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Velocity Manufacturing Company

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Working Paper 02-009

VELOCITY MANUFACTURING COMPANY
VELOCITY CONSULTING CASE ASSIGNMENT

***AN ANALYSIS OF HISTORIC DEMAND TO SUPPORT THE DESIGN
OF INVENTORY STOCKING AND REPLENISHMENT POLICIES***

Working Paper # 02-009

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VELOCITY CONSULTING CASE ASSIGNMENT

AN ANALYSIS OF HISTORIC DEMAND TO SUPPORT THE DESIGN OF INVENTORY STOCKING AND REPLENISHMENT POLICIES

The Velocity Manufacturing consulting opportunity arises in large part from the company's inability to profitably supply its customers with the product variety and service levels that are now required. Any proposal by your team to redefine Velocity's market strategy or operating policies will require justification, and should include a thorough analysis for any new production, stocking or reordering policy. As illustrated in Figure 1, a basic building block for such analysis is a forecast of demand for products and the resulting requirements for components and raw materials. These often derive in large part from an investigation of historical demand.

The goal of this assignment is to provide an understanding of the historical demand for Velocity's products by customer and part number, and the resulting requirements for product components and raw materials (illustrated in Figure 2).

The file, **Demand2002.XLS**, contains a history of all orders for Velocity's products during the year 2002. Your task is to analyze that data to establish the following facts and statistics.

- **Daily demand.** Determine the demand by part and by customer for each day of the past year on which there was some customer order. Summarize your findings with a table giving the mean, variance, standard deviation and the coefficient of variation (standard deviation/mean) for each part. Do the same for each customer. Finally, calculate these statistics for the total demand each day.
- **Relative demand.** Perform a Pareto analysis of the annual demand for both customers and parts. Graph your results for the top 15 elements of each category and group the remaining demand into a sixteenth item ("other").
- **Daily demand for components and raw materials.** Using the bill-of-materials tables found in Figure 3 (and provided in **VelocityBOMs.XLS**) calculate the average daily consumption and variation in demand for the 18 end fittings and 17 raw materials used to build Velocity's 68 products. (Matrix multiplication that can accomplish this is illustrated in **ExplosionIllustration.XLS** for the simplified example of the end fittings consumed by 20 parts over 10 days.) Determine the mean, variance, standard variation and the coefficient of variation for these daily requirements and summarize your findings in the form of a table.

Submit your report in both printed and electronic form. Name your file **Team#.XLS**

