PACIFIC ISLANDS FORUM DIESEL MAINTENANCE PROGRAMME

SOPAC Training Report 99

30 September – 09 October 2002

Mitsubishi Heavy Industries Ltd and Taiyo Electric Company Ltd,
Training Centres, Japan

South Pacific Applied Geoscience Commission
Private Mail Bag, GPO, Suva, Fiji Islands
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Prepared by

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Cover picture: Some of the participants, with their instructor and interpreter, after reassembling the diesel engine at the MHI Training Centre
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>4</td>
</tr>
<tr>
<td>Introduction and Background</td>
<td>5</td>
</tr>
<tr>
<td>Programme Objectives</td>
<td>5</td>
</tr>
<tr>
<td>Programme Outline and Content</td>
<td>5</td>
</tr>
<tr>
<td>Participants Viewpoint</td>
<td>6</td>
</tr>
<tr>
<td>Conclusion and Recommendations</td>
<td>7</td>
</tr>
<tr>
<td>Annexes</td>
<td></td>
</tr>
<tr>
<td>Annex 1 Detailed Programme Outline</td>
<td>10</td>
</tr>
<tr>
<td>Annex 2 Participants List</td>
<td>12</td>
</tr>
<tr>
<td>Annex 3 Photos of Participants during the Programme</td>
<td>13</td>
</tr>
</tbody>
</table>
ACKNOWLEDGEMENTS

The following are gratefully acknowledged for their assistance in the organisation and for the delivery of the training programme:

- The Government of Japan
- Japan Atomic Industrial Forum (JAIF)
- Overseas Reprocessing Committee (ORC)
- Federation of Electric Power Companies (FEPC)
- Mitsubishi Heavy Industries Ltd (MHI)
- Taiyo Electric Company Ltd
- Mr Fujisawa (MHI Tourists)
- Ms Michiko Sato (Interpreter)
- Futsu Thermal and LNG Power Plant and Solar Park
- Tokyo Electric Power Company (TEPCO) Energy Museum

It is also noteworthy to acknowledge Mr Yamamoto, Deputy General Manager, Transport Headquarters, Overseas Reprocessing Committee, in reassuring the continuation of the programme in 2003.

Finally, to the participants for their enthusiasm and performance during the course of the training programme.
INTRODUCTION AND BACKGROUND

This report provides a summary of the 2002 Pacific Islands Forum Diesel Maintenance Programme convened at Sagamihara and Isezaki prefectures, Japan, from 30 September – 09 October 2002.

The Pacific Islands Forum Diesel Maintenance Programme was an initiative of the Pacific Islands Forum Leaders meeting in 2000 where a request was made to the Japanese Government to assist the Pacific island countries in the general maintenance of diesel generators. Generally, electricity in the Pacific islands is primarily generated from diesel generators. The maintenance component of these generators was seen as an important task, which the Pacific island power utilities generally lack.

The 2002 Pacific Islands Forum Diesel Maintenance Programme was hosted by the Japan Atomic Industrial Forum (JAIF) with funding provided by the Federation of Electric Power Companies (FEPC) / Overseas Reprocessing Committee (ORC).

Training was delivered by Mitsubishi Heavy Industries Ltd and Taiyo Electric Company Ltd through a series of classroom and practical sessions. The general arrangements, management, training skills and hospitality were excellent and contributed to the success of the programme, particularly the transfer of knowledge and skills in the operation and maintenance of diesel engines and generators.

OBJECTIVES

The Pacific Islands Forum Diesel Maintenance Programme consists of the following primary objectives:

- introduce participants to diesel engine and generator maintenance and trouble shooting procedures, control panel design and operation; and
- highlights the importance of safety in the work environment.

PROGRAMME OUTLINE AND CONTENT

The programme was carried out at two training centres: the Mitsubishi Heavy Industries Ltd in Sagamihara prefecture (south of Tokyo) and Taiyo Electric Company Ltd in Isezaki prefecture (north of Tokyo).
The training schedules were presented in lectures and hands-on practical sessions. In general, the programme content focused on the basic operation of diesel engines and generators, maintenance and trouble shooting, safety, and the current development in these respective technologies.

