**McCoy Company: DDSM Proof of Concept Model**

**Results**

Two objective functions (i.e., that which is being maximized) were used:

1. Maximize revenue (and Sales/Marketing expenditures). Demand added to base case if profitable. Demand left in base case even if unprofitable

2. Maximize profit. Demand added to base case if profitable. Demand removed from base case if unprofitable.

Results include four scenarios

* Max revenue and FE +20%
* Max profit and FE +20%
* Max revenue FE +200%
* Max profit FE +200%

**Table 1: McCoy Company Results (FE 20%)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Scenarios | Revenue | Profit | Sales/  Marketing | | Sales/Marketing ROI | Activity capacity exceeded |
| Baseline | $136.3m | $12.7m | | $28m | 45% | None |
| Revenue max | $143.8m  (6%) | $16.3m  (28%) | | $28.6m | 27% improvement | 1 (labor) |
| Profit max | $140.9m  (3%) | $19.8m  (56%) | | $23.6m | 87% improvement | 1 (labor) |

**Table 2: McCoy Company Results (FE 200%)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Scenarios | Revenue | Profit | Sales/  Marketing | Sales/Marketing ROI | Activity capacity exceeded |
| Baseline | $136.3m | $12.7m | $28m | 45% | None |
| Revenue max | $173.4m  (27%) | $30.0m  (136%) | $34m | 96% improvement | 5 labor  2 mach |
| Profit max | $170.5m  (25%) | $33.5m  (164%) | $39m | 158% improvement | 4 labor  2 machine |

**Details**

The purpose of this detail is to provide a summary of the types of data and information required for optimized planning. The data is both financial and operational. Much of the core requirements are activity/process based unit costs. Organizations that have ABC costing in place will spend less time and effort in providing this information than those who don’t.

Describe in 3 steps how the POC model was built from both existing ABC data and judgments.

1. Model structure (e.g., number of products, activities, customers, facilities)
2. Data available from the ABC model (e.g., fixed costs, variable costs, capacities, prices)
3. Data not available from the ABC model (e.g., response functions, how capacity constraints were relieved)
4. The entire model’s data
5. **Model Structure**

Given the proof of concept model’s objective was to demonstrate the software’s value proposition and not to build a model whose results would, necessarily, be actionable, the structure was simplified from the original ABC model. POC ABC model details include:

* One facility
  + US plant/distribution center
* 2 products: standard and custom
* nine customers
  + 5 regions in North American area (NA)
  + 2 each in Europe/Middle East(E/ME) and Far East areas (FE)
* 8 response functions
  + 6 for the 3 areas (NA, E/ME and FE)
    - One for +/- 20% sales/marketing expenditures off baseline in each area
    - One for custom and one for regular product
  + 2 for FE area
    - One for + 200% and -20% sales/marketing expenditures off baseline
    - One for custom and one for regular product
* Activities
  + COGS
    - 7 direct manufacturing
    - 11 indirect manufacturing
    - 2 warehouse
  + 13 SG&A
    - 6 S
    - 7 G&A

**2. Data available from ABC model**

* Activity costs: A described above, all the activities had to be represented in the model as cost functions. Given the POC model structure, the data from the original ABC model were aggregated, appropriately, and broken out by fixed and variable costs at the appropriate volumes. Of the total 27 activities, 9 were fixed cost only. For the remaining 18, the total variable cost for each activity divided by the activity’s volume became the slope of that activity’s cost function curve in the IEO model. Bills of materials were also created between adjacent activities when the first activity’s volume was greater than the second due to scrap, etc..
* Capacities: All of the activities had capacities associated with them and these were entered in the model,
* Prices: As with activity costs, the prices were developed after the demand data had been aggregated into the two products and nine customers/demand regions.

**3. Data not available from the ABC model**

1. Capacity relief: Where appropriate, capacity relief was included in the model. Most of the activities’ capacities were relieved with labor in the form on new hires. Two, however, required additional capital equipment. These data were developed by John Miller.
2. Link costs: Link costs were developed using native IEO functionality
3. Response Functions: Response functions were developed by John Miller, qualitatively.

