

# ***Manufacturing Engineering Technology***

## ***TMJ4M***

### ***Culminating Activity***

This activity is designed to combine the theory and skills developed throughout the term. As in actual, (real world), situations, this task is broken down into team and individual components. The team will submit one document (in a Duo Tang), complete with the team and individual assignments and the finished project. This activity is worth 30% of the year and must be submitted on \_\_\_\_\_, Not before or After.

Failure to attempt/complete this activity will result in a zero (0) grade for the culminating task.

**Safety:** Safety is one of the prime concerns of any manufacturing organization. Students are reminded not to operate any machinery they have not been trained and certified on.

#### **Ministry of Education Expectations**

##### ***MANUFACTURING TECHNOLOGY SKILLS OVERALL EXPECTATIONS***

**B1.** apply a design process to plan and develop solutions, products, or services in response to challenges in manufacturing technology;

**B3.** demonstrate the safe and effective use of tools, equipment, and materials in the production of a product or the development of a production process

**B4.** develop and use a quality assurance system to industry standards in the production of a project.

##### ***SPECIFIC EXPECTATIONS***

**B1.2** demonstrate proficiency in using a design process to plan and develop solutions to manufacturing-related challenges

**B1.5** generate product specifications through the accurate interpretation of engineering drawings, sketches, and reports;

**B1.6** select suitable materials for fabricating products based on the design specifications and the intended use of the products;

**B3.1** demonstrate the skills required to safely operate machine tools and equipment

**B4.2** demonstrate a working knowledge of how quality assurance is used to maintain design specifications (*e.g., through quality inspection and testing procedures*);

##### ***TECHNOLOGY, THE ENVIRONMENT, AND SOCIETY OVERALL EXPECTATIONS***

**C1.** demonstrate an understanding of ways in which the manufacturing industry affects the environment, and make informed decisions based on this understanding

##### ***SPECIFIC EXPECTATIONS***

**C1.1** identify potentially harmful consequences of manufacturing activities for the environment

## CHALLENGE:

**Scenario:** Your manufacturing engineering team, (of 1-3 people), has been given the task of developing and implementing a new product line. To accomplish this, your team will work through three (3) phases, Pre-production planning, Fabrication, and Post-production analysis, then construct a prototype (see attached design), to “prove out” the manufacturing plan. This will require the team to complete group tasks as well as individual.

**Note each team member is responsible for at least one (1) individual activity per section**

**Phase 1 Pre-production Planning: /55 team marks, 15 individual marks**

### **Team activity- Process Routing: T/I /20 marks**

-review of the engineering drawing and specifications, then develop a process routing to fabricate the project. (Note this routing plan must include a listing of work centres and a brief description of the operation, ***not just the numerical sequence of operations*** as well as quality assurance check points and a description of what is to be inspected. Work centre descriptions are in your notes).

Example:

Work Centre	Operation Number	Est. Labour Standard	Description
#6 drill press	5-drilling	15 minutes	Drill 3/8 diam hole, 2 plcs
Quality check	6	N/A (indirect)	Confirm that the holes are drilled to 3/8 inch diameter

### **Team activity-Labour Standard(s): T /15 marks**

-in discussion with the team develop ***Estimated Labour Standards*** for each direct labour operation

### **Team activity-Build/Project Management Plan: T / 20 marks**

-develop a staffing plan based upon individual skills (hint survey the team and find out what each person feels they are good at)

-use the above information to develop a ***Build /Project Management Plan***. and assignment of duties (Note 1: you will have to assign team members duties such as quality technician, cost control analyst, and supervisor. Note 2: the build plan must include a relevant schedule of events and a time frame e.g. Pre-Production Planning June 12-13, 2006.)

### **Individual activity-Estimated Project Cost: K/U /15 marks**

Assigned to: \_\_\_\_\_

-development of an ***Estimated Project Cost*** (material and labour). See attached chart of labour rates and material costs.

### **Individual activity-Human Resources: K/U /15 marks**

Assigned to: \_\_\_\_\_

### **Individual activity-Quality Assurance Plan: K/U /15 marks**

Assigned to: \_\_\_\_\_

-development of a ***Quality Assurance Plan*** including check points, reporting, corrective measures and tooling.

### **Individual activity-cost control plan: K/U /15 marks**

Assigned to: \_\_\_\_\_

-development of a ***Cost Control Plan*** that will track labour time used (direct and indirect).

**Phase 2, Fabrication /85 team marks (17 marks per day), 0 individual marks**

**Team activity : App /25 marks**

-construction/fabrication of the product (to build plan)

**Team activity : App /30 marks**

-tracking and reporting of time spent and duties performed. (hint use the process routing as a guide)

Example:

Activity/Duty	Actual Time	Direct	Indirect
Cut block to length	3 minutes	X	
Wait for drill press to be free	5 minutes		X

**Team activity: App /30 marks**

-completion of quality checks and reports

**Phase 3, Post production analysis /0 team marks, 60 individual marks**

**Individual activity-Methods Engineering: K/U /15 marks**

Assigned to: \_\_\_\_\_

**Methods engineering:**

-describe how you would improve the methodology of at least one operation and state the anticipated savings

**Individual activity-Quality Assurance Report: K/U /15 marks**

Assigned to: \_\_\_\_\_

**Quality Assurance** report and final audit of finished project

-completion of a final quality report detailing the findings throughout the production phase (on specification or not, which work centre, why), and the final audit of the project (comparison of the completed project to the specifications).

**Individual activity-Labour Analysis: K/U /15 marks**

Assigned to: \_\_\_\_\_

**Labour Analysis and Efficiency calculation**

-analysis of the actual direct and indirect labour and calculation of labour cost  
-comparison of “earned hours” versus “actual hours”

(Efficiency calculation)

**Individual activity-Final Cost: K/U /15 marks**

Assigned to: \_\_\_\_\_

-based upon the data collected (actual labour times), observations, and materials used (including scrap), determine the **final actual** cost of the product

**Individual Reflection: (assigned to all team members): Com /30 marks**

-personal reflection of the culminating activity detailing what worked, what did not, and what could be done to improve your, and the teams performance.

### Data

#### **Materials:**

-lumber, \$1.45 per board foot

-screws, \$3.95/100

-brad nails, \$0.0005/each

-glue, \$7.99 per 500 ml bottle

-piano hinge, \$3.33/ft

#### **Labour:**

-direct labour is to be charged out at \$25.00 per hour

-indirect labour is to be charged out at \$18.00 per hour

**Formula(s):** Board footage =  $\frac{L \times W \times T}{144}$       Efficiency=  $\frac{(\text{estimated hours}) \times 100}{(\text{actual hours})}$

### Contract

We, (the team), have read, discussed (with the instructor), and understood the content requirements and completion date of this project.

Date: \_\_\_\_\_ Team Members: \_\_\_\_\_ Instructor: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

#### **Summary notes:**

-each team member is to be assigned at least one (1) individual activity per section

-each team member is responsible to write the reflection

-the team is responsible to complete and submit all documentation and product (**regardless of completion status**) on time.

-all marks will be prorated based upon individual attendance during the culminating activity time frame (e.g. a student/team member that has attended only 2 out of the 5 days of the culminating task will only be eligible for 2/5 of their total team marks )

<b>Team Member</b>	<b>Team Mark /140</b>	<b>Individual Mark /60</b>	<b>Total /200</b>