



Integration Management

Case Study: Materials Management and Controlling

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1 Introduction

1.1 The Case

Our company produces communication systems for air traffic control (ATC). Figure 1 shows the product structure. Each system consists of a central unit and a number of workstations. A central unit consists of a certain number of switches depending on the size of the system. These units are responsible for the connection between different communication partners (pilots, other air traffic controller, etc.) using different means of communication (radio, ISDN, etc.).

The air traffic control workstations are connected to these switches with a switch being able to serve up to 8 workstations. The switches are interconnected to assure a failsafe speech connection with the communication partners.

A workstation consists of a touch screen, where flight objects are marked using a greasy pencil resulting in an immediate connection with the communication partner, a headset, some twisted-pair (TP) cables and a panel. The panel mainly consists of a keyboard and two boards are responsible (i) for the control of the workstation and (ii) the workstation – panel interconnection.

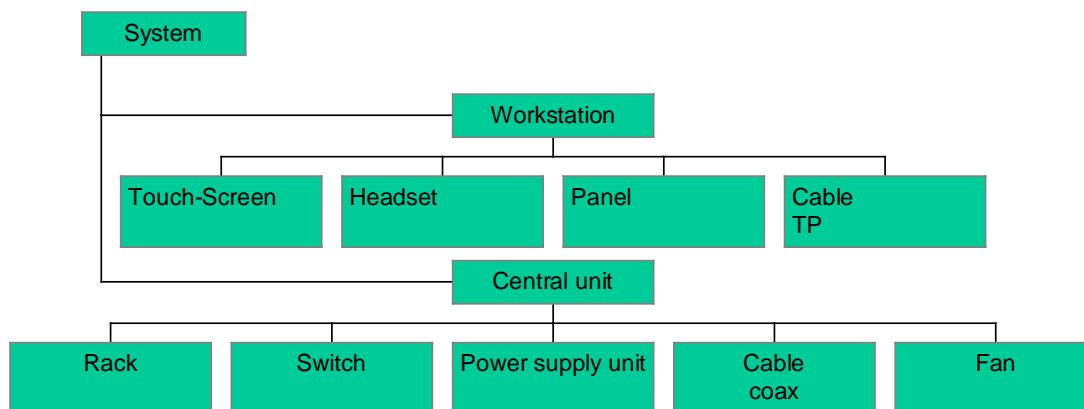


Fig. 1 : Product structure – overview

Panel and Switch are made to stock (they are also the technological core of the system), the workstations and the central unit are assembled individually for each ATC centre, all other parts in Figure 1 are externally procured. Panel and switch are semi-finished products, only the system itself is a finished product.

1.2 The “Sydney System”

Sydney Airport ordered such an ATC system with 20 workstations, which yields the following parts list derived from Figure 1:

System	Number
Workstations	20
Central unit	1

Workstation	Number
Touch-Screen monitor	1
Headset	1
Panel	1
Cable TP	30m

Central Unit	Number
Rack	1
Switch	3
Power supply unit	2
Fan	2
Cable coax	10m

1.3 Your Task

You have been assigned as a consultant to introduce SAP ECC for materials management and cost center accounting. You have to enter the master data and test the case study given according to customer needs. As usual in real-world projects, a prototype is used to test and verify the implementation, production of the Sydney system is used as the test project to verify the SAP ECC system you prepared.

The job will be done by a group of 2 consultants/students. Each group works in a unique plant grxx. All materials etc. start with the prefix grxx-. Cost centres start with prefix grxx.

Each plant has a purchasing organization whose name is identical to the plant.

All prices indicated in EUR.

2 Cost Centre Planning

We have three types of cost centers (s. Fig. 3):

- Direct cost centers.
- Supervisor and Building are indirect cost centers whose costs are allocated to the direct cost centers and the remaining indirect cost centers.
- Storage and Production Planning (PP) are further indirect cost centers whose costs are attributed to the cost objective by an overhead (OH) surcharge.

Figure 3 shows the performance flow among the cost centers. Building comprises the depreciation for the building, possible maintenance and repairs to it as well as energy costs which cannot be attributed directly to any of the other cost centres, such as lights outside the building or in the corridors.

The supervisor is in charge of the EPROM and SMD loader and the assembly line.

