Robotics and Manufacturing Control Systems

7ME512

Coursework Brief

Dr Todor Dobrev

Robotics and Manufacturing Control Systems – 7ME512

Contents

Module Leader

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Key dates and details

Assessment Type:	Individual Report and System files
Assessment weighting:	100%
Word count:	3000 words (maximum of 3300 as taken from Turnitin)
Learning Outcomes:	1, 2
Submission Method:	Turnitin for report
Submission Date:	12:00 (Noon) UK time, 13/05/2024
Provisional Feedback Release Date:	June 2024

Description of the assessment

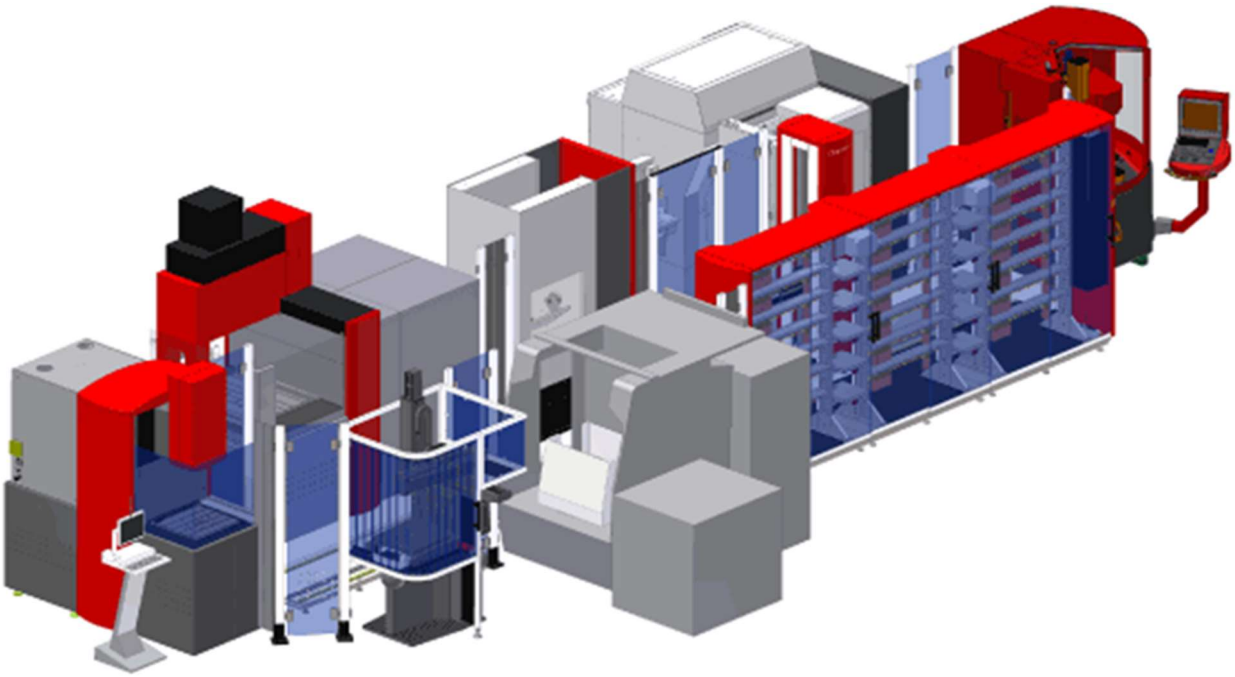

Figure 1 Flexible Manufacturing Cell

Introduction

Industry robots have been widely used in the automotive industry and electrical equipment industry for assembly line and component handling (see Figure 1). This assignment aims to advance the skills necessary to design and develop an economic and efficient material handling system on the shopfloor.

Learning Outcomes

On successful completion of this assignment, the student should be able to:

1. Fully understand the hardware and software of the industrial robot.
2. Critically analyse the robot tasks' environment and then design a robot based control system.

The Brief

A local company is producing the finished component shown in Figure 2. The component is machined out of a billet (see Figure 2) to achieve its final machined geometry. The manufacturing company has a function layout throughout its workshop. Since the component needs to be machined using the turning machine first, producing the outside profile and then needs to be transported to the milling machine to cut the key slot and flat section on ø90. As a result, considerable time is wasted in the transportation due to the current function layout.

Investigating possible improvements, the company is considering building a Flexible Manufacturing Cell (see Figure 1) which has one CNC TURNING machine, one CNC MILLING machine and one ABB robot with the necessary conveyer(s) as required.

