<table>
<thead>
<tr>
<th>TSC Category</th>
<th>Marine and Offshore System Design</th>
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<tbody>
<tr>
<td>TSC</td>
<td>Control System Programming</td>
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<tr>
<td>TSC Description</td>
<td>Develop capabilities in areas of communications and remote operations by programming logic circuits and erasable programmable read-only memory for ships, rigs and/or conversions</td>
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### TSC Proficiency Description

<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>
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<tr>
<td></td>
<td>MAR-MSD-2004-1.1</td>
<td>MAR-MSD-3004-1.1</td>
<td>MAR-MSD-4004-1.1</td>
<td>MAR-MSD-5004-1.1</td>
<td>MAR-MSD-6004-1.1</td>
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<tr>
<td>Apply basic hardware programming techniques to build peripheral systems around the programmable logic controllers (PLC) and troubleshoot programming errors in the codes</td>
<td>Implement hardware programming techniques to enhance functionality of equipment and systems by using appropriate process parameter measuring devices and utilising their outputs to control operations</td>
<td>Develop programmable control systems by incorporating new technologies and linking them to operating principles of equipment and systems on-site and advise involved parties on programming techniques</td>
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### Knowledge

- **Level 1**
  - Fundamental concepts of programming
  - Logic arguments in programming
  - Standard built-in functions and sub-routines
- **Level 2**
  - Procedures for hardware programming in the areas of communication, remote operation and sensor capabilities
  - Basic principles of mechanical engineering
  - Principles of interaction between electronic and mechanical components
  - Best practices and industry innovations in the field of coding and programming
  - Types of communication and remote or autonomous operation sensors and feedback units
- **Level 3**
  - Advanced principles of mechanical engineering
  - Advanced concepts of communication systems
  - Advanced principles of sensor technologies
  - Types of fully automatic, semi-automatic and manual control systems
  - Logic flow for implementation of systems for ships, rigs and/or conversions

### Abilities

- **Level 1**
  - Apply object-oriented programming
  - Construct programmes with user-defined functions and sub-routines
- **Level 2**
  - Infer final mechanical effects of sensor programming
  - Identify potential hazards in using programmable sensors in lieu of manpower
- **Level 3**
  - Design control systems for a variety of applications
  - Review programming inputs and guide improvements
| • Convert algorithms into programming codes | • Create contingency procedures for local and remote interventions | • Conduct feasibility studies for new programmable equipment to ensure profitability  
• Predict aftersales support requirements |