Automated Costing to Identify Opportunities to Reduce Direct Material Spend

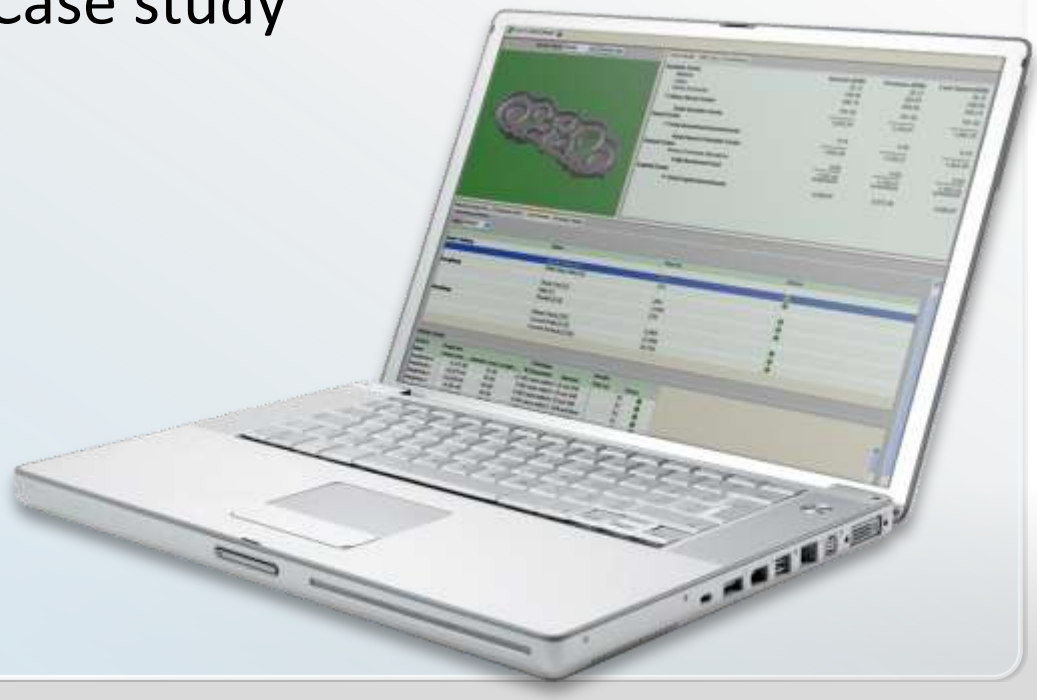
May 2014

www.apriori.com

aPriori

Today's Agenda

- Intro to Automated Costing
- Product Cost Reduction Case study



aPriori Customers

+ 4 of the Largest Ag & Const Companies in the World


MacDon · TOYOTA INDUSTRIAL EQUIPMENT · AGCO Your Agriculture Company · eXmark · HUSTLER · NMHG · JUNGHEINRICH

Agricultural & Construction Equipment

+ 1 of the Largest Power & Energy Companies in the World

DRESSER-RAND · DEMATIC · ThyssenKrupp · FMC Technologies · NATIONAL OILWELL VARCO · HUSSMANN · KARL MAYER · multitest · KONE · ASML

Industrial Machinery

+ 3 More Global Tier One Auto Mfgrs & 1 Global Train Mfg



Ford · AMERICAN AXLE & MANUFACTURING · CVG · POLARIS · EZGO A Textron Company · ALSTOM · BLUE BIRD

Automotive/Transportation

+ 4 of the Largest High Tech Companies in the World



WINCOR NIXDORF · ZEBRA TECHNOLOGIES · DIEBOLD · Pitney Bowes

Electronics & High Tech Devices

BISSELL

+ The Largest Mfg of Home Appliances in the World

Consumer Durable Goods

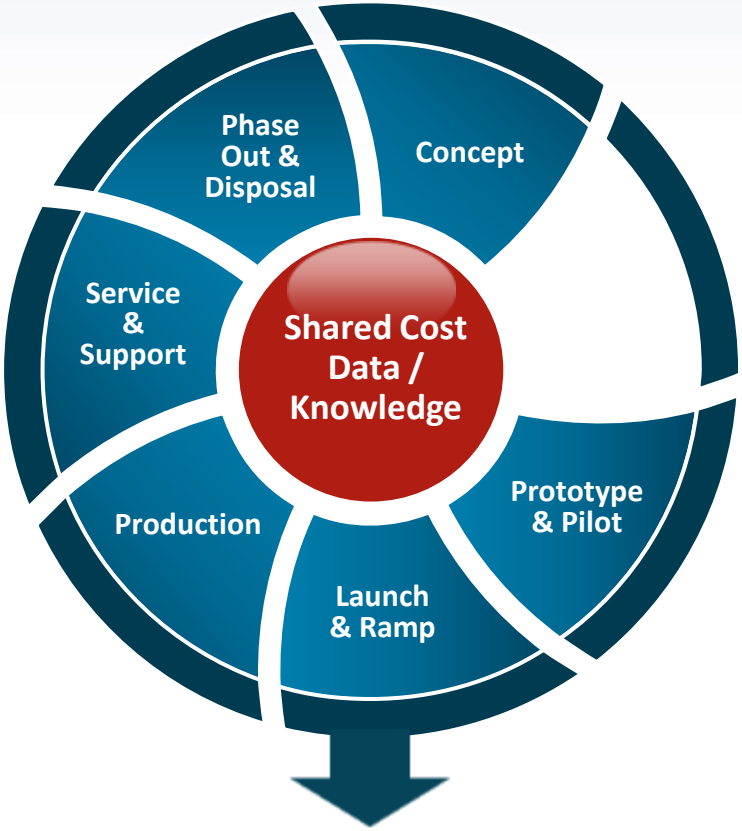
+ 4 of the World's Top Defense Contractors