PARTICIPANTS VIEWPOINT

Fourteen countries participated in the 2002 programme. The participants consist of engineers, mechanics, operators and trainers (or teachers). The following provides a summary of the participants’ views raised during the round table meeting at the conclusion of the training programme.

| What do you think of the duration and timing (and season) of the programme? | • Good timing  
| | • Duration – sufficient  
| | | • not sufficient (there is a need to extend the duration beyond 2 weeks to allow more time for practical sessions). |
| What were the impressive and useful programmes to you? | Many of the participants listed the following areas as major areas of interest.  
| | • Theory and practical sessions on load testing  
| | • The improvement in the diesel cycle (with the application of the Miller cycle)  
| | • Site visits to the Futsu thermal and LNG power plant, and the solar energy park; TEPCO Energy Museum and the Mitsubishi Heavy Industry and Taiyo Electric Ltd factories  
| | • Hands-on practical sessions at the Mitsubishi Heavy Industries Ltd and Taiyo Electric Company Ltd training centres  
| | • Generator and control panel trouble shooting and maintenance  
<p>| | • Development in improving diesel engine efficiency |
| Was there any programme that was not useful to you? | Everyone found the programmes useful. |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>How about the degree of difficulty?</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
| Do you have any proposal of events that should be included in future programmes? | • The training to cover the current programmes in more detail  
• Should spend more time on the practical sessions  
• To include the participation of all the four states (Chuuk, Kosrae, Phonpei and Yap) of the Federated States of Micronesia in each year’s invitation  
• Additional coverage needed in theory and practical sessions on governors, fuel injection pumps, engine and cylinder head pressure tests, lubricant oil purifier maintenance and fuel system  
• A discussion session for all participants to share their experiences and difficulties faced by the respective countries  
• Include session(s) on diesel engine overhaul  
• Field visits to include renewable energy (such as hydro, wind and solar) sites. |
| Others (would you please frankly let us know anything you have perceived for the whole programme?) | • The generator component of the programme should just provide an overview of its operation, as many of the participants were mechanical engineers (or mechanics).  
• The training programme to include electrical engineers (or technicians) on an alternate basis with their mechanical counterparts. Should this be considered then the programme focus will be on generators with an overview of diesel engines.  
• Duration of the training programme to be extended to about a month.  
• Have an interpreter with an engineering background to enable a better explanation of the engineering concepts  
• A very helpful programme for the Pacific islands |

**CONCLUSION AND RECOMMENDATIONS**

The excellent arrangements, training skills and hospitality provided by the hosts and the enthusiasm and performance of the participants contributed to the overall success of the 2002 Pacific Islands Diesel Maintenance Programme.
The participants' views expressed during the round table meeting at the end of the training programme are noteworthy as they highlight some of the areas of interest by participants. However, these may not be immediately incorporated into the 2003 training programme or future programmes due to factors such as budget constraints, its relevance to the region, etc.

Since the beginning of the Pacific Islands Forum Diesel Maintenance Programme in 2000, its focus has been on basic maintenance of diesel engines. Major mechanical and service work on diesel engines and generators in the respective power utilities are usually referred to the suppliers of the equipment due to limited manpower, knowledge, skills and availability of appropriate tools in the Pacific islands.

It is therefore suggested that future diesel maintenance programmes consider the following:

• continue to focus on the basic maintenance procedures, safety and trouble shooting with diesel engines;
• extend the time duration for practical sessions with diesel engines;
• just provide an overview on the generator operations and functions. This is considered sufficient background information for participants, as most of the participants are mechanical engineers and mechanics; and
• maintain the 2 weeks duration of the programme.
ANNEXES
ANNEX 1
2002 PACIFIC ISLANDS FORUM DIESEL MAINTENANCE PROGRAMME SCHEDULE

28 - 29 September
• Arrive at Narita Airport
• Leave Tokyo (Shinigawa) for Sagami Club

30 September
• Orientation
• Introduction to Mitsubishi Heavy Industries Training Centre and Factory
• Basic Acknowledgment of Engine (Lecture)
• Welcome Reception

01 – 04 October
• Engine disassembling (Practical)
• Major component parts (Lecture & Practical)
• Fuel injection pump & governor, turbocharger, water pump etc
• Engine reassembling (Practical)
• Diesel generator set operation procedure
• Diesel generator load and performance test
• Calculation of test data
• Maintenance schedule & procedure (Lecture)
• Trouble shooting (Lecture)
• Valve mechanism, fuel system, cooling system, etc
• Questions & Answer Session
• Closing

05 Saturday
08:50 Assemble at lobby
09:00 Leave Sagami Club
11:30 - 12:30 Lunch
12:30 Leave restaurant
13:00 - 15:00 Futtsu New Energy Park & Thermal Power Plant
15:00 Leave for Sagami Club
06 Sunday
08:20    Assemble at lobby
08:30    Leave Sagami Club
10:00 - 12:00 Shibuya Electric Energy Museum
12:10 - 13:00 Lunch
13:00    Leave restaurant
14:00 - 16:00 Sightseeing (Asakusa, Akihabara)
16:00    Leave for Hotel Route Inn Isezaki

