

Case Study On

Surface Mount Technology at Chromalox Instruments and
Control Corporation

Group No. 5

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Abstract: -

In Chromalox Corporation, management decided to introduce 1/16DIN controller in the market. For that reason, they need to choose from two alternative 1) In-house production 2) Sub-contracting method. Finally, they will decide based on PW and IRR method that which method is feasible for production.

BACKGROUND: -

A 1/16 DIN controller goes through various manufacturing process. The two alternatives available are

a) In-house production

Purchase the equipment needed to perform the surface mount assembly process in-house. Chromalox would be able to utilize equipment currently available for the hand insertion, wave soldering, and board-level testing steps in the manufacturing process, assuming no capacity constraints. This equipment would need no additional maintenance or working capital but would require additional programming and setup.

b) Sub-Contracting

Subcontract the circuit board assembly process to an assembly house. Chromalox would continue to purchase all materials, kit the materials for the jobs, and forward the kits to the subcontractor. The subcontractor would install surface mount and through-hole components to the boards and perform a visual inspection. Chromalox would continue to test electrically. Rework would be performed at Chromalox for minor repairs or at the subcontractor for major repairs.

a. In house production

In house production							
EOY	Working capital	Initial investment	SV	No of units sold/ year	unit price	Revenue	Before tax cash flow
0	\$ -	\$ 115,000.00	\$ -	0	0		\$ (115,000.00)
1	\$ -	\$ -	\$ -	2000	\$ 175.00	\$ 350,000.00	\$ 66,500.00
2	\$ -	\$ -	\$ -	3000	\$ 161.00	\$ 483,000.00	\$ 91,770.00
3	\$ -	\$ -	\$ -	3000	\$ 148.12	\$ 444,360.00	\$ 84,428.40
4	\$ -	\$ -	\$ -	4000	\$ 136.27	\$ 545,080.00	\$ 103,561.20
5	\$ -	\$ -	\$ -	4000	\$ 125.37	\$ 501,480.00	\$ 95,276.20
6	\$ -	\$ -	\$ -	4000	\$ 115.34	\$ 461,360.00	\$ 87,652.40
7	\$ -	\$ -	\$ -	4000	\$ 106.11	\$ 424,440.00	\$ 80,636.60

total expenses (In house)							
EOY	Material cost	overhead cost	labor	SA&E	Inventory carrying cost	total	
1	\$ 105,000.00	\$ 84,000.00	\$ 21,000.00	\$ 73,500.00	\$ -	\$ 283,500.00	
2	\$ 144,900.00	\$ 115,920.00	\$ 28,980.00	\$ 101,430.00	\$ -	\$ 391,230.00	
3	\$ 133,308.00	\$ 106,646.40	\$ 26,661.60	\$ 93,315.60	\$ -	\$ 359,931.60	
4	\$ 163,524.00	\$ 130,819.20	\$ 32,704.80	\$ 114,466.80	\$ -	\$ 441,518.80	
5	\$ 150,444.00	\$ 120,355.20	\$ 30,088.80	\$ 105,310.80	\$ -	\$ 406,203.80	
6	\$ 138,408.00	\$ 110,726.40	\$ 27,681.60	\$ 96,885.60	\$ -	\$ 373,707.60	
7	\$ 127,332.00	\$ 101,865.60	\$ 25,466.40	\$ 89,132.40	\$ -	\$ 343,803.40	

IRR	69%
PW	\$ 193,095.74

b. Sub-contracting

Sub contracting							
EOY	Working capital	Initial investment	SV	No of units sold/ year	unit price	Revenue	Before tax cash flow
0	\$80000 = -\$80000	\$ -	\$ -	0	-		\$ (80,000.00)
1	108000 - 80000 = -\$28000	\$ -	\$ -	2000	\$ 175.00	\$ 350,000.00	\$ 10,425.00
2	108000 - 108000 = \$0	\$ -	\$ -	3000	\$ 161.00	\$ 483,000.00	\$ 67,536.90
3	136000 - 108000 = -\$28000	\$ -	\$ -	3000	\$ 148.12	\$ 444,360.00	\$ 33,961.15
4	136000 - 136000 = \$0	\$ -	\$ -	4000	\$ 136.27	\$ 545,080.00	\$ 82,203.46
5	136000 - 136000 = \$0	\$ -	\$ -	4000	\$ 125.37	\$ 501,480.00	\$ 75,410.58
6	136000 - 136000 = \$0	\$ -	\$ -	4000	\$ 115.34	\$ 461,360.00	\$ 69,159.89
7	\$ 136,000.00	\$ -	\$ -	4000	\$ 106.11	\$ 424,440.00	\$ 199,407.75

total expenses(Sub contractor)							
EOY	Material cost	overhead cost	labor cost	SA&E	Tooling cost	Inventory carrying cost	Total
1	\$ 181,475.00	\$ 42,000.00	\$ 10,500.00	\$ 73,500.00	\$ 2,500.00	\$ 1,600.00	\$ 311,575.00
2	\$ 239,423.10	\$ 57,960.00	\$ 14,490.00	\$ 101,430.00	\$ -	\$ 2,160.00	\$ 415,463.10
3	\$ 220,269.25	\$ 53,323.20	\$ 13,330.80	\$ 93,315.60	\$ -	\$ 2,160.00	\$ 382,398.85
4	\$ 263,927.74	\$ 65,409.60	\$ 16,352.40	\$ 114,466.80	\$ -	\$ 2,720.00	\$ 462,876.54
5	\$ 242,816.62	\$ 60,177.60	\$ 15,044.40	\$ 105,310.80	\$ -	\$ 2,720.00	\$ 426,069.42
6	\$ 223,390.51	\$ 55,363.20	\$ 13,840.80	\$ 96,885.60	\$ -	\$ 2,720.00	\$ 392,200.11
7	\$ 205,513.85	\$ 50,932.80	\$ 12,733.20	\$ 89,132.40	\$ -	\$ 2,720.00	\$ 361,032.25

IRR	55%
PW	\$ 144,002.81

Proposed Solution: -

When comparing the two alternatives for in-house production and sub-contracting, we are able to analyze the initial investment, total cost incurred while production and the total revenue. The BTCF (Before Tax Cash Flow) is calculated by solving the variables and then the decision to choose the preferred alternative is made based on the PW (Present Worth) and IRR (Internal Rate of Return). The PW is found at a MARR of 20% for both alternatives.

Additional Decision-Making Factors:

The additional decision-Making factor that should be considered to select the preferred alternative is the Ease of modification/flexibility. If the company wants to make changes in-between the production process, it might be easier to do so in in-house production. The in-house alternative has better control over the duration and quantity of controllers produced. The quantity of units produced can be increased or decreased easily midway if needed. Similarly, the time it takes to produce the controllers can also be modified if needed. Also, the quality of the controllers can be easily monitored and controlled in in-house production alternative.

Conclusion: -

From the two feasible solution, in-house production and Sub-contracting. Finally, we decide to choose the in-house production because Present Worth and Internal Rate of Return are higher when we compare the values with Sub-contracting. Therefore, after 7 years company is getting higher profit from in-house production.