Honeywell · BOEING

Aerospace & Defense Products

Our Enterprise Product Cost Management Vision

aP Manufacturing & Suppliers



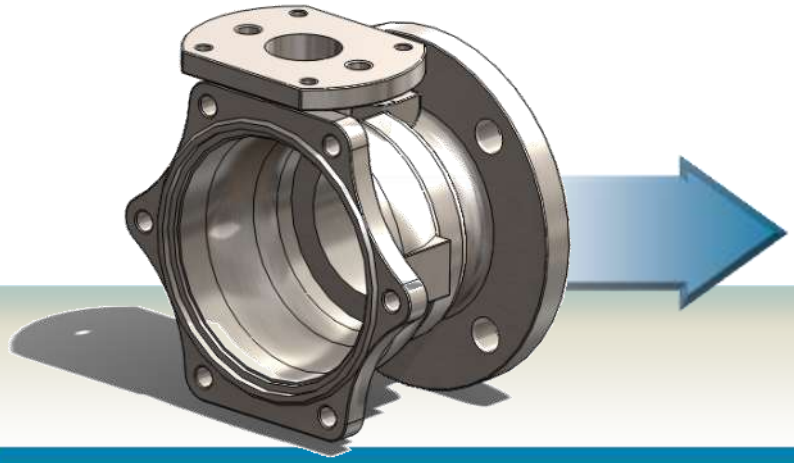
aP Product Design

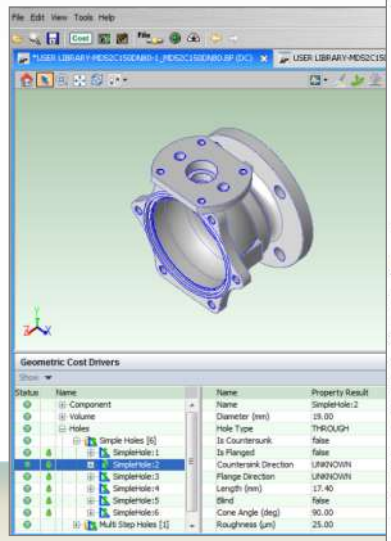
aP Cost Specialists & Sourcing

aP Business

With aPriori you can quickly cost components

Go from a 3D Solid CAD Model…





aPriori Part Cost Report — Date: 01/28/2011 — User: pvessely

Part Name:	user library-md52c150dn80-		
Description:			
Scenario:	DC		
Process Group:	Casting		
VPE:	aPriori USA		
Fully Burdened Cost:	24.87	Total Planned Volume:	27,500
Cost Target:	Not specified	Material:	Aluminum AL360
Amount Variance:	-	Approx. CAD Rev/Ver:	-/0
Percent Variance:	-	Date part was costed:	01/28/2011
Projected Savings:	-	Date GCDs saved:	01/28/2011

