RME40003 Robot Systems Design

Robot Assembly Marking Rubric

	Fail (0-49)	**Pass (50-59)**	**Credit (60-69)**	**Distinction (70-79)**	**High Distinction (80-100)**
Component redesign (2 marks)	No component redesign is imposed.	Few component redesigns are provided but with no valid justifications.	Various component redesigns are provided but with minimal justifications.	Various component redesigns are provided with valid justifications.	Multiple design approaches are provided for each redesigned component. Justifications are provided for the finalized design.
Design of jigs/fixtures (3 marks)	The design provided is not necessary or is not justifiable.	The design provided serves minimal purposes.	The design provided is justifiable.	The design provided is unique and serves it purposes with minimal automation required.	Multiple design approaches are provided and justifications are given for the finalised design.
Design of gripper (3 marks)	Gripper fails to serve its purpose of gripping onto each component.	The designed gripper fails to grip onto some components.	Gripper fully serves the purpose of gripping onto each component.	Gripper can grip onto each and every component with additional capability.	Multiple design approaches are provided and justifications are given for the finalised design.
Design of storage, feeders and orientation devices (3 marks)	Selected or designed devices fail to serve their respective purposes.	Selected or designed devices partially serve their respective purposes.	Selected or designed devices fully serve their purposes.	On top of credit's requirement, additional modification that improves the assembly process are considered.	Multiple design approaches are provided and justifications are given for the finalised design and the added modifications.

Selection of industrial robot (2 marks)	Selected robot is not suitable for the assembly.	Selected robot is partially acceptable for the assembly.	Selected robot can fulfil the basic requirements of the assembly.	Selected robot are chosen with valid justification based on cost and efficiency.	Multiple robots are considered and justifications are provided for the final choice.

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Flowchart of robot program (2 marks)	Flowchart is not provided or with insufficient details.	Flowchart is provided but fails to provide a detailed overview of the robot operation.	Flowchart provides detailed overview of the robot operation.	Flowchart program considers multiple input from sensors, indication from subprogram to ensure smooth yet safety robot operation.	On top of distinction requirement, a path planning routine is incorporated in the flowchart. Flowchart is comprehensive and well structured.
Dimensioned layout of manufacturing cell (2 marks)	No layout is provided or the layout provided is inappropriately dimensioned.	A dimensioned layout is provided but the location of robot and other devices are not located.	A dimensioned layout is provided with the location of robot and other devices clearly marked.	On top of credit's requirement, the layout design has minimal space redundancy. Location of robots and feeding devices are placed with justifications of facilitating the assembly process.	On top of Distinction's requirement, path planning for the robot is considered. Waypoints are marked on the cell plane where the robot will perform the gripping, traversing and releasing action.
Cycle time analysis (2 marks)	Little to no analysis is provided.	Analysis is provided but insufficient to cover the whole robot operation.	Analysis provided covers the basic operation of the robot.	Analysis provided considers the 3-stage movement of robot during different action of gripping, traversing and releasing.	Analysis includes time delay and trapezoidal profile of the robot movement to ensure smooth yet safety operation.

Design of safety system (2 marks)	Little to no safety system is provided.	Safety systems are provided but insufficient to ensure basic work safety.	Safety systems are provided to ensure basic work safety.	Safety system encompasses all the devices on the assembly cell to ensure full work safety.	Unique and interesting safety systems are provided that ensures both smooth robot operation and work safety.
Report Presentation and comprehension (2 marks)	Report has no structure in terms of presentation.	Report has a basic structure but is presented poorly.	Report has a basic structure which include appropriate cover sheets, introduction and concluding remark.	On top of credit's requirement, report is presented comprehensively with good and consistent formatting.	On top of Distinction's requirement, diagram in the report is well formatted with captions, table of figures and table of contents for better readability.
Challenge (2 marks)	Students are required to design a manufacturing cell with modular design that emphasizes on ease of maintenance, reduction of maintenance costs, flexibility and/or upgradability of manufacturing cell.				
Total (25 marks)					