

Modular Design...A Path to Rapid Customer Response

by

Kevin Dailida

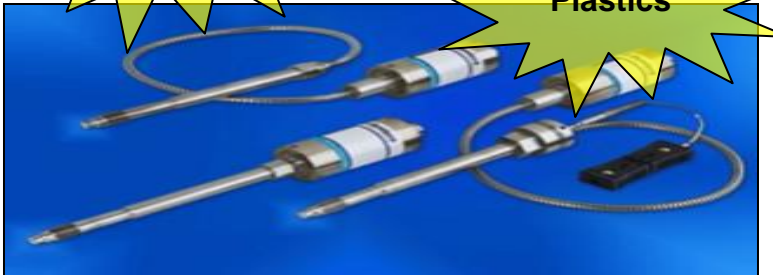
**Sr. Director of
Operations and Supply Chain**

Topics

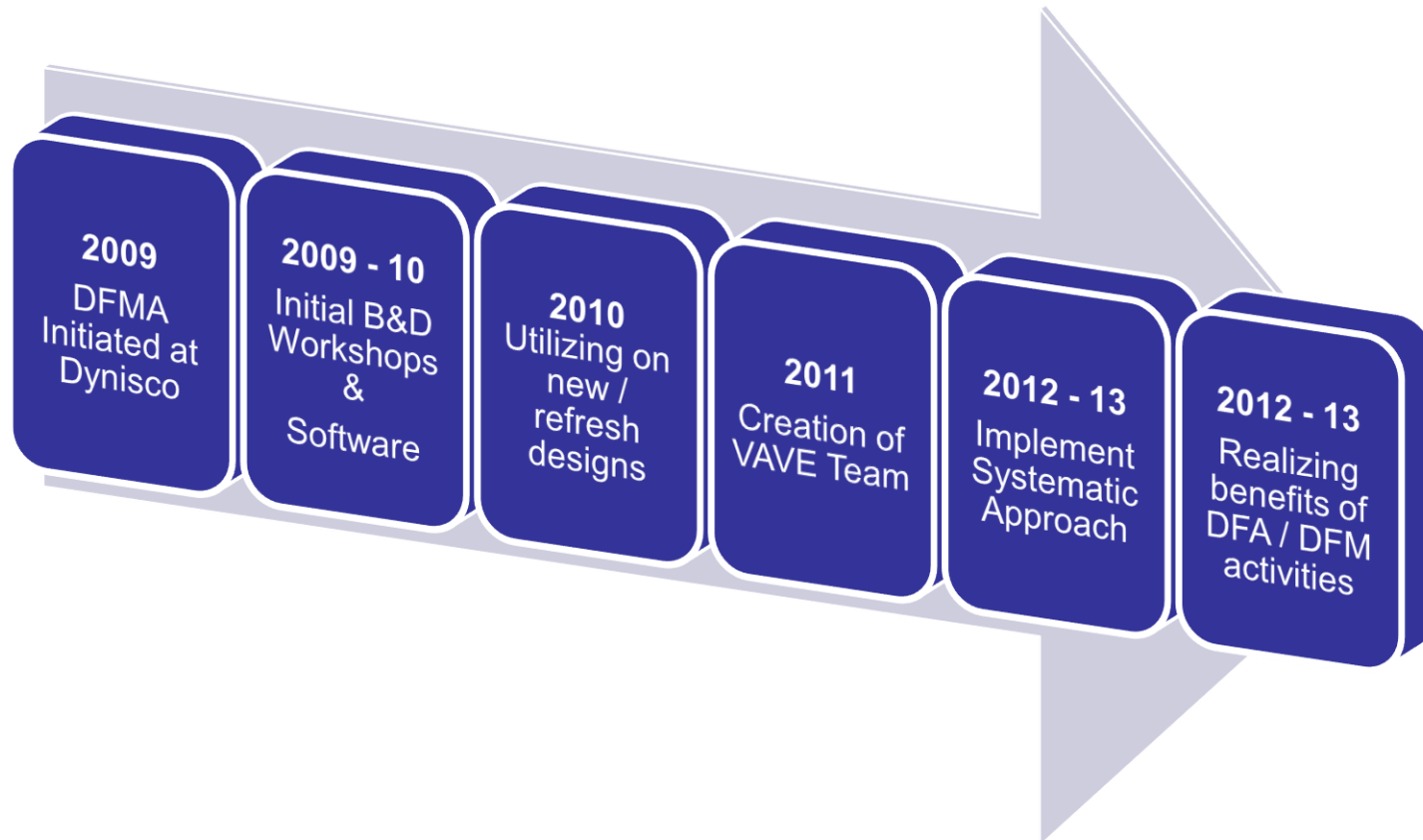
- Introduction
- Vertex TM DFMA: Early Stages
- Postponement Theory: Flexibility in design
- Transition to modularity: Comparison of old and new designs
- Manufacturing benefits: Reaping the rewards of a great design
- Closing Remarks