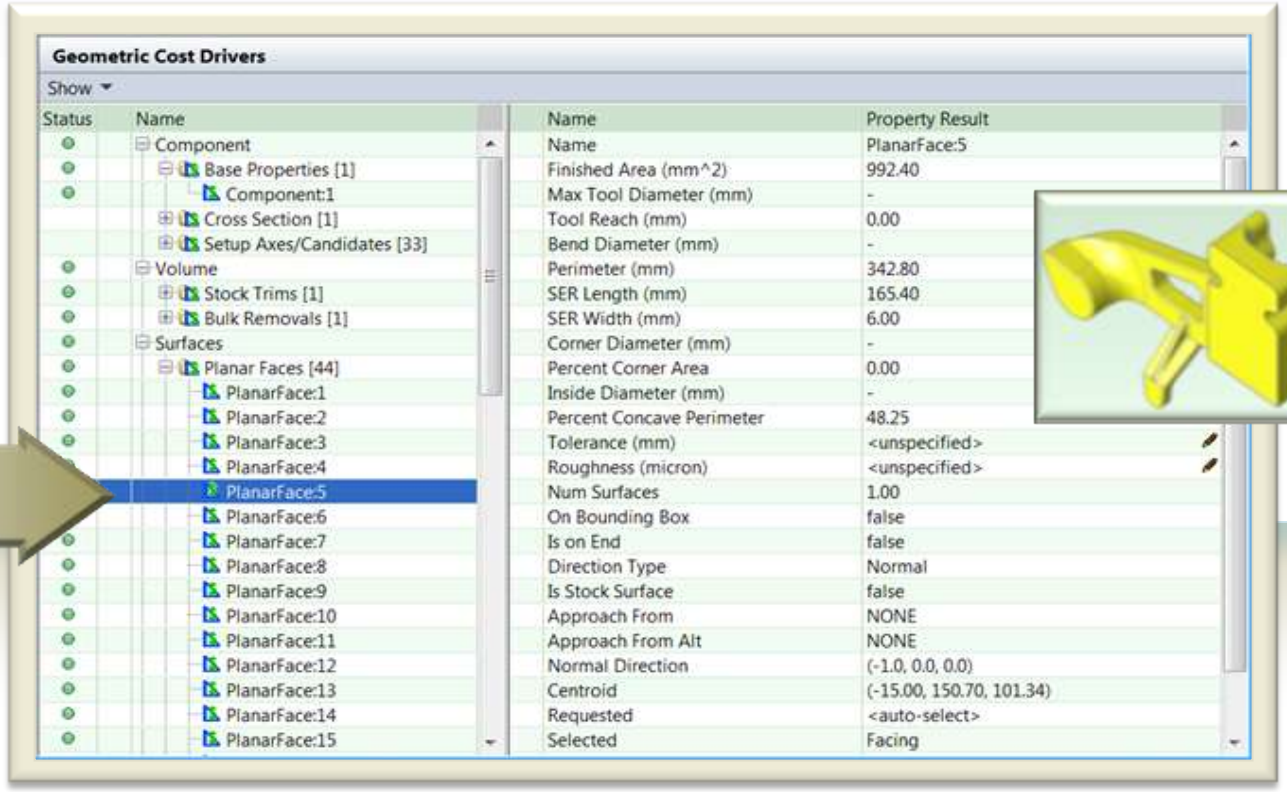
	Part	Processes: Die Casting	3 Axis Lathe	Standard Temper	Sand Blast
Manufacturing Times:	sec	sec	sec	sec	sec
Labor Time	443.73	95.85	311.88	36.00	0.00
Cycle Time	407.73	95.85	311.88	0.00	0.00
Variable Costs:	(USD)	(USD)	(USD)	(USD)	(USD)
Material Cost	7.55	7.55	0.00	0.00	0.00
Labor	3.39	0.66	2.47	0.26	0.00
Direct Overhead	5.48	1.71	3.52	0.25	0.00
Amortized Batch Setup	0.85	0.78	0.08	0.00	0.00
Logistics	0.00	0.00	0.00	0.00	0.00
Expendable Tooling	0.38	0.00	0.38	0.00	0.00
Additional Direct Costs	4.88	0.00	0.00	3.77	1.12
Extra Costs	0.00	0.00	0.00	0.00	0.00
Other Direct Costs	**5.26**	**0.00**	**0.38**	**3.77**	**1.12**
Total Variable Costs	**22.53**	**10.69**	**6.45**	**4.28**	**1.12**
Period Overhead Allocations	0.00	0.00	0.00	0.00	0.00
Margin	0.00	0.00	0.00	0.00	0.00
Piece Part Cost	**22.53**	**10.69**	**6.45**	**4.28**	**1.12**
Fixed Costs:					
Hard Tooling (amortized)	2.33	2.33	0.00	0.00	0.00
Fixture Cost (amortized)	0.00	0.00	0.00	0.00	0.00
Programming Cost	0.00	0.00	0.00	0.00	0.00
Additional Amortized	0.00	0.00	0.00	0.00	0.00
Total Amortized	**2.34**	**2.33**	**0.00**	**0.00**	**0.00**
Fully Burdened Cost	**24.87**	**13.02**	**6.45**	**4.28**	**1.12**
Hard Tooling	64,207.35	64,207.35	0.00	0.00	0.00
Fixture Cost	0.00	0.00	0.00	0.00	0.00
Programming Cost	98.43	0.00	98.43	0.00	0.00
Total Capital Investments	**64,305.78**	**64,207.35**	**98.43**	**0.00**	**0.00**

…to a detailed cost estimate

How aPriori Works

Automated Geometric Cost Driver Extraction

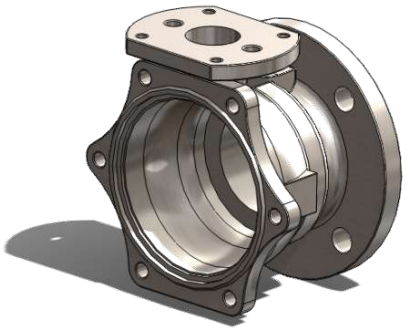
- ✓ Ease of Use
- ✓ Speed
- ✓ Minimizes Errors Associated with Manual Input
- ✓ Drives detailed cost models



Change any design parameter, GCDs are re-assessed in seconds

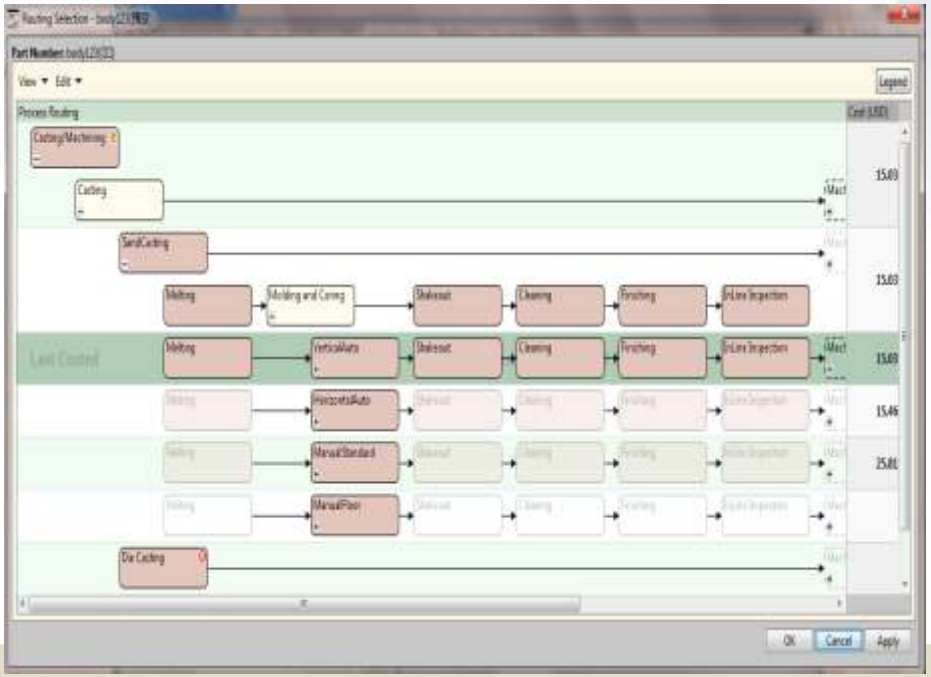
How aPriori Works

Rules Based Engine Drives Intelligent Routing Selection



aPriori Evaluates:

- ✓ Design Geometry
- ✓ Material Type
- ✓ Production Volume
- ✓ Manufacturing Process
- ✓ Machine Rules
- ✓ Facility Rules



Change from Cast Iron to Aluminum…

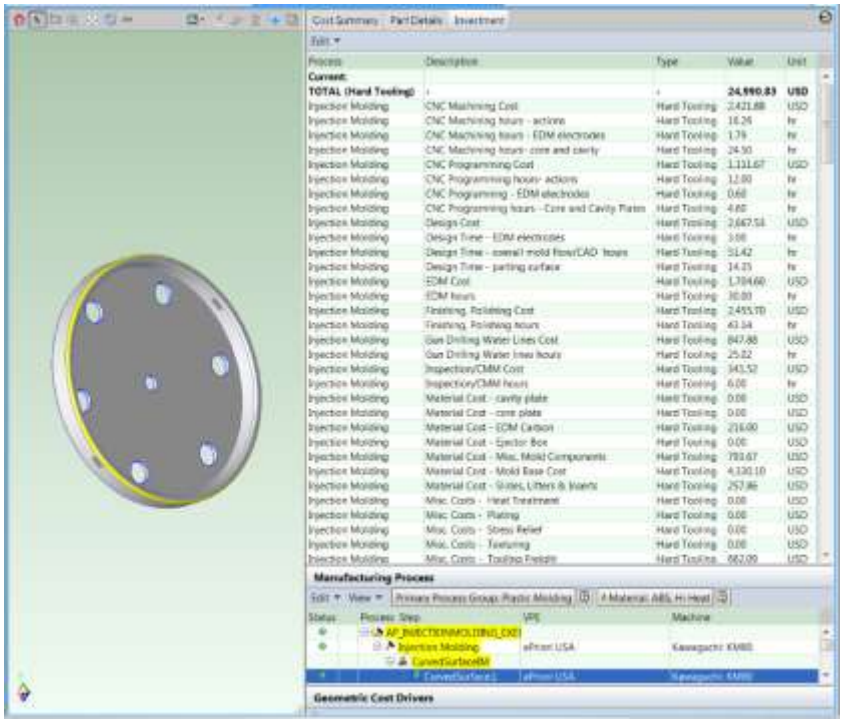
Change Volume from 10 to 10,000…

aPriori automatically recommends switch from Sand Casting to Die Casting

How aPriori Works

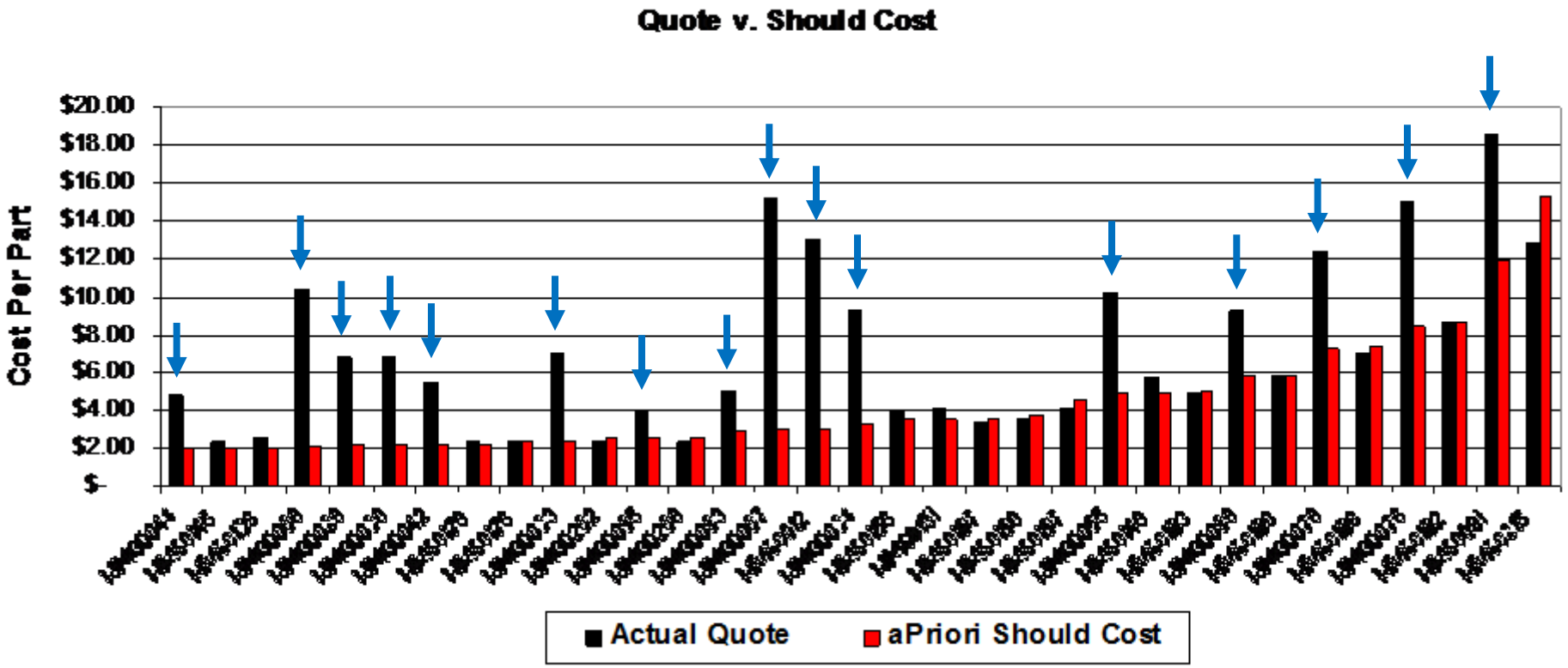
Robust Baseline Cost Models and Regional Cost Data

