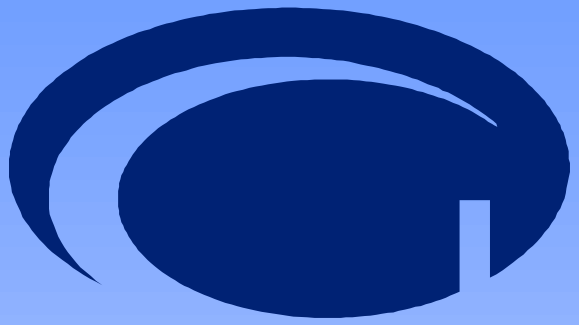

GALORATH

The Power of Parametrics™

Who is Galorath Incorporated?

- The software and training division of Galorath Incorporated, a California-based software and consulting company, started in 1979.
- SEER-SEM, the first software product, rated as the best product in its field, estimates, analyzes and evaluates schedule, cost, effort and risk for software product development. That technology has evolved into 5 other similar type products.
- Today, thousands of users throughout the world use SEER software tools to estimate, analyze and evaluate new product development projects.

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Galorath Incorporated Mission Statement

Create and maintain the absolute best product development *decision support* available for estimating, analyzing & evaluating through the use of parametric algorithms, knowledge bases and customer data. These software tools will be easy to use by both technical and nontechnical people.

Provide high quality *training and consulting services* to support and compliment SEER software tools.

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The SEER Product Line

- **SEER-SEM**

  For Estimating, Analyzing & Evaluating the Costs and Risk Involved in Developing Software

- **SEER-SSM**

  For Estimating the Size of a Software Project

- **SEER-H**

  For Estimating, Analyzing & Evaluating the Costs and Risk Involved in Developing and Manufacturing New Products

- **SEER-IC**

  For Estimating, Analyzing & Evaluating the Costs and Risk Involved in Developing and Manufacturing Integrated Circuits

- **SEER-DFM**

  For Estimating, Analyzing & Evaluating the Costs and Risk Involved in Design and Manufacturing Alternatives

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What is Different about SEER Software?

SEER software uses a combination of parametric algorithms, knowledge bases and existing data to estimate, analyze and evaluate new product development projects, product life cycles, designs and manufacturing processes to lower costs, assess risks, and reduce time to market.

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SEER-DFM

Software for Estimating, Analyzing and Evaluating Product Designs and Manufacturing Processes

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The SEER-DFM Checklist

RAPID DESIGN FOR COST, DESIGN FOR ASSEMBLY ANALYSIS & DESIGN FOR MANUFACTURABILITY

EASY TO LEARN, EASY TO USE & RUNS UNDER WINDOWS 3.1, 95 OR NT

INPUT OR IMPORT - Bills of Material, Project Items or Manufacturing Routings (Requires Software Modification)

The bills of material, manufacturing routings or project line items are made up of work elements which can be a PART, an ASSEMBLY or a COST ROLLUP.

PROCESS TYPES (Work Elements) COVERED:

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The SEER-DFM Checklist Cont'd

Machining includes milling, turning, boring, broaching, shaping, grinding, screw machining, EDM, chemical milling, drilling, tapping, reaming, sawing & auto production/transfer lines.

Fabrication includes conventional machines, CNC turret presses, CNC laser cutting, CNC plasma cutting, CNC flame cutting, dedicated dies, progressive dies, spin forming, tube bending & rolling.

Assembly includes physical assembly, welding, brazing, riveting, staking & adhesive bonding.

Electrical Assembly cable, harness & part preparation.

PC Boards includes board manufacturing, assembly/testing & components.

Mold/Cast/Forge includes injection molding, thermoforming, die casting, sand casting, investment cast molding & forging.

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The SEER-DFM Checklist Cont'd

Process Types Cont'd:

Finishing includes spray painting, electrostatic wet painting, electrostatic powder painting, E-coating, dip coating, brush painting, vacuum metalizing, chromate/phosphate coating, thermal spraying & electroplating.

Composites includes lay-up, filament winding, pulltrusion & composite spray.

Custom Processes is a catch-all for virtually any process or operation not covered by the above processes or unique to a particular manufacturing plant.