Our Products



Introduction



DFMA does not happen overnight (Culture / Process)

Vertex™ DFMA...The Early Stages

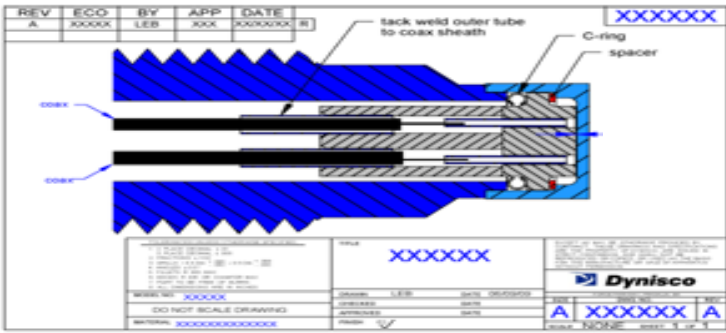


- Dynisco's core product consists of a filled sensor that is utilized in the plastic extrusion industry to measure pressure & temperature
 - Oil
 - Hg
 - NaK
 - Push Rod (mechanical)
- Last 20 years efforts have been underway to develop an equivalent non filled sensor
- The Vertex™ project was identified as an opportunity to achieve the non filled objective and utilize DFMA to improve the design

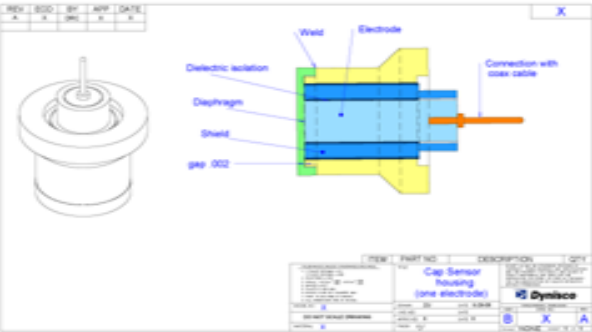


Multi-functional design teams were key to success

Vertex™ DFMA...The Early Stages

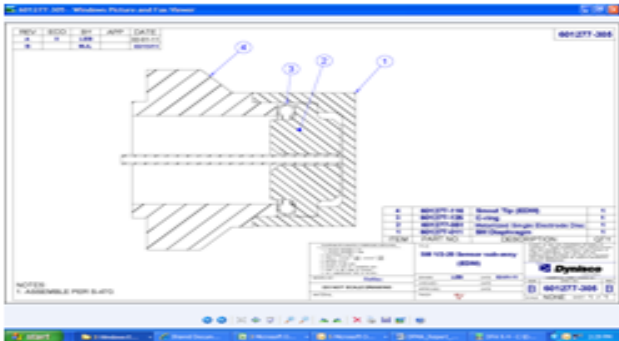


Dual Capacitance Concept



Single Capacitance Concept

50% Reduction In Parts
76% Reduction in Mfg Costs



Prototype Design

Sensor tip assembly was first big win for team

Vertex™ DFMA...The Early Stages



The image displays three overlapping screenshots of the Design For Assembly 9.4 software interface, showing the iterative process of DFMA analysis for a Capacitance Melt Sensor assembly. Each screenshot shows a hierarchical tree view of the assembly structure on the left and a detailed results table on the right. The results table includes metrics such as Count, Minimum count, Labor time, Labor cost, Other op. cost, Assy. tool/fixture, Item costs, Total cost, and DFA Index.