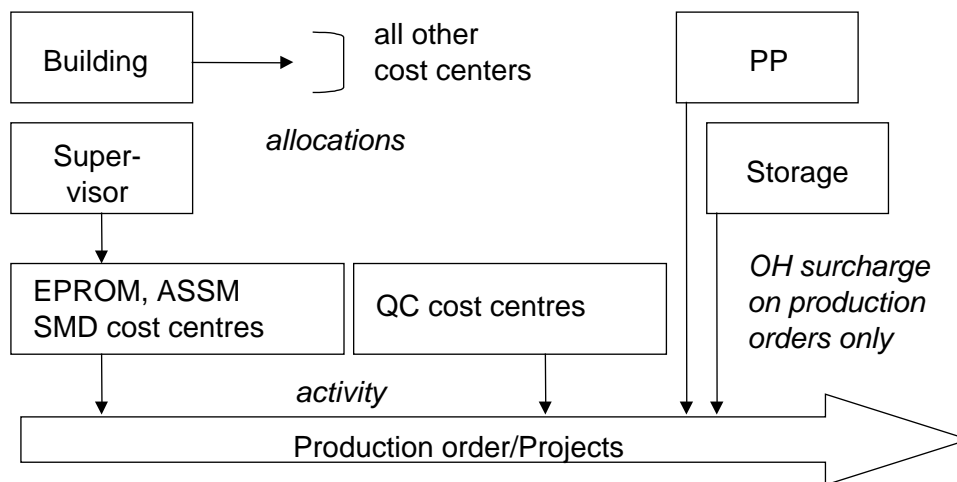


Figure 3: The cost centers involved

2.2 Primary Costs

Let us first consider primary costs (annual values):

Wages and salaries:

	No. of people	Total wages EUR	Fixed EUR	Variable EUR
Assembly	2	40.000,00	32.000,00	8.000,00
EPROM Loader	0	0,00	0,00	0,00
SMD	0	0,00	0,00	0,00
Q-Control	1	45.000,00	36.000,00	9.000,00
Storage	2	65.000,00		
PP	1	85.000,00		
Supervisor	1	60.000,00		

Social Security:

	No. of people	Total wages EUR	Fixed EUR	Variable EUR
Assembly	2	12.000,00	9.600,00	2.400,00
EPR0M Loader	0	0,00	0,00	0,00
SMD	0	0,00	0,00	0,00
Q-Control	1	13.500,00	10.800,00	2.700,00
Storage	2	19.500,00		
PP	1	25.500,00		
Supervisor	1	18.000,00		

The following table shows the basis for depreciation, whether the asset is depreciated by time or operating hours, and in case of time-dependent depreciation the annual value. The depreciation of the assembly line and the two loaders is considered 80% variable.

Depreciation

	Original investm. EUR	Useful life years/hours	Annual depr. EUR
EPR0M			
Loader	60.000,00	5000 hours	
SMD			
Loader	750.000,00	5000 hours	
Assembly			
assembly line	2.000.000,00	10000 hours	
tools	40.000,00	5 years	8.000,00
Q-Control			
Tools	12.000,00	2 years	6.000,00
Building			
Building	300.000,00	25 years	12.000,00
Storage			
storage system	105.000,00	15,00	7.000,00
PC plus control software	30.000,00	5,00	6.000,00
PP			
PC with PP software	50.000,00	5,00	10.000,00
	2.537.000,00		49.000,00

The next table shows cost elements other than payroll and depreciation. The electricity in direct cost centers is considered 80% variable, all training costs are completely fixed. Minor assets in direct cost centres are considered 50% variable.

All cost elements used for primary cost planning and for allocating Supervisor and Building are combined in cost element group **ATC-GROUP**.

Other costs:

	Total Cost (EUR)	Comment
Assembly		
minor assets	1.000,00	can be depreciated in the first year
electricity	3.200,00	each cost centre has a separate meter
Q-Control		
electricity	500,00	
EPROM Loader		
minor assets	1.600,00	can be depreciated in the first year
electricity	1.900,00	
SMD Loader		
electricity	4.850,00	
Building		
Heating	6.500,00	
Repairs	1.500,00	not activated
electricity	1.200,00	general consumption which cannot be attributed
Supervisor	n/a	
Storage		
electricity	3.450,00	
minor assets	7.200,00	can be depreciated in the first year
PP		
electricity	400,00	
training	2.000,00	
Sum	35.300,00	

2.3 The Service Flow

Fig. 3 shows the main service flow between the cost centres. Cost allocation of the two indirect cost centers which are allocated is done by operating hours (Supervisor) and surface in m² (Building) per year. The individual values for the cost centers are shown in the following table. The operating hours indicated are also the basis for activity pricing in the direct cost centers. There is only one activity type in the direct cost centres: production hour (MANU-H). Please assume that all direct cost centers are planned to capacity.