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The SEER-DFM Checklist Cont'd

PARAMETERS - for each work element, SEER-DFM displays a list of parameters. These work with SEER mathematical algorithms to calculate these outputs

- Total Time
- Set-up Labor Time
- Rework Labor Time
- Direct Labor Cost
- Inspection Labor Cost
- Material Cost
- Tooling Cost
- Other Costs
- Weight (as req'd)
- Direct Labor Time
- Inspection Labor Time
- Total Labor Cost
- Set-up Labor Cost
- Rework Labor Cost
- Total Unit Cost
- MTBF & MTTR
- Vendor Cost
- Plus, Many Others...

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The SEER-DFM Checklist Cont'd

REPORTS - quick estimate, detailed analysis, trade-off analysis, cost contribution summary & dfa/dfm costs avoidance.

CHARTS - cost allocation, cost risk, cost sensitivity & cost analysis.

IMPORTING - import excel spread sheets, text files & virtually any database.

EXPORTING - flexible export will export any input or output.

KNOWLEDGE BASES - preserve the process knowledge of a company's history, employees and special expertize.

CUSTOM CALC'S - customize seer's mathematical algorithms, inputs or outputs.

REFERENCE SETTING - conduct work study analysis & what-if scenarios.

MERGE PROJECTS - the ability to merge several projects into one project.

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How Can SEER-DFM Be Used?

1. SEER-DFM can be used to apply DFM concepts before layouts and drawings are available.

2. SEER-DFM's parametric cost estimating can be used for benchmarking, evaluating product design alternatives and manufacturing process options.

3. SEER-DFM's knowledge bases can be used to reduce time to market through increased accuracy and faster cost estimating. knowledge bases also make it easier for less experienced engineers to perform cost estimation, design evaluation and process analyses.

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DFM Concepts*

- Be Designed in the Least Time with the Least Development Cost;
- Make the Quickest and Smoothest Transition into Production;
- Be Assembled and Tested with the Minimum Cost in the Mimimum Amount of Time;
- Have the Desired Level of Quality and Reliability; and
- Satisfy Customers Needs and Compete Well in the Marketplace.

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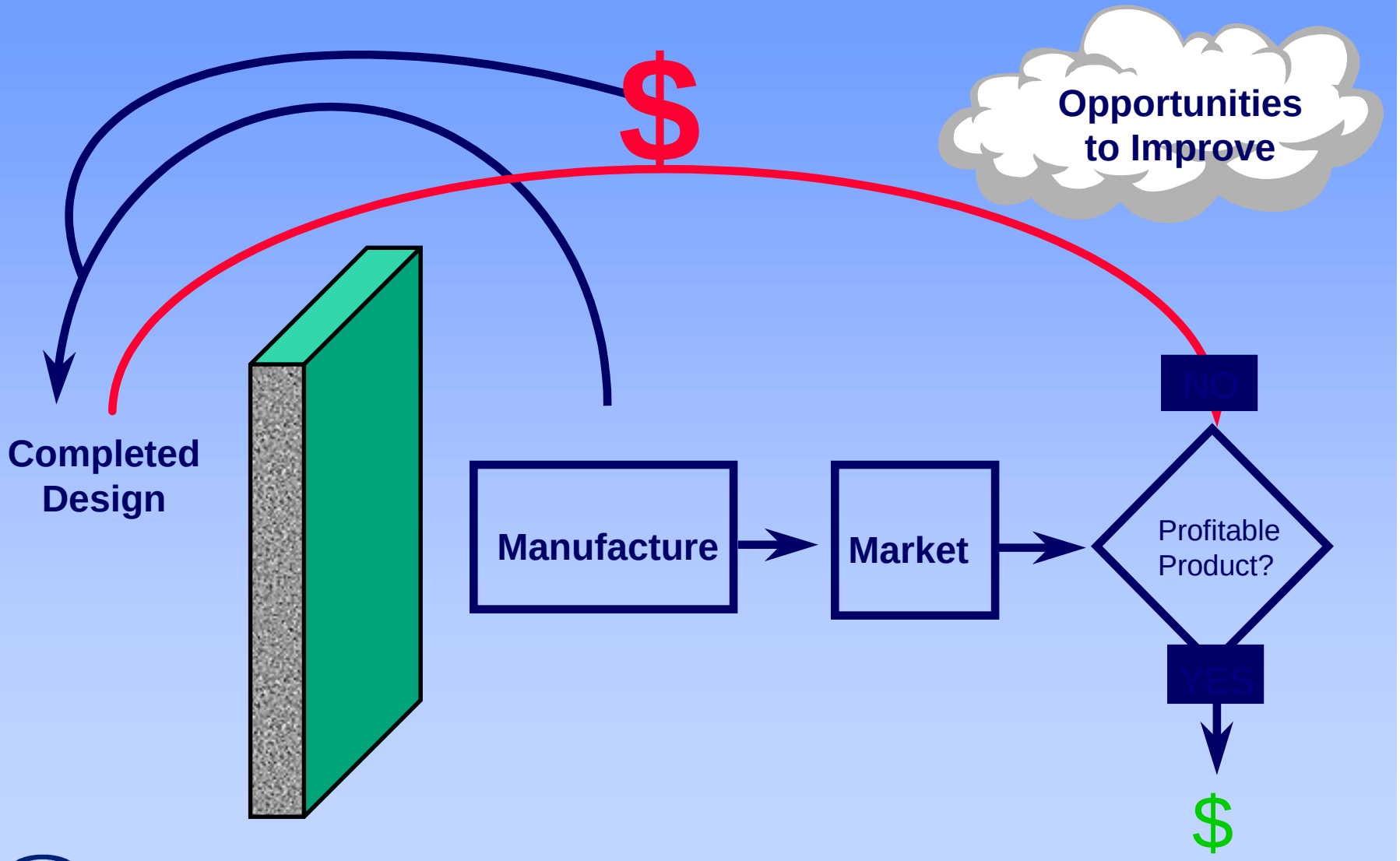
Now, with less Abstraction, SEER-DFM's Capabilities