**4. Model’s Data Detail**

**SALES DATA**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **Units (M)** | **$ Amount** | **Ave Sell Price** |
|  |  |  |  |
| **Standard** |  |  |  |
| Tong | 7192 | 56097 | 7.80 |
| Snap | 1345 | 8838 | 6.57 |
| Clip | 1988 | 14015 | 7.05 |
| Total Standard | 10525 | 78950 | 7.50 |
|  |  |  |  |
| **Custom** |  |  |  |
| Engraved | 2818 | 23353 | 8.29 |
| Embossed | 652 | 6324 | 9.70 |
| Decorated | 2505 | 26673 | 10.65 |
| Total Custom | 5975 | 56350 | 9.43 |
|  |  |  |  |
| **Total** | 16,500 | 135300 | 8.20 |

**SALES BY DEMAND AREA/REGION (units)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Areas and Regions** | **Tong** | **Snap** | **Clip** | **Engraved** | **Embossed** | **Decorated** | **Total** |
| **Domestic Wholesale** |  |  |  |  |  |  |  |
| East Region | 1295 | 310 | 78 | 103 | 11 | 11 | 1808 |
| Midwest Region | 2331 | 213 | 154 | 101 | 5 | 24 | 2828 |
| West Region | 1554 | 365 | 791 | 95 | 7 | 6 | 2818 |
| **Far East** |  |  |  |  |  |  |  |
| Beijing | 127 | 70 |  | 772 | 105 | 633 | 1707 |
| Tokyo | 85 | 71 |  | 493 | 106 | 423 | 1178 |
| **Europe** |  |  |  |  |  |  |  |
| Rome | 369 | 76 | 397 | 306 | 52 | 319 | 1519 |
| London | 63 | 55 | 460 | 225 | 76 | 138 | 1017 |
| **Domestic Specialty** |  |  |  |  |  |  |  |
| East Region |  |  |  | 265 | 75 | 214 | 554 |
| Midwest Region |  |  |  | 220 | 74 | 354 | 648 |
| West Region |  |  |  | 104 |  | 175 | 279 |
| **Fulfillment** |  |  |  |  |  |  |  |
| Los Angeles | 601 | 81 | 52 |  |  |  | 734 |
| Dallas | 678 | 84 | 56 |  |  |  | 818 |
| **Middle East** |  |  |  |  |  |  |  |
| Dubai | 89 | 20 |  | 134 | 142 | 208 | 593 |
| **Total** | **7192** | **1345** | **1988** | **2818** | **653** | **2505** | **16501** |

**SALES BY DEMAND AREA/REGION ($)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Areas and Regions** | **Tong** | **Snap** | **Clip** | **Engraved** | **Embossed** | **Decorated** | **Total** |
| **Domestic Wholesale** |  |  |  |  |  |  |  |
| East Region | 9972 | 1983 | 685 | 813 | 101 | 119 | 13673 |
| Midwest Region | 17949 | 1365 | 893 | 799 | 43 | 259 | 21308 |
| West Region | 11966 | 2335 | 5378 | 750 | 65 | 65 | 20559 |
| **Far East** |  |  |  |  |  |  |  |
| Bejing | 1105 | 508 |  | 6235 | 1055 | 7279 | 16182 |
| Tokyo | 739 | 507 |  | 4012 | 1055 | 4865 | 11178 |
| **Europe** |  |  |  |  |  |  |  |
| Rome | 3284 | 524 | 2938 | 2723 | 512 | 3667 | 13648 |
| London | 561 | 380 | 3404 | 2003 | 733 | 1587 | 8668 |
| **Domestic Specialty** |  |  |  |  |  |  |  |
| East Region |  |  |  | 2146 | 705 | 1901 | 4752 |
| Midwest Region |  |  |  | 1781 | 681 | 3143 | 5605 |
| West Region |  |  |  | 843 | 0 | 1554 | 2397 |
| **Fulfillment** |  |  |  |  |  |  | **0** |
| Los Angeles | 4568 | 535 | 363 |  |  |  | 5466 |
| Dallas | 5152 | 554 | 393 |  |  |  | 6099 |
| **Middle East** |  |  |  |  |  |  |  |
| Dubai | 792 | 148 |  | **1246** | **1363** | **2268** | **5817** |
| **Total** | **56088** | **8839** | **14054** | **23351** | **6313** | **26707** | **135352** |