07 Monday - 08 Tuesday
08:20    Assemble at lobby
08:30    Leave Hotel Route Inn Isezaki
09:00 - 12:00 Training
12:00 - 13:00 Lunch and break
13:00 - 16:00 Training
16:00    Leave Taiyo Electric

09 Wednesday
08:20    Assemble at lobby
08:30    Leave Hotel Route Inn Isezaki
09:00 - 12:00 Training
12:00?13:00 Lunch and break
13:00?14:30 Program Review
14:30    Leave for Shinagawa Prince Hotel

10 Thursday
Leave Narita
<table>
<thead>
<tr>
<th>Country</th>
<th>Participant</th>
<th>Utility / Institute</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cook Islands</td>
<td>Mr. Andrew Koni Iroa</td>
<td>Te Aponga Uira</td>
<td>Mechanic - Generation</td>
</tr>
<tr>
<td>Federated States of Micronesia</td>
<td>Mr. Handle Aitel Soryz</td>
<td>Chuuk State Public Utilities</td>
<td>Shift Supervisor</td>
</tr>
<tr>
<td>Fiji Islands</td>
<td>Mr. Uate Biutamaseva</td>
<td>Fiji Electricity Authority</td>
<td>Graduate Engineer - Mechanical</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Mr. Kakiarerei Babo</td>
<td>Public Utilities Board</td>
<td>Mechanical Forman</td>
</tr>
<tr>
<td>Nauru</td>
<td>Mr. Bernard Koepke</td>
<td>Nauru Phosphate Corporation</td>
<td>Diesel Fitter - Mechanic</td>
</tr>
<tr>
<td>Niue</td>
<td>Mr. Malaki Regan Campbell</td>
<td>Niue Power Corporation</td>
<td>Mechanic</td>
</tr>
<tr>
<td>Palau</td>
<td>Mr. Jack Ngiraked</td>
<td>Palau Public Utilities Corporation</td>
<td>Mechanic Supervisor</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>Mr. Elias Burua Kurapa</td>
<td>PNG Power</td>
<td>Mechanical Engineer</td>
</tr>
<tr>
<td>Marshall Islands</td>
<td>Mr. Billy Enos</td>
<td>Marshalls Energy Company</td>
<td>1st Class Operator</td>
</tr>
<tr>
<td>Samoa</td>
<td>Mr. Meki Toilolo</td>
<td>Electric Power Corporation</td>
<td>Foreman Mechanic</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>Mr. Mado Mathius Age</td>
<td>Solomon Islands Electricity Authority</td>
<td>Mechanical Supervisor</td>
</tr>
<tr>
<td>Tonga</td>
<td>Mr. Tevita Tali Vakalahi</td>
<td>Tonga Institute of Science and Technology (TIST)</td>
<td>Assistant Teacher</td>
</tr>
<tr>
<td>Tuvalu</td>
<td>Mr. Fatoga Talama</td>
<td>Tuvalu Electricity Corporation</td>
<td>Generation Engineer</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>Mr. Edwin Mashingaer</td>
<td>Vanuatu Rural Development Training Center Association Navota Rural Training Center</td>
<td>Trainer - Mechanic</td>
</tr>
<tr>
<td>SOPAC¹</td>
<td>Mr. Rupeni Taukave Mario</td>
<td>Community Lifelines Programme (Energy)</td>
<td>Energy Project Officer</td>
</tr>
<tr>
<td>PPA²</td>
<td>Mr. Gordon Jackson Chang</td>
<td>Pacific Power Association</td>
<td>Manager</td>
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</tbody>
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1. South Pacific Applied Geoscience Commission  
2. Pacific Power Association
ANNEX 3  PARTICIPANTS DURING THE 2002 PACIFIC ISLANDS FORUM DIESEL MAINTENANCE PROGRAMME

A classroom session at MHI training Centre

This is how it is done….. MHI Instructors in one of their demonstrations

Mr. Edwin Mashingaeur, Trainer – Mechanic, Vanuatu Rural Development Training Center, Santo, Vanuatu, receives his certificate from one of the MHI Instructors

Mr Nobuo Ishizuka, Secretary General, Japan Atomic Industrial Forum Inc. addresses participants during the welcome reception

Women at work at the Taiyo Electric Company Ltd factory

Control Panel testing at the Taiyo Electric Company Ltd Training Centre
Participants with the Instructors outside the MHI Training Centre

Demonstration at the Taiyo Electric Company Ltd

Taiyo Factory Manager addresses participants

Mr Yamamoto (2nd from left) and his team

Participants on a site visit