Metric	PC - 128	PC - 87	PC - 67
Count	128	87	67
Minimum count	14	14	17
Labor time, s	2550.57	588.19	548.49
Labor cost, \$	25.01	6.92	6.45
Other op. cost, \$	0.56	0.00	0.00
Assy. tool/fixture, \$	0.00	0.00	0.00
Item costs, \$			
Total cost, \$			
DFA Index	1.0	1.0	9.1

PC - 128
DFA - 1.5

PC - 87
DFA - 7.0

PC - 67
DFA - 9.1

Final
PC - 57
55%
Reduction
In Part Count

Multiple iterations drove significant results



Postponement...Flexibility in Design



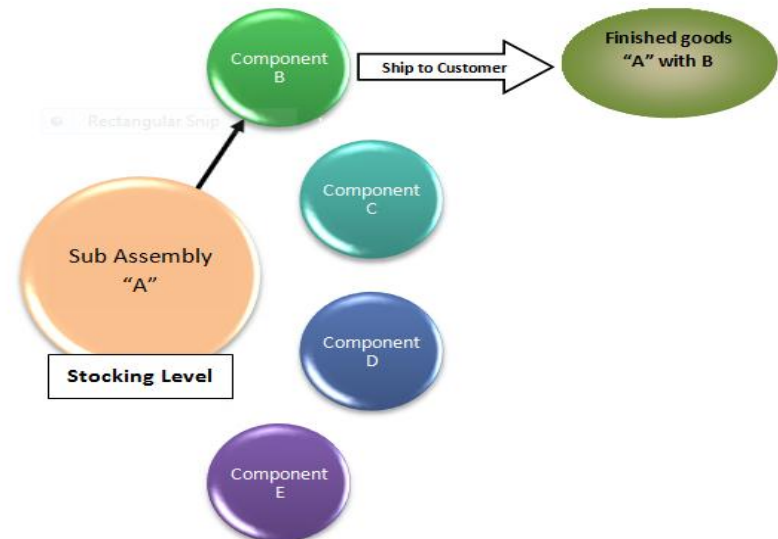
Traditional Stocking

- Inventory stocked at finished goods level
- High inventory qty
- High inventory costs



Postponement Stocking

- Inventory stocked at sub assembly levels
- Higher flexibility
- Lower inventory costs

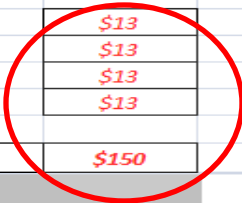


Postponement Value Cost Comparison

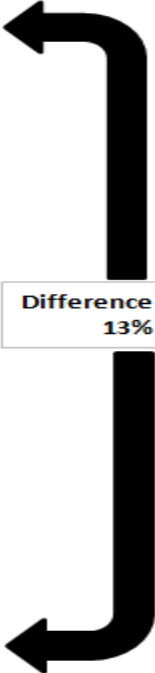


Traditional Model			
Material		Material Cost	Labor Cost
Sub A		\$50	\$25
Sub A		\$50	\$25
Sub A		\$50	\$25
Sub A		\$50	\$25
Component B		\$10	
Component C		\$10	
Component D		\$5	
Component E		\$5	
Finished Goods A with B			\$13
Finished Goods A with C			\$13
Finished Goods A with D			\$13
Finished Goods A with D			\$13
Total Inventory Value		\$230	\$150
Postponement Model			
Material		Material Cost	Labor Cost
Sub A		\$50	\$25
Sub A		\$50	\$25
Sub A		\$50	\$25
Sub A		\$50	\$25
Component B		\$10	
Component C		\$10	
Component D		\$5	
Component E		\$5	
Finished Goods A with B			
Finished Goods A with C			
Finished Goods A with D			
Finished Goods A with D			
Total Inventory Value		\$230	\$100