- Simplify and Design to (a target) Cost
- Evaluate Different Design Scenarios
- Evaluate Process Alternatives
- Reduce Time to Market
- Encourage Concurrent Engineering or Integrated Product Development Teams
- Conduct Make vs Buy Analysis
- Evaluate Purchased Costs
- Perform Cash Flow or ABC Costing
- Justify Capital Equipment & Tooling

Traditional Manufacturing Methodology



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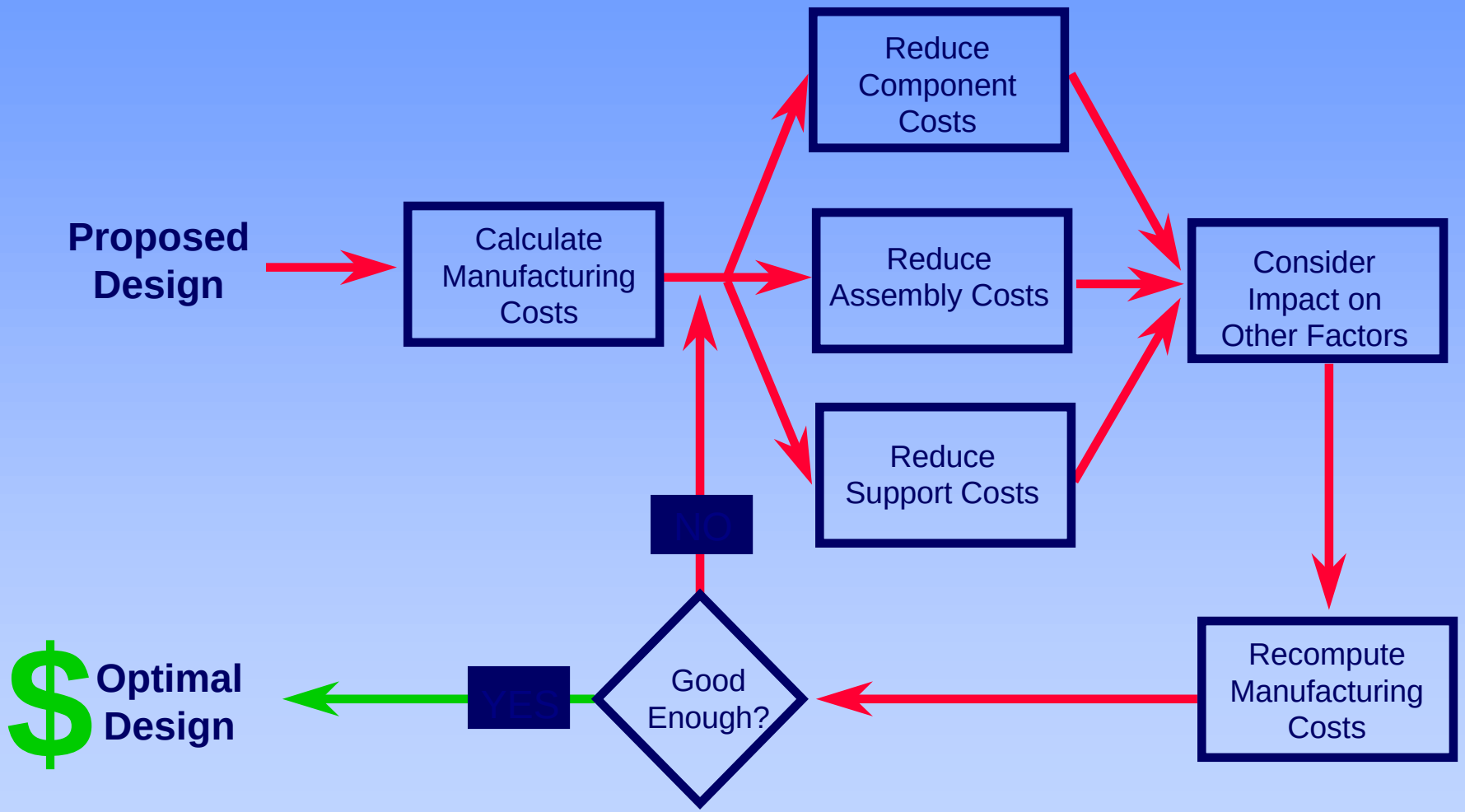
DFM Methodology



