good or good.
  - (iv) The appropriateness of the countries involves for the course. This is validated by the feedback of the ex-participants, where 22 out 24 ex-participants (91.7%) who responded to the survey rated this to be either very appropriate or appropriate.
  - (v) Text / materials that were provided for the course. This is validated by the feedback of the ex-participants, where 19 out 24 ex-participants (79.2%) who responded to the survey rated this to be just right.
  - (vi) The clarity of the lecturers who taught in the course. This is validated by the feedback of the ex-participants, where all 24 ex-participants (100%) who responded to the survey rated this to be either very clear or clear.

- (vii) The equipment and facilities used for conducting the course. This is validated by the feedback of the ex-participants, where 22 out of 24 ex-participants (91.7%) who responded to the survey rated this to be very good or good.
  - (viii) The administration and management of the course. This is validated by the feedback of the ex-participants, where all 24 ex-participants (100%) who responded to the survey rated this to be either very good or good.
  - (ix) Visits conducted to other organizations during the course. This is validated by the feedback of the ex-participants, where 23 out of 24 ex-participants (95.9%) who responded to the survey rated this to be very good or good.
  - (x) Hands-on practical training conducted during the course. This is validated by the feedback of the ex-participants, where 20 out of 24 ex-participants (83.4%) who responded to the survey rated this to be very good or good.
- b. Factors inhibiting the effects of the training program
- (i) Curriculum of the course. 8 out of 24 ex-participants (33.3%) who responded to the survey rated the course to be too advanced. The 8 ex-participants who indicated that the course was too advanced are from Nepal, Maldives, Brunei, Mongolia, Bhutan, Vietnam and Cambodia. 1 ex-participant (4.2%) rated the course to be too simple. He is from Indonesia. JICA and MFA Singapore may need to pay more attention to the selection of the applicants to ensure that all participants are adequately knowledgeable in the field of



mechatronics systems technology.

- (ii) Duration of the course. 16 out of 24 ex-participants (66.7%) who responded to the survey rated the course to be too short. JICA and MFA Singapore may need to consider extending the duration of the course to cover the number of topics taught in the course. Alternatively, they may also consider reducing the number of topics taught in the course.
  
- (iii) Treatment of subjects taught in the course. 3 out of 24 ex-participants (12.5%) who responded to the survey indicated that the course did not have enough theory. 5 out of 24 ex-participants (20.8%) indicated that it did not enough practical. JICA and MFA Singapore, together with NYP, should examine whether or not there is a need to balance the number of theory and practical lessons.

c. Final conclusion

- (i) It is concluded by the evaluation team that the course has successfully achieved its output and purpose. This conclusion was attained after the analysis of the achievement of output based on the 10 criteria, and the evaluation of the promoting and inhibiting factors.
  
- (ii) The attainment of the conclusion is also based on the feedback of the ex-participants, where a majority of them (75% or more) provided positive feedback on various aspects of the course, leading to the promoting factors. Negative feedback was provided by only a minority of the ex-participants (25% or less), except for the rating of the duration of the course where a majority of the ex-participants (66.7%) indicated that the course was too short. Notwithstanding the negative feedback on the duration of the course, the evaluation team concluded

that the course has achieved its output and purpose from the high number of promoting factors versus the low number of inhibiting factors.

## **CHAPTER V            RECOMMENDATIONS AND LESSONS LEARNT**

### **1.        Recommendations**

- a.        Recommendations for Partner Country Side (direction of future activities of the project)
  - (i)        As a short course to provide the participants with the essential application knowledge and skills in the various mechatronics technologies, it is concluded by the evaluation team that the course has successfully achieved its output and purpose.
  - (ii)        JICA and MFA Singapore should consider developing new programs which are focused on specific mechatronics systems technology.
  