Data Required For Materials Requirement Planning

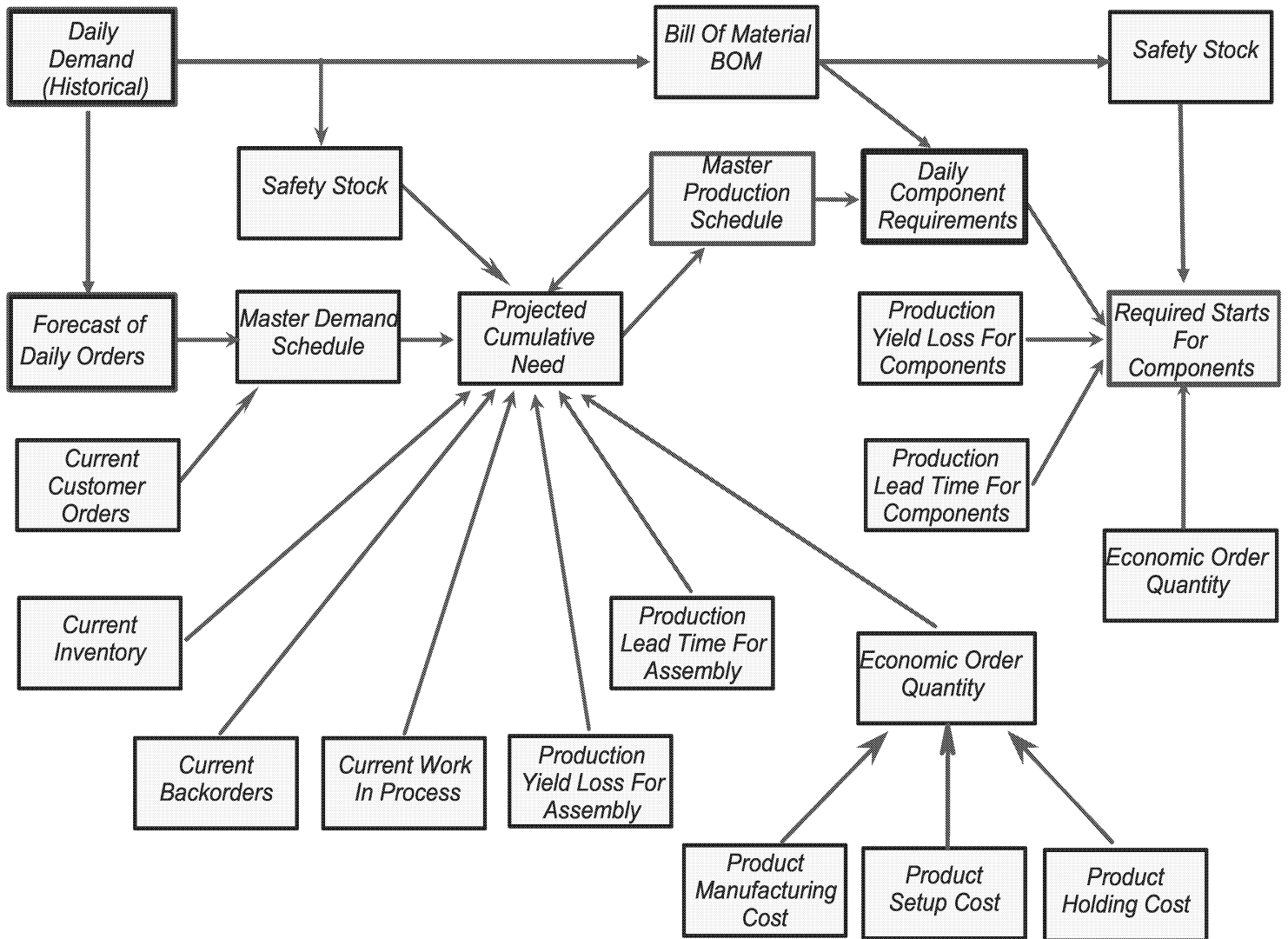
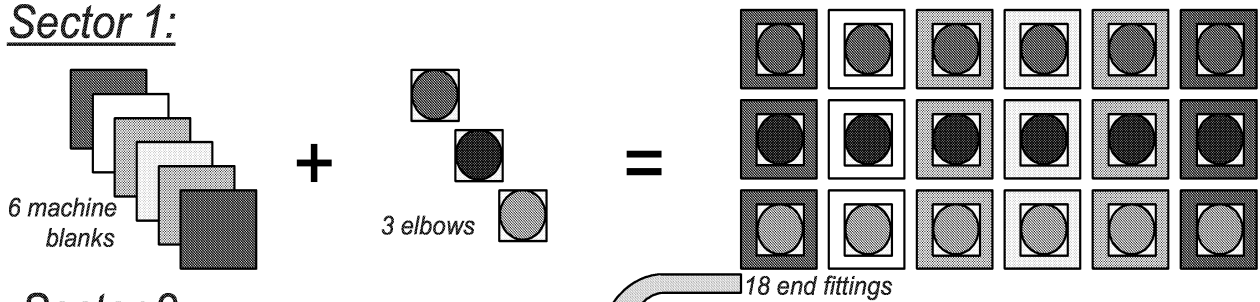