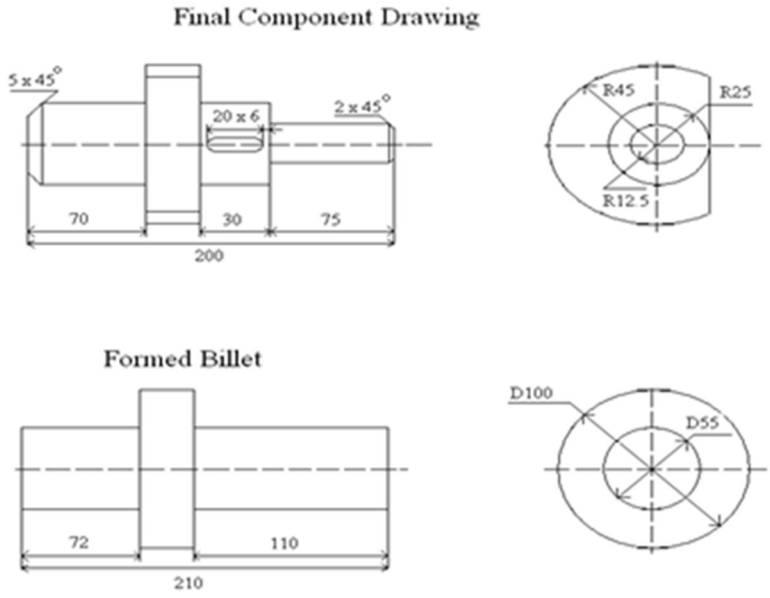

Figure 2 Component drawings

1. You need to select the equipment to be used for FMC. It must include IRB120 robot. Based on the equipment you have to design the layout according to the manufacturing process sequence. **(10%)**
2. Produce the concept designs for the gripper and support fixture for the robot IRB120 to handle the billet and the finished component. **(20%)**
3. Design an interface system on IRB120 which includes system design, interface electrical circuit design with sensors, executors, etc. **(30%)**
4. Design a RobotStudio program/simulation to complete the machining of the component. **(30%)**

Notes on the Assignment

Individually compile and write a formal technical report, using an appropriate format and Harvard referencing as indicated in the corresponding tutorial lecture, covering the following:

Your assignment will be evaluated based on three components: breadth and depth of research; quality of analysis; quality of presentation. The first component reflects the quantity and quality of material you find regarding the answers for the questions and the selected case(s). Use as many external sources as possible. Good quality external sources such as textbooks, referred articles, newspapers, company reports, trade journals, are preferred. The second component reflects coherence of your arguments and the insights of your analysis. The third component reflects the quality of your writing (Report basic requirements).

Basic requirements on report presentation: appropriate structure and logical development of discussions, Harvard referencing, introduction & conclusions, formatting, Tables and Figures, etc. **(10%)**

This is a formal academic report. Therefore, it must clearly demonstrate an extensive research into and a critical discussion of the corresponding theory, which may be complemented with your own experience, opinion and conclusions.

Assessment Rubric

The full assessment criteria for this assignment can be found in the Turnitin submission point located in the assessment section of the module page.

Anonymous Marking

Submissions that require a name

This assignment cannot be marked in line with the Anonymous Marking Policy requirements as you are required to be assessed by your name. Please ensure that in this assessment you are identified by your **name**.

Designated Deadline

The deadline given for your assessment is known as the 'Designated Deadline' for that given piece of work. The 'designated deadline' includes any approved extension/s granted by a support plan for students with disabilities or long-term health conditions. It is important that you make every effort to submit your work to the specified designated deadline. Any work received after the designated deadline will be considered late and marked as a non-submission unless you have an approved Request for Additional Consideration application.

Request for Additional Consideration

The Request for Additional Consideration policy applies when there are serious, unforeseen personal circumstances which could impact on your ability to undertake an assessment. You can find out more about the new Request for Additional Consideration policy by visiting the Academic Regulations webpage, where you will find both the policy document and a student guidance document. You can also find information of UDo, by searching for 'extensions'. It is your responsibility to make a Request for Additional Consideration in line with the timescales detailed in the policy. If you have any questions about the Request for Additional Consideration policy, you should contact your Personal Academic Tutor, Programme Leader, or Personal College Advisor / Online Learner Advisor. The Request for Additional Consideration policy cannot be used to manage existing disabilities or long-term health conditions. If you feel you have a disability which affects your academic performance, it is your responsibility to contact the Student Wellbeing Centre and discuss whether a support plan is appropriate. Please go to the UDo homepage and search for "extensions" for further details (https://udo.derby.ac.uk/campusm/home#menu).