- aPriori automatically derives detailed piece part **AND** tooling costs based on inputs
- Users can edit/override system generated data
- Leverage the experience & expertise of your Cost Engineering team to easily add your own
  - Cost Models
  - Machine, Material & Rate Data
  - Routings & Routing Rules



aPriori for Cost Engineering & Sourcing

What if you could quickly identify which initial quotes are unreasonably high based on comparison to the should cost?



Case Study:

Leading global manufacturer of agricultural and construction equipment

Challenge

The cost management team needed to help them more rapidly reduce the cost on a high volume of components and help the company launch a new product at target cost.

Solution

The company used aPriori to:

- Identifying parts with the greatest cost-savings potential
- Evaluate lower-cost manufacturing and sourcing alternatives for those parts
- Examining re-design opportunities to maximize cost savings

Results

- Analyzed $20 million of annual spend
- Evaluated 21 Major Components Consisting of 230 Parts
- Identified $1.2 Million in Annual Savings
- **Realized $700**K in annual savings

Using aPriori to Support Cost Reduction Goals

Step 1:
Bulk Cost Parts & Execute Outlier Analysis

→

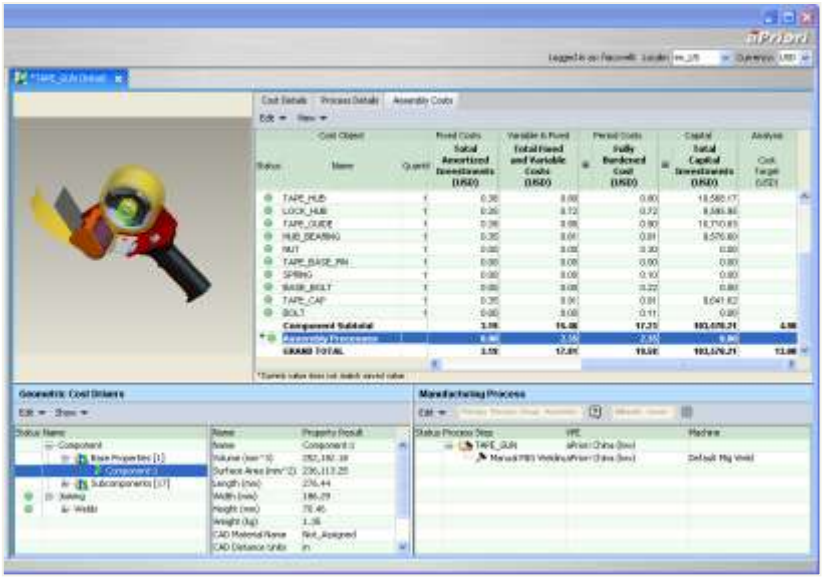
Step 2:
Examine sourcing & manufacturing alternatives

→

Step 3:
Optional: Evaluate Design Alternatives

Methodology:

1. Quickly cost hundreds or thousands of parts and analyze results to identify outliers (parts with the most savings opp.)
2. Examine parts for sourcing and manufacturing alternatives
3. Evaluate parts for re-design alternatives



Step 1: Bulk Costing & Outlier Analysis

- Two Methods of Outlier Analysis
  - **Cost per Mass** - Compare the $/kg of a part to the average $/kg for a group of similar parts.

Edit ▾ View ▾ Table View ▾ **Outlier Analysis**

Cost Object	Fully Burdened	Quote Info	Quote Cost Per Mass		Cost Comparison	
Name	**Fully Burdened Cost (USD)**	Quoted Total Cost (USD)	Quote Cost Per Finish Mass ($ / kg)	Est. Annual Savings Based On Avg. Quote Cost Per Mass (USD)	aPriori vs. Quoted Cost (% Diff)	Est. Annual Savings Based on Var. Between aPriori & Quoted Cost (USD)
2980123_CLAMP.Initial	0.50	0.26	15.63	3,305	-95	-
2840020_BRACKET.Initial	0.52	0.59	3.53	3,188	12	1,043
1684402WEARPAD.Initial	0.42	0.71	2.89	2,340	41	4,338
1684402BOT_BRACKET.Initial	0.84	0.91	2.63	1,988	8	1,064
2980123_LINK.Initial	0.38	0.35	2.91	1,173	-11	-
1684402TOP_BRACKET.Initial	0.36	0.40	2.36	265	8	480
3575136.Initial	134.11	38.06	1.11	-	-252	-
3575137.Initial	134.11	38.45	1.12	-	-249	-
3575760.Initial	54.30	20.99	1.14	-	-159	-
3574718.Initial	55.28	30.26	1.48	-	-83	-
3574688.Initial	54.53	30.59	1.18	-	-78	-
3574719.Initial	13.50	11.59	1.36	-	-16	-
3574908.Initial	10.29	10.05	1.67	-	-2	-
3574855.Initial	3.28	3.24	1.09	-	-1	-
3575362.Initial	1.61	1.60	1.87	-	-0	-
3574715.Initial	31.84	31.86	0.69	-	0	263
3574721.Initial	13.50	13.63	1.60	-	1	1,995
3574854.Initial	3.24	3.28	1.42	-	1	653
0903237.Initial	0.91	0.94	1.85	-	2	350
3574707.Initial	41.16	42.95	1.27	-	4	26,848
2551580.Initial	0.54	0.58	1.91	-	7	600

