Cost Report

Costing model

The aim of this document is to show the process and philosophy behind the costing method used for the FSAE Cost Event.

# Context and hypothesis

The simulated company is sized to be a prototyping shop, able to manufacture and assemble most of the components of an FSAE car. Therefore, it will not have in-house specific expensive machinery used for a unique or only few parts of the car. For instance, 3D stereolithography printer used for the air intake, water-jet cutter, …

Of course, the machinery will not be used all the year to build only one FSAE car. Thus, we assume that the remaining time where the equipment is not allocated for the FS project is used for other customers, to build another car, small/medium series of components, prototypes, …

The same hypothesis is used for manpower.

Therefore, the shop is built around:

* Administrative department for marketing, production support (materials orders, invoice, …), finance, …
* Several shop floor workstations:
  + A 3 axis Haas CNC Mill VF-3SSYT
  + A CNC mill with Y axis Haas ST35-Y
  + A CNC laser table FL510HD-1000 from Baileigh
  + An assembly station
  + A welding station
  + A conventional machining area with a mill and a lathe
  + A metrological lab
  + FAO workstations

The following assumption are used in the cost model:

* The shop is running 35 hours a week, 46 week per year.
* During the opening time, machines are considered to have an OPE reflecting downtime, preventive maintenance, lack of orders, …
* Manpower of the shopfloor are considered to work 95% of the time

Items are attributed a linear depreciation between 3 to 10 years regarding equipment type.

In this simulation is not included :

* Building expense : rent, security, insurance
* VAT for the purchased and sold products
* Governmental taxes
* Margin applied on sell products

# Overhead cost

In the overhead cost are include office furniture, items used for different workstations, administrative wages, manpower time used for maintenance purpose, energies cost for small machinery and offices, …

This overhead is then distributed equally between each workstation production in order to annually compensate the overhead expense of the company.

Insérer tableau

# Manufacturing cost

For the manufacturing cost, the way to cost milling is explained below.

# Manufacturing/assembly Equipment

* Hand tool and electric tools :
  + 2 full roller cabinet
  + Torque wrench
  + Drill/ Angle grinder
* 3 Axis CNC mill dimensions
* 2 Axis CNC lathe dimensions
* (Conventional lathe)
* (Conventional mill)
* 2D laser cutting (or water jet) dimensions
* Lifting equipment
  + Mobile workplace crane
* Hydraulic press
* Band saw for stock
* Manual/hydraulic sheet bender
* Workstations
* (%tage accessories for CNC: length probe for mill tools; tool holders, … or price for more precise model)
* TIG Welder
* PPE equipment
* Specific tools (percentage of hand tool ?)
* Drill press

Include a percentage for maintenance in the shop (preventive maintenance + maintenance) : time of availability and cost for parts.

# Metrology

* Micrometre
* Inside micrometre
* indicator
* Profile projector?

# Consumables

* Cutting fluid
* Glue
* Cleaning agents
* Cutting tools (insert/mill/sawblade…)
* Grease/oil
* Fasteners
* Stock material
* Sand paper
* …

# Real Estate

* Shop floor
* Electricity and electric supply
* Heating
* Water
* Maintenance of building
* Compressed Air
* Recycling/waste management
* Worktable/office

# Manpower

* Technician (CNC program and run CNC program, complex assembly)
* Operator (Run CNC program and simple assembly task)
* TIG Welder (Experienced welder, and simple assembly task)
* Engineer (Complex CNC program, run CNC program, complex assembly) 50%administrative sales etc; 50%manufacturing
* Administrative/sales

# IT

* Computers
* Dedicated software: CAM/CAD (Fusion 360)
* Office pack
* Printer (A3/A0)

# Other

* Insurance
* Security/safety
* Compatbility
* Office furniture (paper/pen/…)
* Internet/phone access