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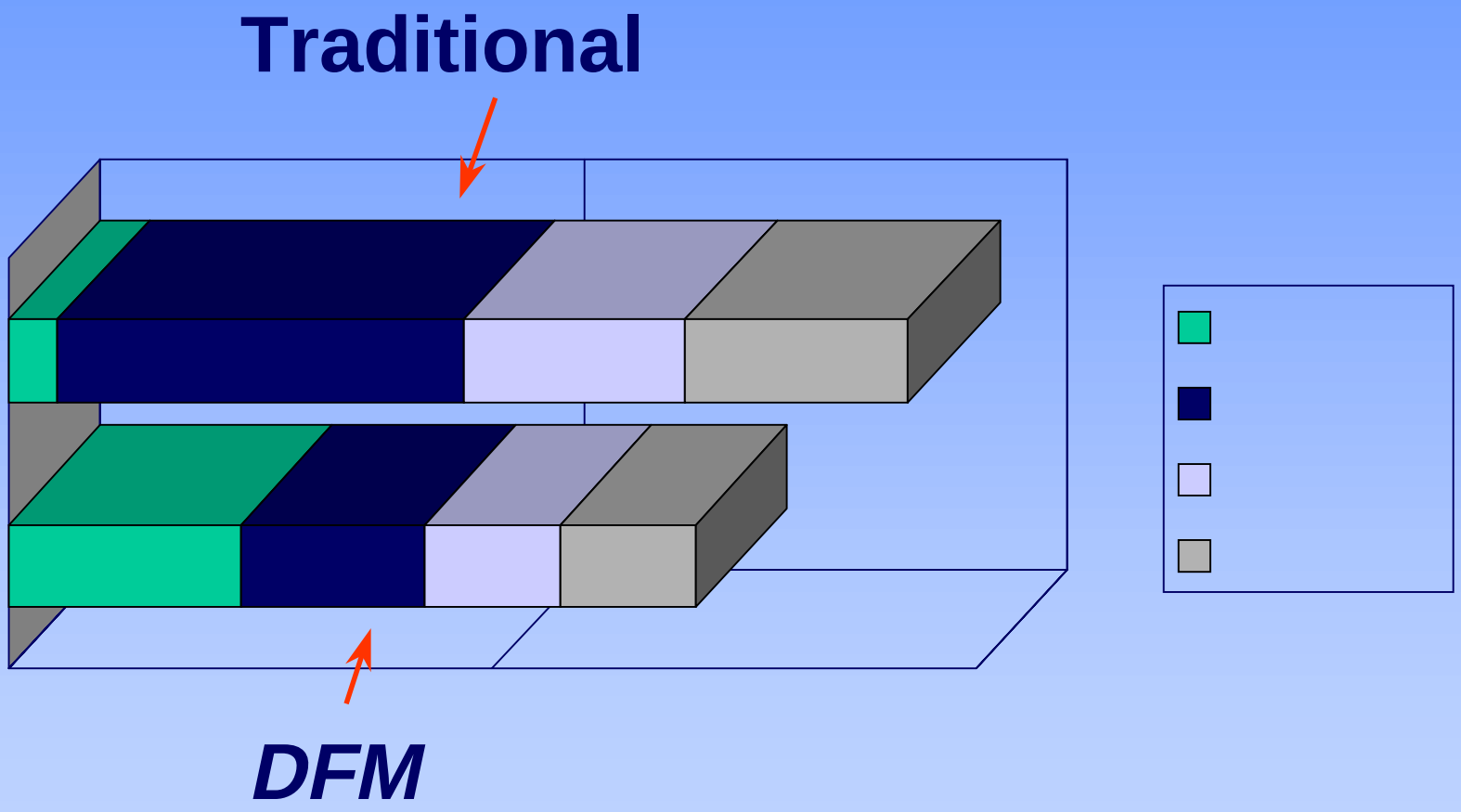
SEER-DFM Encourages Concurrent Engineering and Integrated Product Development Teams, Because:

- **Designers and Product Engineers do not have the detailed knowledge needed to evaluate manufacturability.**
- **Manufacturing Engineers do not have the detailed knowledge to evaluate process driven design changes.**
- **Neither Design or Manufacturing Engineers know enough about suppliers' products and processes.**
- **Project Managers do not have the tools to reduce schedules.**
- **Marketing does not have costs or volume impact studies.**

Product Development Cycle



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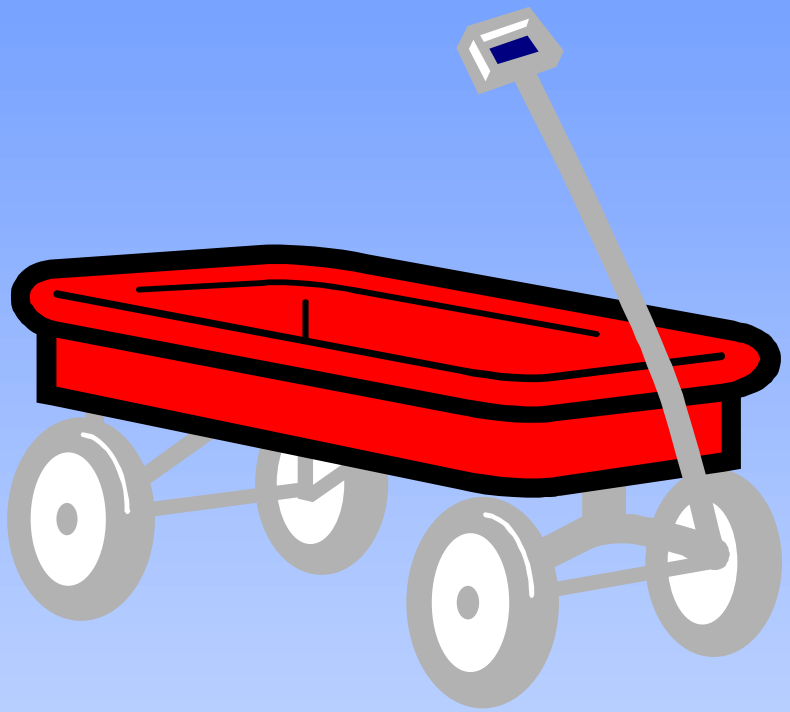
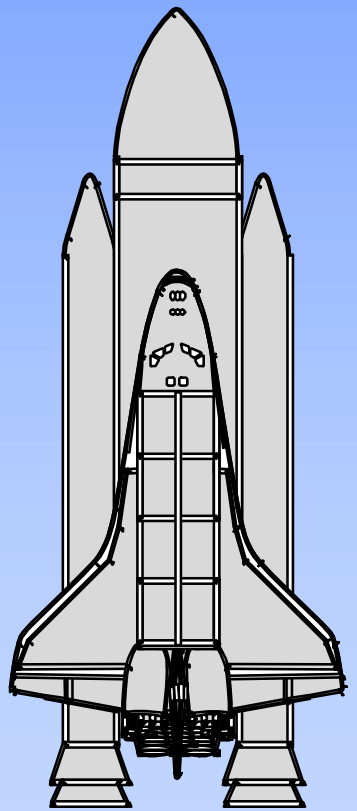
Reducing Cost and Justifying Capital Equipment & Tooling