Step 1: Bulk Costing & Outlier Analysis

- Two Methods of Outlier Analysis
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3575362.Initial	1.61	1.60	1.87	-	-0	-
3574715.Initial	31.84	31.86	0.69	-	0	263
3574721.Initial	13.50	13.63	1.60	-	1	1,995
....						
Total	**611.22**					
Rollup Target Cost						
Averages			2.25			

Ave. Cost Per Mass for Group Auto Calculated

Step 1: Bulk Costing & Outlier Analysis

- Two Methods of Outlier Analysis
  - Cost per Mass - Compare the $/kg of a part to the average $/kg for a group of similar parts.
  - **Comparison of aPriori Cost vs. Current Cost**

Edit ▾ View ▾ Table View ▾ Outlier Analysis

Cost Object	Fully Burdened	Quote Info	Quote Cost Per Mass		Cost Comparison	
Name	**Fully Burdened Cost (USD)**	Quoted Total Cost (USD)	Quote Cost Per Finish Mass ($ / kg)	Est. Annual Savings Based On Avg. Quote Cost Per Mass (USD)	aPriori vs. Quoted Cost (% Diff)	Est. Annual Savings Based on Var. Between aPriori & Quoted Cost (USD)
2840020_JACK_WHEEL_ATTACH_TR50.Initial	1.94	2.83	2.56	20,253	31	52,948
1271576.Initial	9.91	12.58	0.72	-	21	40,040
3574707.Initial	41.16	42.95	1.27	-	4	26,848
3575085.Initial	2.52	3.15	1.59	-	20	9,496
1684402WEARPAD.Initial	0.42	0.71	2.89	2,340	41	4,338
2980123_MT_BRACKET.Initial	0.29	0.33	1.82	-	12	2,455
1684443_OUTRIGGER_CAM.Initial	1.06	1.19	1.86	-	11	1,999
3574721.Initial	13.50	13.63	1.60	-	1	1,995
1100149.Initial	1.15	1.27	1.88	-	9	1,733
0903238.Initial	0.94	1.03	1.55	-	8	1,275
1684402BOT_BRACKET.Initial	0.84	0.91	2.63	1,988	8	1,064
2840020_BRACKET.Initial	0.52	0.59	3.53	3,188	12	1,043
3574854.Initial	3.24	3.28	1.42	-	1	653
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1684402TOP_BRACKET.Initial	0.36	0.40	2.36	265	8	480
0903237.Initial	0.91	0.94	1.85	-	2	350
3574715.Initial	31.84	31.86	0.69	-	0	263

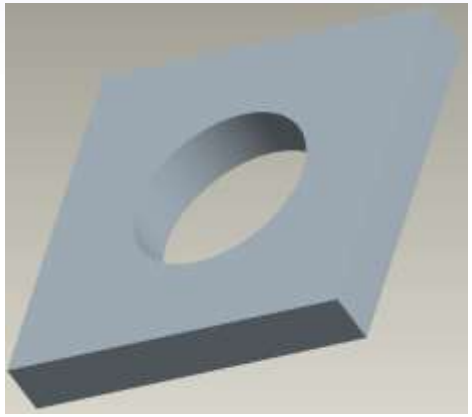
Step 2. Examine Parts for Manufacturing & Sourcing Alternatives

Part	Current Cost	Annual Volume	Total Spend	Cost Reduction @ 50%	aPriori Cost	Dif. aP vs. Current	Potential Opportunity
Lower Chassis	$280	5,400	$1,512,000	$756,000	$240	14%	$ 216,000
Cab Top	$149	5,400	$804,600	$402,300	$135	9%	$ 75,600
Engine Block	$72	5,400	$388,800	$194,400	$70	3%	$ 10,800
Bracket Assembly	$41	5,400	$221,400	$110,700	$22	46%	$ 102,600
Valve Body	$20	10,000	$200,000	$100,000	$21	-5%	$ (10,000)
Battery box	$10	20,000	$200,000	$100,000	$7	30%	$ 60,000
Ladder step	$7	20,000	$140,000	$70,000	$12	-71%	$ (100,000)
Hand rail	$12	5,400	$66,420	$33,210	$11	11%	$ 7,020
Plastic Housing	$3	20,000	$60,000	$30,000	$4	-33%	$ (20,000)
Kick plate	$10	5,400	$52,380	$26,190	$11	-13%	$ (7,020)
Rear mount	$9	5,400	$48,600	$24,300	$7	22%	$ 10,800

- aP Cost < Current Cost, the part is a candidate for resourcing or rerouting
  - aP Routing = Current routing – Part is a candidate for requoting/ rebidding
  - aP Routing /= Current routing -- Examine for routing / manuf. alternatives
- If aP Cost s greater than or equal to Current Cost, the part is a candidate for redesign