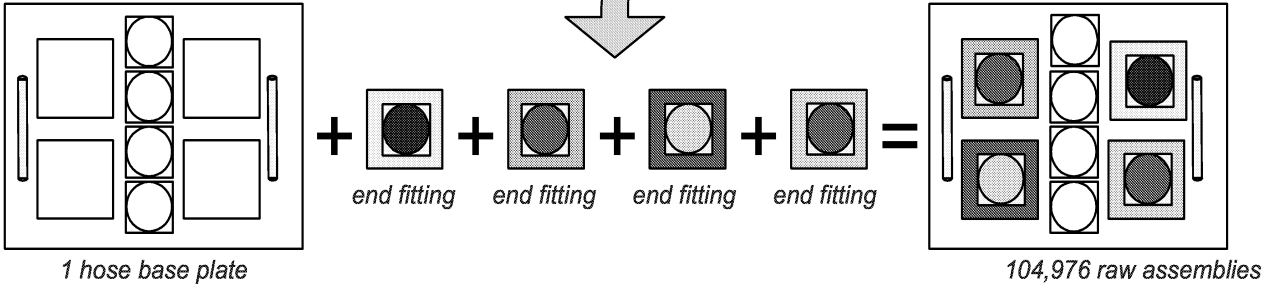
Figure 1.

Bill-of-Materials / Process Description

Sector 1:



Sector 2:



Sector 3:

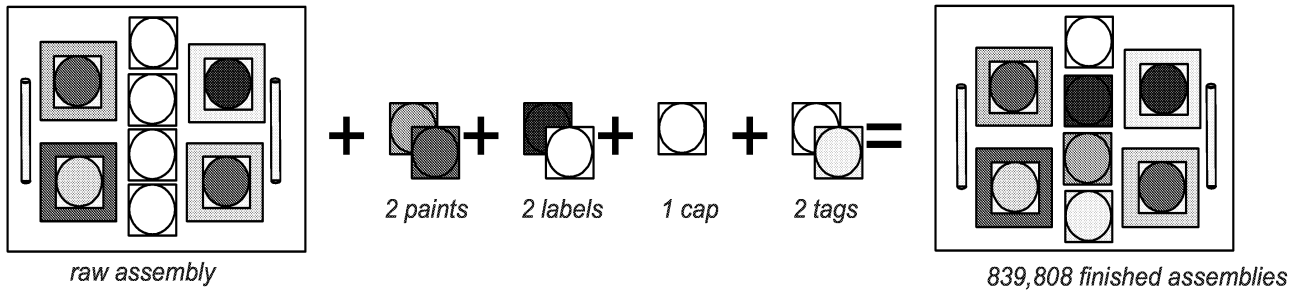


Figure 2.

SECTOR 1

P/N	Red Blank	Blue Blank	Orange Blank	Yellow Blank	White Blank	Pink Blank	Red Elbow	Blue Elbow	Green Elbow
R-R	1						1		
R-B	1							1	
R-G	1								1
B-R		1					1		
B-B		1						1	
B-G		1							1
O-R			1				1		
O-B			1					1	
O-G			1						1
Y-R				1			1		
Y-B				1				1	
Y-G				1					1
W-R					1		1		
W-B					1			1	
W-G					1				1
P-R						1	1		
P-B						1		1	
P-G						1			1

Figure 3a.

P/N	Sector 2																	Bases	
	R-R	R-B	R-G	B-R	B-B	B-G	O-R	O-B	O-G	Y-R	Y-B	Y-G	W-R	W-B	W-G	P-R	P-B		P-G
01-2	2			1						1									1
02-2	2					1							1						1
03-2	1	1						1		1									1
04-2	1		1			1							1						1
05-2		1	1		1								1						1
06-2	1	1		1												1			1
07-2		2			1					1									1
08-2	2					1									1				1
09-2	1	1		1												1			1
10-2	1	1							1				1						1
11-2	1		1				1									1			1
12-2		1	1				1					1							1
13-2		2					1			1									1
14-2		1	1					1					1						1
15-2	1	1						1								1			1
16-2	1	1				1				1									1
17-2		2			1					1									1
18-2	1		1							1						1			1
19-2	2					1					1								1
20-2		1	1					1		1									1
21-2			2	1								1							1
22-2	1		1			1									1				1
23-2	1		1		1											1			1
24-2	1	1							1	1									1
25-2	1	1				1						1							1
26-2		1	1		1									1					1
27-2	1		1					1										1	1
28-2			2					1					1						1
29-2		1	1						1	1									1
30-2	2					1			1										1
31-2	1	1		1									1						1
32-2	1	1		1											1				1
33-2			2			1												1	1
34-2		1	1			1												1	1
35-2	1		1		1										1				1
36-2	1	1			1													1	1
37-2	1	1							1			1							1
38-2	1		1					1								1			1
39-2	2								1								1		1
40-2	1	1							1		1								1
41-2	1		1				1								1				1
42-2	1	1			1											1			1
43-2			2						1						1				1
44-2	1	1							1								1		1
45-2	1	1							1						1				1
46-2	1		1				1						1						1
47-2	1	1		1											1				1
48-2	1		1			1						1							1
49-2		1	1	1											1				1
50-2		1	1		1							1							1
51-2		2		1															1
52-2		2						1											1
53-2	1	1						1							1				1
54-2		1	1		1													1	1
55-2		1	1				1			1									1
56-2	1	1		1							1								1
57-2		2		1								1							1
58-2		2			1						1								1
59-2		2		1												1			1
60-2			2					1				1							1
61-2	2								1						1				1
62-2	2							1									1		1
63-2		2						1				1							1
64-2		2						1							1				1
65-2		1	1					1								1			1
66-2		2							1		1								1
67-2		1	1						1				1						1
68-2	2								1							1			1