- b.        Recommendations for JICA (necessity for follow-up cooperation)
  - (i)        JICA and MFA Singapore should continue to conduct the same course in the next FY. However, for future courses after the next FY, JICA and MFA Singapore should consider developing new programs which are focused specific mechatronics systems technology.
  - (ii)        As a short term solution to address the feedback from the ex-participants, JICA and MFA Singapore should examine if they have the resources to extend the duration of the course to 4 weeks. The extension of the duration to 4 weeks would allow NYP to have more time to cover the introductory topics in mechatronics systems technology in greater depth, and allow for more theory / practical lessons and site visits.
  - (iii)        JICA and MFA Singapore should also consider

developing different programs which focus on technical and business issues. The technical program would have a greater technical emphasis which would cater for engineers and engineering practitioners. The business program would have a greater emphasis on the business and industrial applicability, and the cost-benefit analysis of mechatronics systems technology, and would cater for managers and decision makers.

- (iv) As part of developing new programs in mechatronics, JICA and MFA Singapore should also consider the possibility of developing an industrial automation program to help some of the targeted countries start their industrialization process. This program would be focused on basic tools for industrial automation, instead of advanced topics like industrial robotics.

## **2. Lessons Learnt**

- a. Lessons learnt regarding the situations in the evaluated countries and sectors (policy, technological level, social and cultural aspect, institution, economic and financial aspect, etc.), with recommendations for JICA (necessity for follow-up cooperation)
  - (i) As the economic background and industrial base of the countries invited for the program is diverse, it is recognized that it is very difficult to developing a program which will satisfy all the participants. JICA and MFA Singapore should examine developing new programs focused on specific mechatronics systems technology which can be applied to the long-term development needs of the participants and their countries.
  - (ii) Some of the more advanced topics in mechatronics

system technology e.g. the use of industrial robots may not be useful for the participants and their countries.

(iii) On the other hand, new programs such as one focused on basic tools for industrial automation may be more useful for the participants and their countries.

b. Lessons learnt regarding project management (finding, formulation, implementation, evaluation, etc.)

(i) To ensure the sustainability of the course, it is anticipated that the course participants would train their fellow colleagues when they return to their own countries. However, the course material provided consists largely of PowerPoint slides which may be too brief to be used by the participants as teaching material. JICA and MFA Singapore should consider providing reference list / reference materials to the participants during the course so that participants can choose to either acquire or use them when they return to their countries. However, the provision should be subjected to the copyright of the materials.

(ii) JICA and MFA Singapore should consider conducting a post-course evaluation 3 to 6 months after the end of the course. This would allow participants to have time to either implement some of the knowledge acquired during the training, or discuss with their colleagues the skills and knowledge taught in the course. Alternatively, JICA and MFA Singapore may also conduct such evaluations after a number of runs of the course, although this may be disadvantageous as there will be some ex-participants who will not be contactable.

(iii) As a follow-up to the course, JICA and MFA Singapore

should also consider creating a forum / alumni group for ex-participants to come together to share ideas and look for solutions in mechatronics systems technology. The forum / alumni group may be created either online or through normal mail.

- (iv) JICA and MFA Singapore should also consider providing ex-participants with reference materials and free software on mechatronics systems technology after they have returned to their countries. These may be provided in the form of a CD-ROM. JICA and MFA Singapore may also use these as an incentive for ex-participants to respond to any post-course evaluation. However, the provision should be subjected to the copyright of the materials.

## **ANNEXES**

## **ANNEX A**

### **SURVEY FORM FOR THE EX-PARTICIPANTS OF THE JAPAN-SINGAPORE PARTNERSHIP PROGRAM (JSPP 21)**

**COURSE TITLE: TCTP IN MECHATRONICS SYSTEMS TECHNOLOGY**

This survey form is to be completed only by the ex-participant named below who attended the above-mentioned Third Country Training Program (TCTP).

The survey form is used for your evaluation and feedback of the above-mentioned course. Please co-operate with us by answering all the questions below.

**SURVEY FORM TO BE COMPLETED BY :** \_\_\_\_\_

Please respond by circling your choice and by answering all questions. Please circle only one answer for each question. For open-ended questions, please type or write your answers legibly on the lines provided. Please use a separate sheet of paper for your answers if necessary.

#### **SECTION 1: PURPOSE OF COURSE**

1. Has the course achieved its purpose of providing you with the essential application knowledge and skills in the various mechatronics technologies?

Yes                       No

#### **SECTION 2: OBJECTIVES OF COURSE**

2. Has the course achieved its objective of providing you with the knowledge and skills in machine system elements and peripherals for automation?

Achieved  
 Partly Achieved  
 Not Achieved

3. Has the course achieved its objective of providing you with the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology?