Labor Applied to generate finished goods stock



Labor still applied but only when ready to ship to customer



Difference in cost 13%

Modularity & Benefits



Stocking Level



- Pressure Range
- Snout Length
- Flex Length

Stocking Level



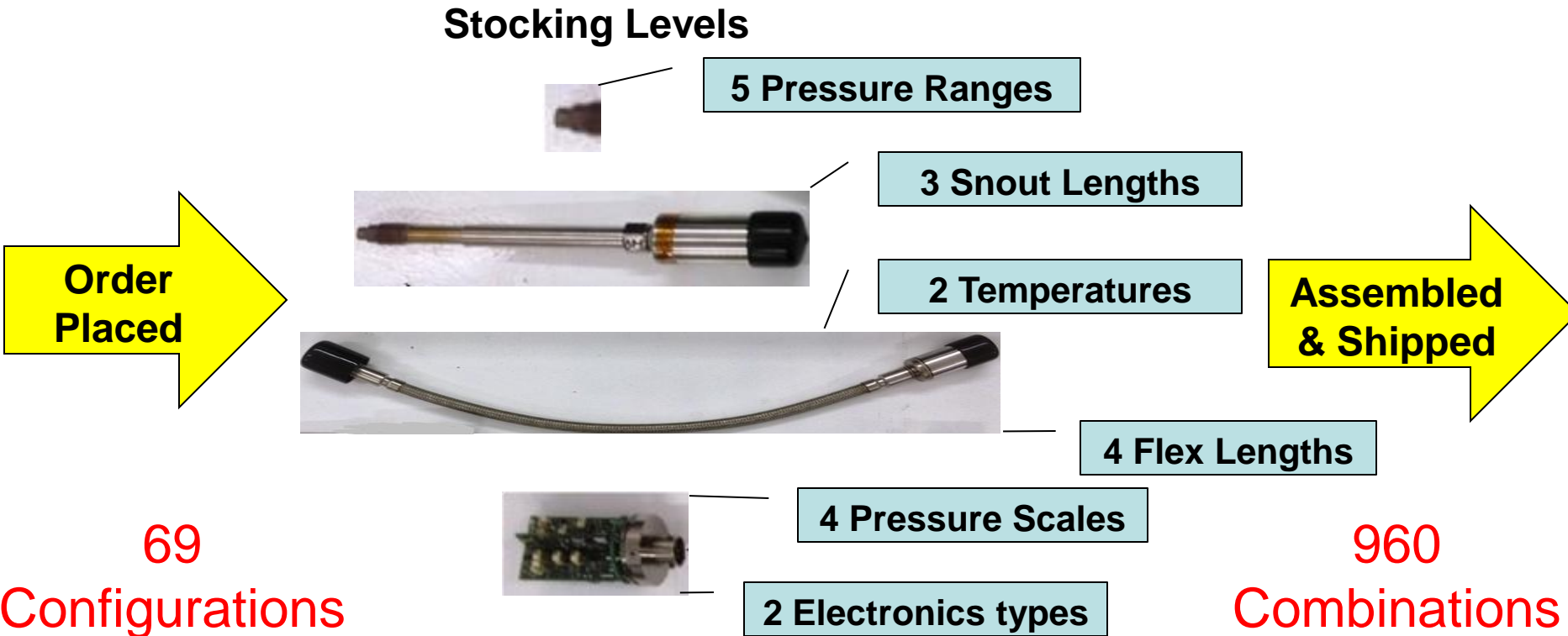
- Electronics

Order
Placed

Assembled
& Shipped

- Pressure, Snout and Flex all locked in at sub assy level
- Legacy design limited from flexibility level