**Average Selling Price**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Areas and Regions** | **Tong** | **Snap** | **Clip** | **Engraved** | **Embossed** | **Decorated** |
| **Domestic Wholesale** |  |  |  |  |  |  |
| East Region | 7.70 | 6.40 | 8.78 | 7.89 | 9.18 | 10.82 |
| Midwest Region | 7.70 | 6.41 | 5.80 | 7.91 | 8.60 | 10.79 |
| West Region | 7.70 | 6.40 | 6.80 | 7.89 | 9.29 | 10.83 |
| **Far East** |  |  |  |  |  |  |
| Bejing | 8.70 | 7.26 |  | 8.08 | 10.05 | 11.50 |
| Tokyo | 8.69 | 7.14 |  | 8.14 | 9.95 | 11.50 |
| **Europe** |  |  |  |  |  |  |
| Rome | 8.90 | 6.89 | 7.40 | 8.90 | 9.85 | 11.50 |
| London | 8.90 | 6.91 | 7.40 | 8.90 | 9.64 | 11.50 |
| **Domestic Specialty** |  |  |  |  |  |  |
| East Region |  |  |  | 8.10 | 9.40 | 8.88 |
| Midwest Region |  |  |  | 8.10 | 9.20 | 8.88 |
| West Region |  |  |  | 8.11 |  | 8.88 |
| **Fulfillment** |  |  |  |  |  |  |
| Los Angeles | 7.60 | 6.60 | 6.98 |  |  |  |
| Dallas | 7.60 | 6.60 | 7.02 |  |  |  |
| **Middle East** |  |  |  |  |  |  |
| Dubai | 8.90 | 7.40 |  | 9.30 | 9.60 | 10.90 |

**Cost of Goods Sold**

|  |  |  |  |
| --- | --- | --- | --- |
| **Description** | **# of Units (M)** | **Cost** | **Cost of Goods** |
|  |  |  |  |
| **Standard** |  |  |  |
| Tong | 7192 | 4.09 | 29415 |
| Snap | 1345 | 3.67 | 4936 |
| Clip | 1988 | 4.52 | 8986 |
| Total Standard | 10525 | 4.12 | 43337 |
|  |  |  |  |
| **Custom** |  |  |  |
| Engraved | 2818 | 5.38 | 15161 |
| Embossed | 652 | 5.91 | 3853 |
| Decorated | 2505 | 6.6 | 16533 |
| Total Custom | 5975 | 5.95 | 35547 |
|  |  |  |  |
| Cost of Goods Sold | 16,500 | 4.78 | 78884 |

**Production Data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Description** | **$ Amount** | **# Units** | **BOM** | **% Fixed** | **Var Cost/Unit** | **Capacity** | **Incremental Fixed Costs** |
| **DIRECT MATERIAL** |  |  |  |  |  |  |  |
| Direct Material Regular | 44,347 | 18325 | 1 | 0 | $2.42 | N/A | N/A |
| Direct Material Slim | 2,862 | 1475 | 1 | 0 | $1.94 | N/A | N/A |
| Direct Material Decoration | 2,029 | 2505 | 1 | 0 | $0.81 | N/A | N/A |
| Total Direct Material | 49,237 |  |  |  |  |  |  |
| **STANDARD** |  |  |  |  |  |  |  |
| Units Started |  | 19800 | 1 | 0 |  |  |  |
| Fabrication | 2,800 | 19400 | 1.02 | 100 | N/A | 30,000 | $1 million/10 million buckles |
| Buffing | 2,900 | 18400 | 1.05 | 25 | $0.12 | 19,000 | $250,000/2 million buckles |
| Plating | 3,500 | 17000 | 1.08 | 25 | $0.15 | 25,000 | $950,000/10 million buckles |
| Assemble | 3,500 | 16750 | 1.01 | 10 | $0.20 | 30,000 | $300,000/10 million buckles |
| Coat Process | 200 | 1988 | 1 | 25 | $0.08 | 2,000 | $50,000/2 million buckles |
| Total Standard | 12,900 |  |  |  |  |  |  |
| **CUSTOMIZATION** |  |  |  |  |  |  |  |
| Engraved | 2,113 | 2818 | 1 | 80 | $0.15 | 3,000 | $250,000/1 million buckles |
| Embossed | 528 | 652 | 1 | 75 | $0.20 | 1,500 | $500,000/1 million buckles |
| Decorated | 2,528 | 2505 | 1 | 20 | $0.81 | 2,750 | $ 50,000/1 million buckles |
| Total Customization | 5,169 |  |  |  |  |  |  |
| **BOX Belt Buckles** |  |  |  |  |  |  |  |
| Standard | 956 | 9180 | 1 | 15 | $0.09 | 9,500 | $100,000/1 million buckles |
| Special | 151 | 1345 | 1 | 15 | $0.09 | 1,500 | $100,000/1 million buckles |
| Custom | 603 | 5975 | 1 | 15 | $0.09 | 6,500 | $100,000/1 million belt buckles |
| Total Box | 1,710 | 16500 |  |  |  |  |  |
| Total Direct Material | **69,016** |  |  |  |  |  |  |