Achieved  
 Partly Achieved  
 Not Achieved

4. Has the course achieved its objective of providing you with the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product design?

Achieved  
 Partly Achieved  
 Not Achieved

5. Has the course achieved its objective of providing you with the knowledge and skills in pneumatic applications?

Achieved  
 Partly Achieved  
 Not Achieved

6. Has the course achieved its objective of providing you with the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems?

Achieved  
 Partly Achieved  
 Not Achieved

7. Has the course achieved its objective of providing you with the knowledge and skills in Borderless Access and Monitoring Manufacturing System (BAMMS)?

Achieved  
 Partly Achieved  
 Not Achieved

8. Has the course achieved its objective of providing you with the knowledge and skills in industrial robotics and automated assembly technology?

Achieved  
 Partly Achieved  
 Not Achieved



9. Has the course achieved its objective of providing you with the knowledge and skills in machine vision technology and their applications?

- Achieved
- Partly Achieved
- Not Achieved

10. Has the course achieved its objective of providing you with the knowledge and skills in Information Technology (IT) technology?

- Achieved
- Partly Achieved
- Not Achieved

11. Has the course achieved its objective of providing you with the knowledge in the latest developments in mechatronics?

- Achieved
- Partly Achieved
- Not Achieved

SECTION 3: FACTORS PROMOTING / IMPEDING THE ACHIEVEMENTS OF THE OBJECTIVES OF THE COURSE

12. How do you rate the setting of the objectives of the course?

- Too advanced
- Just right
- Too simple

13. How do you rate the requirements for application for the course?

- Too strict
- Just right
- Too flexible

14. How do you rate the willingness of the participants for the course?

- Very good
- Good
- Fair
- Poor
- Very poor

15. How do you rate the curriculum of the course?

- Too advanced
- Just right
- Too simple

16. How do you rate the appropriateness of the countries involved for the course?

- Very appropriate
- Appropriate
- Not appropriate

17. How do you rate the duration of the course?

- Too long
- Just right
- Too short

18. How do you rate the text / materials that were provided for the course?

- Too much
- Just right
- Too little

19. How do you rate the clarity of the lecturers who taught in the course?

- Very clear
- Clear
- Not clear

20. How do you rate the equipment and facilities used for conducting the course?

- Very good
- Good
- Fair
- Poor
- Very poor

21. How do you rate the administration and management of the course?

- Very good
- Good
- Fair
- Poor
- Very poor

22. How do you rate the visits conducted to other organizations during the course?

- Very good
- Good
- Fair
- Poor
- Very poor

23. How do you rate the hands-on practical training conducted during the course?

- Very good
- Good
- Fair
- Poor
- Very poor

24. How do you rate the treatment of the subjects taught in the course?

- Not enough theory
- Just right
- Not enough practical

25. What are the other factors promoting / impeding the achievements of objectives of the course?

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**SECTION 4: RELEVANCE OF THE COURSE**

26. How much of the knowledge or skills learnt in the course have been applied to the development needs and policies in your country?

- 0% to 25%       26% to 50%       51% to 75%       76% to 100%

27. If your answer in Question 26 was 50% or below, please tell us why.

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28. Was the training the best way to transfer knowledge and skills to your country?

- Yes                       No

29. If your answer in Question 28 was No, please tell us why.

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30. Was the course meaningful in promoting networking and cooperation among developing countries?

- Yes                       No

31. Please tell us why your answer is so in Question 30.

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32. Please give us any suggestions or recommendations for improving the course.

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THANK YOU FOR YOUR KIND COOPERATION. PLEASE REGARD THIS AS **URGENT**.

PLEASE RETURN THE COMPLETED SURVEY FORM TO US BY **15 JAN 2005**.

