# SKILLS FRAMEWORK FOR PRECISION ENGINEERING

## TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT

**TSC Category**: Automation Management  
**TSC**: Automation Systems Maintenance  
**TSC Description**: Maintain automation systems to meet operation requirements as well as propose strategies for the automation systems performance improvement

<table>
<thead>
<tr>
<th>TSC Proficiency Description</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
<th>Level 5</th>
<th>Level 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE-RAO-1005-1.1</td>
<td>PRE-RAO-2005-1.1</td>
<td>PRE-RAO-3005-1.1</td>
<td>PRE-RAO-4005-1.1</td>
<td>PRE-RAO-5005-1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carry out autonomous maintenance activities on machines and equipment</td>
<td>Perform inspections and plan for parts replacement needed related to wear and tear</td>
<td>Maintain automation systems and interpret system performance metrics for performance verification</td>
<td>Manage major maintenance of automation systems and troubleshoot abnormalities to ensure prompt system recovery</td>
<td>Formulate strategies for automation systems performance improvement through the analysis of automation systems performance metrics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Knowledge

- Activities to eliminate losses during maintenance  
- Steps in autonomous maintenance  
- Equipment cleaning and inspection techniques and standards  
- Common hand tools used  
- Common equipment abnormalities  
- Corrective actions to eliminate abnormalities identified  
- Principles of electronics  
- Principles of mechatronics  
- Principles of pneumatics  
- Safety procedures  
- Non-destructive inspections of static components  
- Proper tools handling  
- Tension of timing belts and chain systems  
- Mechanical parts lubrication  
- Types of automation systems  
- Functionality of systems  
- System safety requirements  
- Automation operational requirements  
- Concept and application of ‘basic maintenance’  
- Automation system performance metrics  
- Automation and production tools interaction  
- Types of alarms and/or faults  
- Concept and application of ‘major maintenance’  
- Automation systems performance metrics  
- Problem solving techniques  
- Automation system performance metrics

## Abilities

- Conduct equipment cleaning and inspection activities  
- Carry out corrective actions against abnormalities  
- Troubleshoot basic robot issues  
- Optimise basic robot functions  
- Maintain uptime performance  
- Interpret robot’s performance data and maintenance schedules  
- Interpret simple electrical schematic and mechanical design diagrams  
- Maintain automated material handling system (AMHS) equipment by  
- Identify automation systems’ functions in manufacturing operations  
- Prepare automation systems for maintenance  
- Perform ‘basic’ maintenance  
- Verify automation systems’ performance against specifications  
- Release automation systems for operations  
- Prepare automation systems for maintenance  
- Conduct ‘major’ maintenance on automation systems  
- Verify automation systems performance against specifications  
- Troubleshoot any abnormalities detected  
- Release automation systems for operations  
- Analyse automation systems performance metrics in accordance with specifications  
- Select appropriate project that will enhance automation system performance  
- Define project scope of work and the number of hours based on business requirements  
- Execute project in accordance with project plan

©SkillsFuture Singapore  
Effective Date: April 2019, Version 1.1
| dis-assembling and replacing worn parts |  |  | • Evaluate project effectiveness in accordance with project objectives  
• Recommend follow up actions |