Basis for cost allocation and activity planning:

	Operating hours	m2
Assembly	1.500,00	140,00
Q-Control	1.400,00	100,00
Eprom Loader	1.500,00	100,00
SMD Loader	1.600,00	160,00
Building	-	-
Supervisor	-	70,00
Storage	-	380,00
PP	-	50,00
	6.000,00	1.000,00

3 Materials

3.1 Externally Procured Materials for the Final Assembly

As already mentioned, panel and switch are produced on stock, all other materials used for the final assembly of the system as depicted in Figure 1 are externally procured:

Material	Price Control*	MRP**
Rack	MVA 65,-	VM/5, HB/10
Cable TP	MVA 2,-/m	VM/200, FX/10000
Cable coax	MVA 30,-/m	VM/20, FX/100
Headset	MVA 80,-	VM/25, HB/100
Touch screen	S-Price 3500,-	PD, EX
Fan and power supply unit are also used for switch and panel.		

* moving average or standard price

** MRP parameter standard code

The materials needed for the production of panel and switch are listed in Section 4 on production data.

- All purchased items have a delivery time of 4 days and a goods receipt processing time of 1 day.
- All materials belong to industry "m".

3.3 Purchasing

After streamlining purchasing, all parts are purchased from two sources only, Electronic Supplies, plc and Techno, plc. with the latter delivering the frame, both types of cables, the headset, the circuit board, the keyboard, and the fan. All other parts are bought from Electronic Supplies, plc.

Please capture the necessary master data for purchasing, but allow for the prices entered at the materials master. Please also note the data indicated below, which are relevant to purchasing.

4. BOM Structure

4.1 The Circuit Boards

All boards used in panel and switch basically consist of the same parts which are listed below; all parts are purchased items:

Part	MRP	MVA/Piece
Circuit board incl. pins	VM/25St., FX/500St.	10,-
EPROM	VM/30St., FX/500St.	20,-
Diode type A	VM/250St., FX/3000St.	1,50
Diode type B	VM/250St., FX/3000St.	1,20
DSP	PD/EX	62,-
Resistance type A	VM/250St., FX/3000St.	9,-
Resistance type B	VM/250St., FX/3000St.	6,-
256 K storage module	VM/250St., FX/2000St.	5,50

Hint for purchasing procedures: diodes, resistances, and storage modules can only be ordered in portions of 1000 pieces, circuit boards and EPROM's only in 100 piece lots. DSPs can be ordered by the piece.

In addition, EPROM's are loaded with software developed by the company; this is done before the components are mounted on the circuit boards. The standard software modules are represented by a materials master with a standard price.

Software Module	Price of License
Software for central switch	1200,-
Software for workstation hub	500,-
Panel control software	430,-
Panel – switch communication software	300,-

The standard price indicated can be derived from the following considerations:

After finishing the development of a new standard software module, the business case indicates how many times such a module (software license) may be sold to a customer (1000 for each module). The costs accrued in the R&D project are then attributed to the software licenses.

The BOM of the boards are as follows:

Workstation hub

Part	No.
Circuit board	1
EPROM	1
Software for workstation hub	1
Diode type A	9
Diode type B	1
DSP	0
Resistance type A	0
Resistance type B	6
256 K storage module	2

Central switch

Part	No.
Circuit board	1
EPROM	1
Software for central switch	1
Diode type A	4
Diode type B	2
DSP	11
Resistance type A	14
Resistance type B	16
256 K storage module	16

Panel control board

Part	No.
Circuit board	1
EPROM	1
Panel control software	1

Diode type A	10
Diode type B	0
DSP	0
Resistance type A	1
Resistance type B	3
256 K storage module	2

Panel-switch communications board

Part	No.
Circuit board	1
EPROM	1
Panel – switch communication software	1
Diode type A	11
Diode type B	2
DSP	1
Resistance type A	7
Resistance type B	0
256 K storage module	4

4.2 Switch and Panel

The BOM of the switch is:

Part	No.	Purchased Item/In-process	Price Control	MRP
Power supply unit	1	purchased	MVA 19,-	VM/100St., FX/500 St.
Fan	3	purchased	MVA 26,-	VM/100St., FX/200 St.
Frame	1	purchased	MVA 65,-	VM/30 St., FX/500 St.
Workstation hub (HW/SW)	1	in-process	MVA ?	PD, EX
Central switch (HW/SW)	1	in-process	MVA ?	PD, EX

Please initialize the moving average prices in a meaningful way. The BOM of the panel is:

Part	No.	Purchased Item/In-process	Price Control	MRP
Frame	1	as above		
Panel keyboard	1	purchased	MVA 230,-	VM/10St., FX/200 St.
Panel control board (HW/SW)	1	in-process	MVA ?	PD, EX
Panel-switch communication board (HW/SW)	1	in-process	MVA ?	PD, EX
Power supply unit	2	as above		
Fan	3	as above		

5. Procurement

Please execute the MRP run and procure the purchase requisitions.