Figure 3b.

SECTOR 3

<u>P/N</u>	<u>Cap</u>	<u>Red Paint</u>	<u>Green Paint</u>	<u>Customized Label</u>	<u>Standard Label</u>	<u>Metal Tag</u>	<u>Plastic Tag</u>	<u>Raw Assembly</u>
01-3	1	1		1		1		01-2
02-3	1		1		1		1	02-2
03-3	1		1		1	1		03-2
04-3	1	1		1		1		04-2
05-3	1		1	1		1		05-2
06-3	1		1	1			1	06-2
07-3	1		1		1		1	07-2
08-3	1		1		1	1		08-2
09-3	1	1			1	1		09-2
10-3	1		1		1		1	10-2
11-3	1		1	1		1		11-2
12-3	1		1	1		1		12-2
13-3	1		1		1		1	13-2
14-3	1		1	1			1	14-2
15-3	1		1		1	1		15-2
16-3	1	1			1	1		16-2
17-3	1		1		1		1	17-2
18-3	1	1		1		1		18-2
19-3	1		1	1			1	19-2
20-3	1	1		1		1		20-2
21-3	1	1			1	1		21-2
22-3	1		1		1		1	22-2
23-3	1	1			1	1		23-2
24-3	1		1		1		1	24-2
25-3	1	1			1	1		25-2
26-3	1	1		1		1		26-2
27-3	1		1		1		1	27-2
28-3	1	1			1	1		28-2
29-3	1		1		1	1		29-2
30-3	1		1		1		1	30-2
31-3	1		1	1		1		31-2
32-3	1		1		1	1		32-2
33-3	1		1	1			1	33-2
34-3	1	1			1	1		34-2
35-3	1		1		1		1	35-2
36-3	1	1			1	1		36-2
37-3	1	1		1		1		37-2
38-3	1		1		1	1		38-2
39-3	1		1		1		1	39-2
40-3	1		1	1		1		40-2
41-3	1	1			1	1		41-2
42-3	1	1			1	1		42-2
43-3	1		1		1		1	43-2
44-3	1		1	1		1		44-2
45-3	1	1			1	1		45-2
46-3	1		1	1			1	46-2
47-3	1	1		1		1		47-2
48-3	1		1	1			1	48-2
49-3	1		1	1		1		49-2
50-3	1	1			1	1		50-2
51-3	1		1		1		1	51-2
52-3	1	1		1		1		52-2
53-3	1	1			1	1		53-2
54-3	1		1	1			1	54-2
55-3	1		1		1		1	55-2
56-3	1	1			1	1		56-2
57-3	1		1		1		1	57-2
58-3	1		1	1			1	58-2
59-3	1	1			1	1		59-2
60-3	1		1		1	1		60-2
61-3	1		1		1		1	61-2
62-3	1		1	1		1		62-2
63-3	1		1		1		1	63-2
64-3	1		1	1			1	64-2
65-3	1		1		1	1		65-2
66-3	1	1		1		1		66-2
67-3	1	1			1	1		67-2
68-3	1		1		1		1	68-2

Figure 3c.