Please return the completed survey form to us by fax at +65 62713351 or by email at: [michael.lai@imrassociates.com](mailto:michael.lai@imrassociates.com)  
You may also mail us at: IMR Associates (S) Pte Ltd, 7500A Beach Road, #04-324 The Plaza, S199591, Republic of Singapore.  
Alternatively, you may also request for an electronic format of this survey form to be sent to you by sending an email to: [michael.lai@imrassociates.com](mailto:michael.lai@imrassociates.com)

## **ANNEX B**

### **1. Result of Questionnaire Survey**

Table 1a: Response rate of ex-participants

Response Rate	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Responded	6	40.0	9	50.0	9	47.4	24	46.2
Did not respond	9	60.0	9	50.0	10	52.6	28	53.8
Total	15	100.0	18	100.0	19	100.0	52	100.0

- a. As of 15 March 2005, a total of 24 out of 52 ex-participants responded to the survey. This represents a total response rate of 46.2%.

Table 1b: Response of ex-participants on whether the course has provided them with the essential application knowledge and skills in the various mechatronics technologies

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Yes	6	100.0	9	100.0	9	100.0	24	100.0
No	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1c: Response of ex-participants on whether the course has provided them with the knowledge and skills in machine system elements and peripherals for automation

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	2	33.3	3	33.3	3	33.3	8	33.3
Partly achieved	4	66.7	6	66.7	6	66.7	16	66.7
Not achieved	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1d: Response of ex-participants on whether the course has provided them with the knowledge and skills in manufacturing systems, processes and applications using mechatronics technology

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	3	50.0	2	22.2	2	22.2	7	29.2
Partly achieved	3	50.0	7	77.8	7	77.8	17	70.8
Not achieved	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1e: Response of ex-participants on whether the course has provided them with the knowledge and skills in Computer Aided Design (CAD) application and mechatronics product design

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	3	50.0	1	11.1	-	-	4	16.7
Partly achieved	2	33.3	7	77.8	5	55.6	14	58.3
Not achieved	1	16.7	1	11.1	4	44.4	6	25.0
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1f: Response of ex-participants on whether the course has provided them with the knowledge and skills in pneumatic applications

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	4	66.7	5	55.6	5	55.6	14	58.3
Partly achieved	1	16.7	3	33.3	4	44.4	8	33.3
Not achieved	1	16.7	1	11.1	-	-	2	8.3
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1g: Response of ex-participants on whether the course has provided them with the knowledge and skills in Programmable Logic Controllers (PLC) programming and applications of automated systems

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	4	66.7	3	33.3	4	44.4	11	45.8
Partly achieved	2	33.3	5	55.6	5	55.6	12	50.0
Not achieved	-	-	1	11.1	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1h: Response of ex-participants on whether the course has provided them with the knowledge and skills in Borderless Access and Monitoring Manufacturing System (BAMMS)

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	3	50.0	1	11.1	-	-	4	16.7
Partly achieved	2	33.3	5	55.6	7	77.8	14	58.3
Not achieved	1	16.7	3	33.3	2	22.2	6	25.0
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1i: Response of ex-participants on whether the course has provided them with the knowledge and skills in industrial robotics and automated assembly technology

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	3	50.0	2	22.2	3	33.3	8	33.3
Partly achieved	2	33.3	5	55.6	5	55.6	12	50.0
Not achieved	1	16.7	2	22.2	1	11.1	4	16.7
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1j: Response of ex-participants on whether the course has provided them with the knowledge and skills in machine vision technology and their applications

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	4	66.7	2	22.2	3	33.3	9	37.5
Partly achieved	2	33.3	6	66.7	5	55.6	13	54.2
Not achieved	-	-	1	11.1	1	11.1	2	8.3
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1k: Response of ex-participants on whether the course has provided them with the knowledge and skills in Information Technology (IT) technology

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	3	50.0	4	44.4	4	44.4	11	45.8
Partly achieved	3	50.0	4	44.4	5	55.6	12	50.0
Not achieved	-	-	1	11.1	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 1l: Response of ex-participants on whether the course has provided them with the knowledge in the latest developments in mechatronics