Step 2. Examine Manufacturing & Sourcing Alternatives

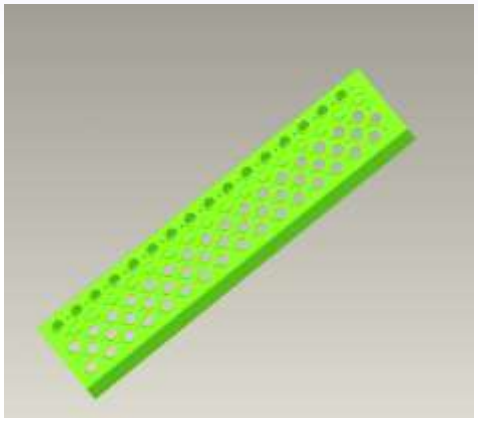
Example: Re-Routing & Re-quoting)



Annual Savings: = $80,000

- Original Part - Cost $4.80 / Process: Cut & Drill
- aPriori - Cost: $0.85 / Process: Laser
- Supplier - New quote: $0.80 / Process: Laser

Example: Re-quoting



Annual Savings: = $80,000

- Current part cost: $40
- aPriori cost: $27.50

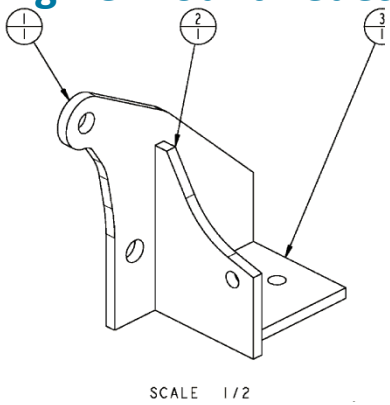
Step 3. Evaluate Re-Design Alternatives

- Reducing part complexity
  - Number of parts
  - Material
  - Eliminating a manufacturing process
- Converting weldments to castings
- Investigating stamping

Example: Engine Mount Redesign

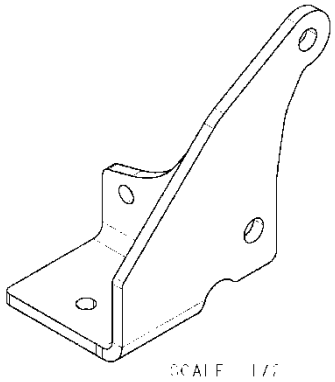
3- part Weldment

Cost = $31.96



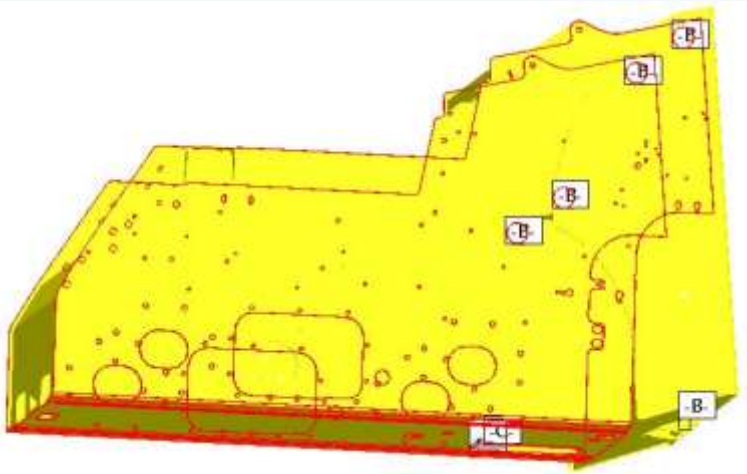
1-piece
formed part

aPriori = $9.89



Annualized Savings = $45,199

Main Frame Sides and Floor



Existing Cutting Process
[Laser]

Process Cost: **$75.54**

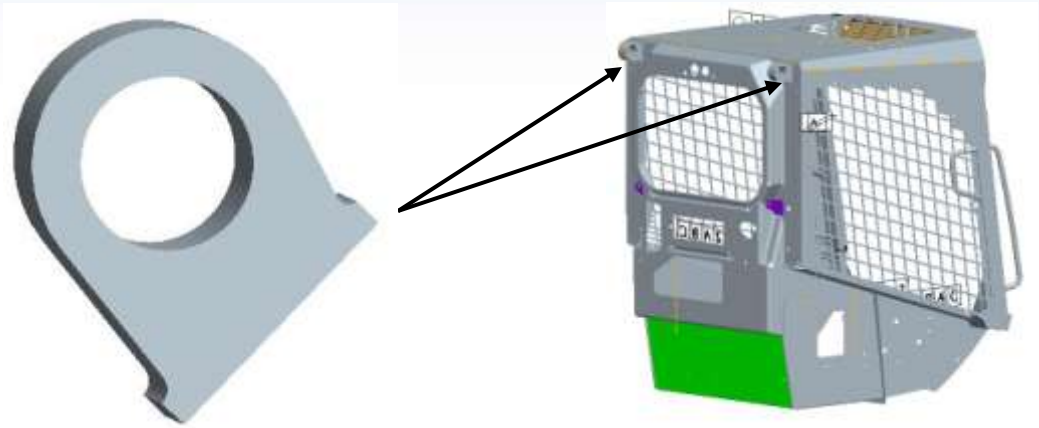
Proposed Manufacturing Change
[Laser / NC punch]

Process Cost: **$33.29**

Laser perimeter + large holes; punch other cutouts

Identified savings: $42.25 per machine and $591,500 per year
Laser cycle time savings: 14 min per machine and 145 days per year