**Support Production Data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ENGINERING SUPORT** |  |  |  |  |  |  |  |
| **Description** | **Amount** | **# Units** | **BOM** | **% Fixed** | **Variable Cost/Unit** | **Capacity** | **Incremental** |
| Custom Design | $1,000 | 5976 | 1 | 25% | 0.12 | 6500 | 1 million/$100K |
| Quality control/inspection | 1000 | 16500 | 1 | 35% | 0.04 | 17000 | 1.5 million/$75K |
| Material testing | 700 | 16500 | 1 | 100% | N/A | 18,500 | 2.5 million/$75K |
| Total Engineering Support | $2,700 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **MANUFACTURING SUPPORT** | |  |  |  |  |  |  |
| Facility Maintenance | $750 | 16500 |  | 100% | N/A | 21500 | 2.5 million/$75K |
| Machine Maintenance | 755 | 16500 |  | 100% | N/A | 21500 | 2.5 million/$75K |
| Custom Machine Main | 500 | 5975 |  | 100% | N/A | 10,000 | 2.5 million/$75K |
| Basic Product Moves | 1,200 | 16500 |  | 60% | 0.03 | 18000 | 500K/$45K |
| Custom Product Moves | 600 | 5975 |  | 60% | 0.04 | 6500 | 250K lighters/45K |
| Total | $3,805 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **MANUFACTURING ADMAN** |  |  |  |  |  |  |  |
| Basic Procurement | $1,811 | 16500 |  | 100% | N/A | 17900 | 2.75 million/$300,000 |
| Custom Procurement | 500 | 5975 |  | 25% | 0.02 | 6500 | 1 million/$100,000 |
| Production Control | 500 | 16500 |  | 100% | N/A | 17900 | 2.2 million/$65,000 |
| Total Manufacturing Adman | $2,811 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Total Manufacturing Support** | $ 9,316 |  |  |  |  |  |  |
| Total Direct Material/Manufacturing (above) | $ 69,016 |  |  |  |  |  |  |
| Total Cost of Goods Sold | $ 78,332 |  |  |  |  |  |  |

**Shipping and Warehouse Data**

|  |  |
| --- | --- |
| Shipping | $ 3000 |
| Warehouse | $ 2000 |
| Total | $ 5000 |

Shipping

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Units Sold\*** | **Shipping costs\*** | **Per Unit Average** |
| Domestic Wholesale | 7454 | $1,080 | $0.14 |
| Far East | 2885 | $660 | $0.23 |
| Europe | 2535 | $570 | $0.22 |
| Domestic Specialty | 1481 | $180 | $0.12 |
| Fulfillment | 1552 | $210 | $0.14 |
| Middle East | 593 | $300 | $0.51 |
|  |  |  |  |
| Total | 16500 | $3,000 | $0.18 |
| \* In Millions |  |  |  |

|  |  |  |
| --- | --- | --- |
| **Assumptions** |  |  |
| 3” X 4”X 1" Box (Both custom and regular) | | |
| 18" x 16" x 12" Case size | |  |
| 240 boxes to a case |  |  |
| Total cases shipped 68750 | |  |
| Average Cost Per Case $43.63 | |  |
|  |  |  |