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Achieved	4	66.7	5	55.6	5	55.6	14	58.3
Partly achieved	2	33.3	4	44.4	3	33.3	9	37.5
Not achieved	-	-	-	-	1	11.1	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2a: Rating of the setting of the objectives for the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Too advanced	2	33.3	2	22.2	1	11.1	5	20.8
Just right	4	66.7	7	77.8	8	88.9	19	79.2
Too simple	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2b: Rating of requirements for application for the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Too strict	-	-	1	11.1	-	-	1	4.2
Just right	6	100.0	7	77.8	9	100.0	22	91.7
Too flexible	-	-	-	-	-	-	-	-
No comment	-	-	1	11.1	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2c: Rating of willingness of the participants for the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very good	1	16.7	4	44.4	5	55.6	10	41.7
Good	4	66.7	4	44.4	3	33.3	11	45.8
Fair	1	16.7	1	11.1	1	11.1	3	12.5
Poor	-	-	-	-	-	-	-	-
Very poor	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2d: Rating of curriculum of the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Too advanced	2	33.3	3	33.3	3	33.3	8	33.3
Just right	3	50.0	6	66.7	6	66.7	15	62.5
Too simple	1	16.7	-	-	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2e: Rating of appropriateness of the countries involved for the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very appropriate	2	33.3	3	33.3	4	44.4	9	37.5
Appropriate	4	66.7	5	55.6	4	44.4	13	54.2
Not appropriate	-	-	1	11.1	1	11.1	2	8.3
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2f: Rating of duration of the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Too long	-	-	-	-	-	-	-	-
Just right	2	33.3	2	22.2	4	44.4	8	33.3
Too short	4	66.7	7	77.8	5	55.6	16	66.7
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2g: Rating of text / materials that were provided for the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Too much	1	16.7	-	-	-	-	1	4.2
Just right	4	66.7	7	77.8	8	88.9	19	79.2
Too little	1	16.7	2	22.2	1	11.1	4	16.7
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2h: Rating of clarity of the lecturers who taught in the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very clear	3	50.0	6	66.7	4	44.4	13	54.2
Clear	3	50.0	3	33.3	5	55.6	11	45.8
Not clear	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2i: Rating of equipment and facilities used for conducting the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very good	4	66.7	6	66.7	6	66.7	16	66.7
Good	2	33.3	2	22.2	2	22.2	6	25.0
Fair	-	-	1	11.1	1	11.1	2	8.3
Poor	-	-	-	-	-	-	-	-
Very poor	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0



Table 2j: Rating of administration and management of the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very good	4	66.7	6	66.7	7	77.8	17	70.8
Good	2	33.3	3	33.3	2	22.2	7	29.2
Fair	-	-	-	-	-	-	-	-
Poor	-	-	-	-	-	-	-	-
Very poor	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2k: Rating of visits conducted to other organizations during the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very good	4	66.7	5	55.6	7	77.8	16	66.7
Good	2	33.3	3	33.3	2	22.2	7	29.2
Fair	-	-	1	11.1	-	-	1	4.2
Poor	-	-	-	-	-	-	-	-
Very poor	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2l: Rating of the hands-on practical training conducted during the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Very good	2	33.3	3	33.3	5	55.6	10	41.7
Good	3	50.0	3	33.3	4	44.4	10	41.7
Fair	1	16.7	3	33.3	-	-	4	16.7
Poor	-	-	-	-	-	-	-	-
Very poor	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 2m: Rating of the treatment of the subjects taught in the course

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Not enough theory	1	16.7	1	11.1	1	11.1	3	12.5
Just right	3	50.0	7	77.8	6	66.7	16	66.7
Not enough practical	2	33.3	1	11.1	2	22.2	5	20.8
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 3a (i): Rating of the knowledge or skills learnt in the course have been applied to the development needs and policies in their countries

Rating	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
0% to 25%	1	16.7	1	11.1	-	-	2	8.3
26% to 50%	2	33.3	4	44.4	1	11.1	7	29.2
51% to 75%	-	-	4	44.4	6	66.7	10	41.7
76% to 100%	2	33.3	-	-	2	22.2	4	16.7
No Comment	1	16.7	-	-	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 3a (ii): Response on whether the training is the best way to transfer knowledge and skills to your country

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Yes	6	100.0	9	100.0	9	100.0	24	100.0
No	-	-	-	-	-	-	-	-
Total	6	100.0	9	100.0	9	100.0	24	100.0

Table 3a (iii): Response on whether the course is meaningful in promoting networking and cooperation among developing countries

Response	1 <sup>st</sup> run		2 <sup>nd</sup> run		3 <sup>rd</sup> run		Total	
	No.	%	No.	%	No.	%	No.	%
Yes	6	100.0	8	88.9	9	100.0	23	95.8
No	-	-	1	11.1	-	-	1	4.2
Total	6	100.0	9	100.0	9	100.0	24	100.0