Modularity & Benefits



- Pressure, snout, flex and electronics all independent
- Maximum configuration flexibility for customer orders
- Reduced inventory value

Modularity & Benefits



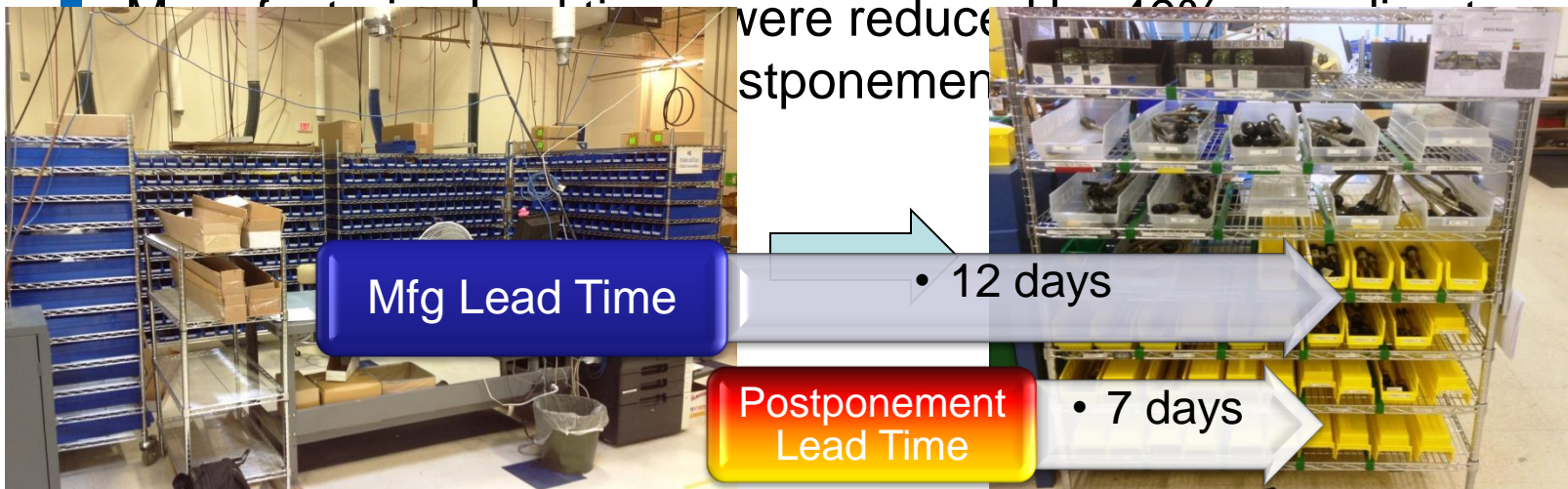
- Pressure, snout, flex and electronics all independent
- Maximum configuration flexibility for customer orders
- Reduced inventory value

Manufacturing Benefits

- In addition to reduced inventory costs and flexibility, modularity drove the ability to establish kanban systems
- A pull system was much easier to establish as a result of the various sub assembly stocking levels
- The requirement for storage was significantly reduced as compared traditional stocking models
- Manufacturing lead times were reduced by 40% as a direct result of modularity and postponement

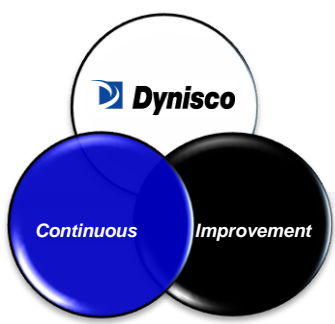
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Closing Remarks

- Design for Manufacture and Assembly has paid huge dividends for Dynisco
- Vertex product has evolved both technically and from a manufacturing perspective by utilizing modularity
- **Engineers and designers have a significant influence on the ability to control inventory costs and customer responsiveness before the product is launched and turned over to operations.**



Thank you for your attention

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