Cage Rear Pivot



Existing Process
[Machined casting w/x-ray]

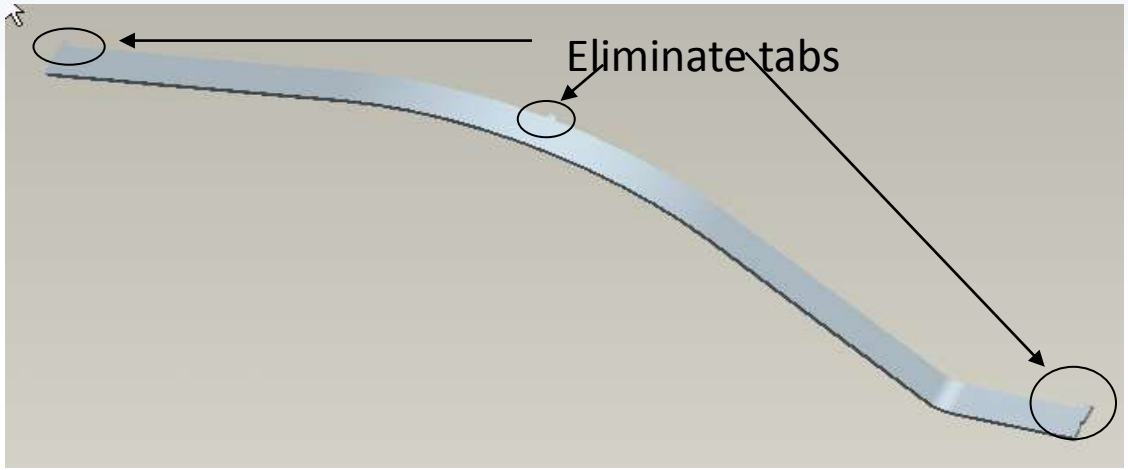
Cost: **$16.56**

Proposed Manufacturing Change
[Burn from plate then machine hole]

Cost: **$10.05**

Identified savings: $13 per machine and $143,000 per year

Upper Link Spanner Plates



Existing Design

Total: **$17.60**

- Part 1 (2x$4.41): $8.82
- Part 2 (2x$4.39): $8.78

Proposed Design

[Eliminate tabs and make part from bar instead of laser cut sheet]

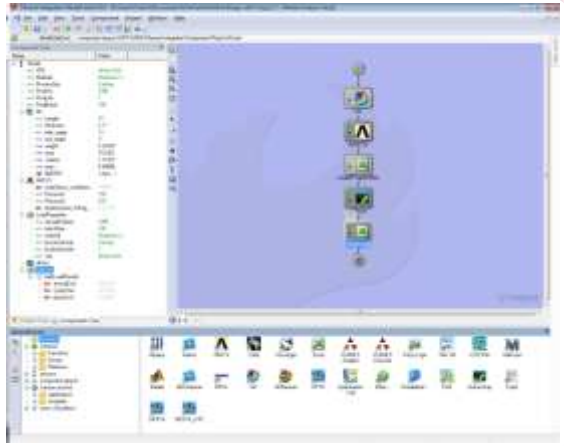
Total: **$10.90**

- Part 1 (2x$2.61): $5.22
- Part 2 (2x$2.84): $5.68

Projected savings: $6.70 per machine and $73,700 per year

Fortune 25 Manufacturer

Integrating Design and Costing

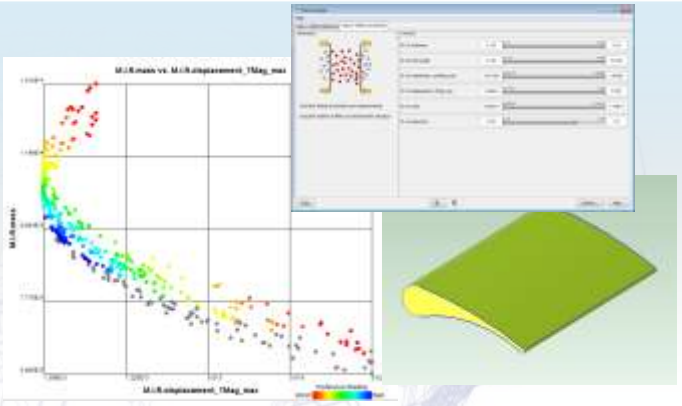


Challenge: Costing of designs was not integrated with the development of new products. As a result, cost was not considered Critical To Quality and was not factored into design trade-offs.

Solution: Through the use of aPriori's Bulk Costing and Analysis capabilities, cost was integrated with the use of NX/ANSYS to provide robust design models from Design of Computer Experiments that enabled engineers to perform cost/performance trade-offs and meet CTQ requirments

Results

- Articulated cost impacts to design
- ~30X increase in part design studies
- 15-25% reduction in design cycle time



Summary

- aPriori provides **quick, precise and consistent** part and tooling cost estimates that allow you to attack cost at the point of origin in engineering & sourcing
- The solution allows cost engineers to **spend less time costing and more time analyzing** and consulting on strategic issues
- aPriori's **flexible cost management platform** provides hundreds of out-of-the-box baseline cost models and the capability to **quickly configure** custom inputs, outputs and cost models to meet your unique requirements
- **Leverage aPriori in Cost Engineering & Sourcing** to meet your cost reduction goals by analyzing hundreds or even thousands of parts and identify outliers where you may be paying too much

Thank you

Julie Driscoll

Vice President of Strategic Marketing and Product Management

Email: jdriscoll@apriori.com