## **ANNEX C**

### **1. What are the other factors promoting / impeding the achievements of objectives of the course?**

- a. Not enough time to do more practice.
- b. Training kits and modules should be provided to participants for demonstration and echo training in home country.
- c. The advanced facilities, the helpful lecturers and the learning enhancements.
- d. Development strategy for automation system in manufacturing.
- e. Provide accommodation with meals. More site visits.
- f. The factors affecting the promotion of this course are its good time management and preparedness of visual aids / training materials, practical exercises and hands-on facilities to enable the participants to apply their newly acquired knowledge. Also, the motivation, cooperation and support of the facilitators, trainers and staff of the program.
- g. Inviting commercial experts to lecture at the course will be more beneficial to the participants.
- h. The application and hands-on experience given by the trainers.
- i. The duration of the course is too short to cover all the training aspects.
- j. Do send the training materials before the start of the course. The use of English in the training course restricted the success of the course.
- k. Inclusion of Computer-Aided Drawing (CAD) would have been good.
- l. More practical training and more discussion about mechatronics applications.
- m. By keeping theory and practical training to an equal proportion.
- n. Rural technology is also an important area which we should focus on.
- o. The factor as agreed by all participants was the course duration; 2 months would be better than 3 weeks.

**2. How much of the knowledge or skills learnt in the course have been applied to the development needs and policies in your country? If your answer was 50% or below, please tell us why.**

- a. I would be able to apply CAD / CAM and Automation as these are being developed in my country.
- b. Suggestions and recommendations were not acted upon by the administration.
- c. Industries are still very much labor intensive in my country.
- d. Engineering programs in my country are not as specialized as the program I attended here.
- e. Mechatronics is not highly developed in my country.
- f. The latest manufacturing systems are not available in my country.
- g. With developments in my country, the knowledge and skills gained will be useful in the future.
- h. The facilities and equipment in our country are outdated.
- i. At present, industries in our country are still largely underdeveloped, so we have little chance to implement mechatronics.
- j. We do not have the opportunity to apply what we learn in this program in our country due to underdevelopment.

**3. Was the training the best way to transfer knowledge and skills to your country? If your answer was No, please tell us why.**

No comments were provided for the above question by any of the ex-participants who responded to the survey.

**4. Was the course meaningful in promoting networking and cooperation among developing countries? Please tell us why your answer is so.**

- a. We set up very good relationships with the NYP and all the classmates.
- b. Yes, as we can share experiences with other participating countries.

- c. Actual hands-on training and benefits derived from mechatronics have greatly opened the concept of improving our industries through education.
- d. Yes, as many companies can use mechatronics to produce high quality products.
- e. Yes, as many participating countries are not as technological advanced as Singapore.
- f. The participants have improved not only their technical skill from the host country, they also have the opportunity to discuss and exchange their experiences. Consequently, there would be cooperation in many areas.
- g. There are not enough practical training facilities in developing countries.
- h. We are able to learning from each other which makes it more interesting.
- i. We shared knowledge and acquired friendships.
- j. At present, most of the developing countries are at the initial stages of networking and cooperation.
- k. The training program brought participants from developing countries together and we could share experiences.
- l. Yes, as the course brought participants from various countries.
- m. We managed to networking with participants from different countries.
- n. We continue to maintain contact long after the training program.

**5. Please give us any suggestions or recommendations for improving the course.**

- a. In my opinion, the course content and delivery was very good but the duration should be longer.
- b. Extensive hands-on training with further school and country linkages.
- c. If the course duration was longer, we could better grasp what was taught.

- d. The course was well organized with good content and materials. However, some topics should have had more practical hands-on training.
- e. More practical training with theory. Extend the period of training.
- f. I would like to suggest that the program include more hands-on exercises particularly on the major topics of the course.
- g. The duration of the course should be extended and more industrial field visits should be included.
- h. Although the course was very useful for me, I would suggest that the course be more practical-oriented and the duration of the course longer.
- i. Adding subjects such as automatic manufacturing systems.
- j. Need to extend duration of the course.
- k. Discussion about mechatronics applications and developments should be added.