Areas and Regions

|  |  |  |  |
| --- | --- | --- | --- |
| **Areas and Regions** | Units\* | Shipping | Per Unit Average |
| **Domestic Wholesale** | 7454 | $ 1,080 | 0.15 |
| East Region |  |  | 0.14 |
| Midwest Region |  |  | 0.16 |
| West Region |  |  | 0.19 |
| **Far East** | 2885 | $ 660 | 0.23 |
| Beijing |  |  | 0.21 |
| Tokyo |  |  | 0.26 |
| **Europe** | 2535 | $ 570 | 0.22 |
| Rome |  |  | 0.23 |
| London |  |  | 0.21 |
| **Domestic Specialty** | 1481 | $ 207 | 0.14 |
| East Region |  |  | 0.14 |
| Midwest Region |  |  | 0.16 |
| West Region |  |  | 0.19 |
| **Fulfillment** | 1552 | $ 210 | 0.14 |
| Los Angeles |  |  | 0.16 |
| Dallas |  |  | 0.12 |
| **Middle East** | 593 | $ 273 | 0.46 |
| Dubai |  |  | 0.46 |
| **Total Shipping Costs** |  | $ 3,000 |  |
| \*In Million |  |  |  |

Warehouse

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Description** | **$ Amount** | **# Units** | **% Fixed** | **Var Cost/Unit** | **Capacity** | **Incremental Fixed Costs** |
| Pull Order Activity | $1,250 | 16.5 million | 0 | 7.5 cents |  | N/A |
| Pack Order Activity | $500 | 16.5 million | 0 | 3.0 cents |  | N/A |
| Warehouse Facility | $250 | 16.5 million | 100 | N/A | 19 million | 2 million/$45k |
| **Total Warehouse** | $2,000 |  |  |  |  |  |

**Sales and Marketing ($)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Areas and Regions** | **Tong** | **Snap** | **Clip** | **Engraved** | **Embossed** | **Decorated** | **Total** |
| **Domestic Wholesale** | **8659** | **1176** | **431** | **1156** | **105** | **223** | **11750** |
| East Region | 2598 | 353 | 206 | 462 | 35 | 5 |  |
| Midwest Region | 3895 | 529 | 81 | 289 | 35 | 120 |  |
| West Region | 2166 | 294 | 144 | 405 | 30 | 98 |  |
| **Far East** | **405** | **207** |  | **2098** | **432** | **2468** | **5610** |
| Beijing | 244 | 105 |  | 1363 | 211 | 1005 |  |
| Tokyo | 161 | 102 |  | 735 | 221 | 1463 |  |
| **Europe** | **804** | **180** | **1255** | **940** | **268** | **1033** | **4480** |
| Rome | 635 | 109 | 565 |  | 114 | 731 |  |
| London | 169 | 71 | 690 |  | 154 | 302 |  |
| **Domestic Specialty** |  |  |  | **1302** | **388** | **1830** | **3520** |
| East Region |  |  |  | 367 | 81 | 407 |  |
| Midwest Region |  |  |  | 693 | 206 | 834 |  |
| West Region |  |  |  | 242 | 101 | 589 |  |
| **Fulfillment** |  |  |  | **1276** | **136** | **108** | **1520** |
| Los Angeles |  |  |  | 607 | 71 | 54 |  |
| Dallas |  |  |  | 669 | 65 | 54 |  |
| **Middle East** | **164** | **38** |  | **245** | **267** | **406** | **1120** |
| Dubai |  |  |  |  |  |  |  |
| **Total** |  |  |  |  |  |  | **28000** |

**General and Administrative**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Description** | **Annual Spend** | **% Fixed** | **Variable** | **Capacity** | **Incremental** |
| Bus Sustaining | $5,000 | 100% fixed |  |  |  |
| Region |  |  |  |  |  |
| North America | $2,000 | 50% fixed | Total Buckles | 9000K | $65K per million units |
| Far East | $250 | 25% fixed | Total Buckles | 4500k | $25K per 500K units |
| M/E and Europe | $750 | 35% fixed | Total Buckles | 4500K | $30K per 500K units |
| Legal/Brand |  |  |  |  |  |
| North America | $500 | 100% fixed |  |  |  |
| Far East | $1,000 | 100% fixed |  |  |  |
| M/E and Europe | $500 | 100% fixed |  |  |  |
| Total G&A | $10,000 |  |  |  |  |