Wagon Bed

Rocket Part



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Sheet Metal Enclosure Results

CNC Turret Press, CNC Brake & Weld		**$19.7449**
Labor	11.8749 minutes	$9.4999
Material (sheet)		$10.2449
Tooling		$0
CNC Laser Cut, CNC Brake & Weld		**$15.6645**
Labor	6.7746 minutes	$5.4196
Material (sheet)		$10.2449
Tooling		$0
Stamped with Progressive Die		**$12.4491**
Labor	.5084 minutes	$.4067
Material (coil)		$9.5619
Tooling		$310,060

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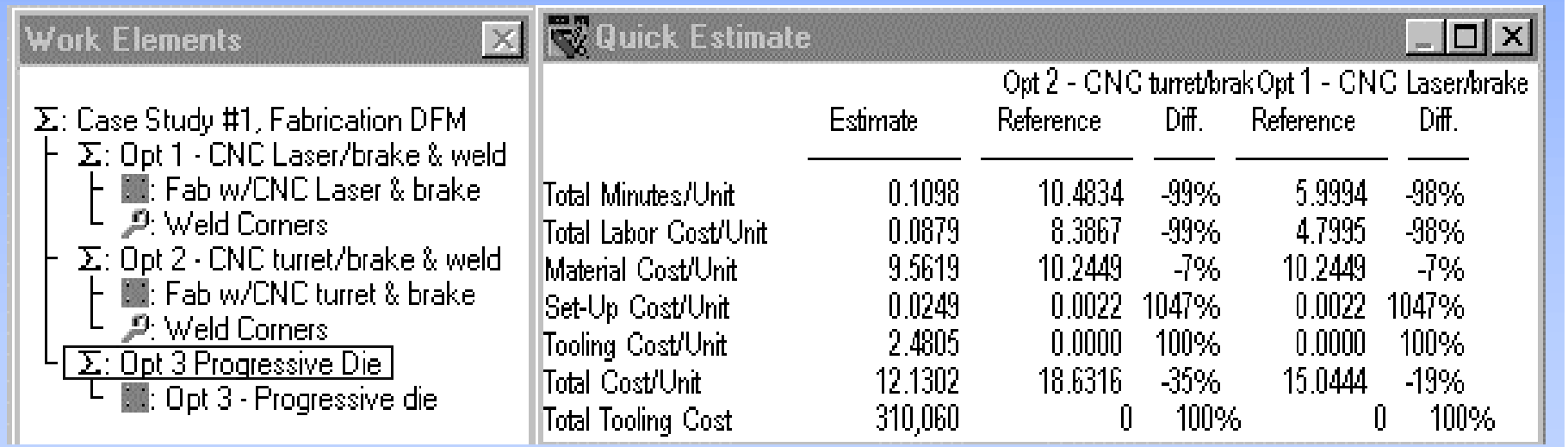
Process Comparison using DFM

Sheet metal fabrication option:

- CNC Laser, Brake & Weld
- CNC Turret, Brake & Weld
- Progressive Die



	Estimate	Opt 2 - CNC turret/brak Reference	Diff.	Opt 1 - CNC Laser/brake Reference	Diff.
Total Minutes/Unit	0.1098	10.4834	-99%	5.9994	-98%
Total Labor Cost/Unit	0.0879	8.3867	-99%	4.7995	-98%
Material Cost/Unit	9.5619	10.2449	-7%	10.2449	-7%
Set-Up Cost/Unit	0.0249	0.0022	1047%	0.0022	1047%
Tooling Cost/Unit	2.4805	0.0000	100%	0.0000	100%
Total Cost/Unit	12.1302	18.6316	-35%	15.0444	-19%
Total Tooling Cost	310,060	0	100%	0	100%

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Nose Cone Results

Machined Part		**$9,498.58**
Labor	5610.6 minutes	$8,696.49
Material		$527.09
Tooling		$5,000
Investment Cast Part		**$934.32**
Labor	129.7 minutes	$201.01
Material		$113.74
Tooling		$12,392
Sheet Metal/Welded Part		**$643.28**
Labor	205.5 minutes	$273.99
Material (sheet)		$3.66
Tooling		$7,312

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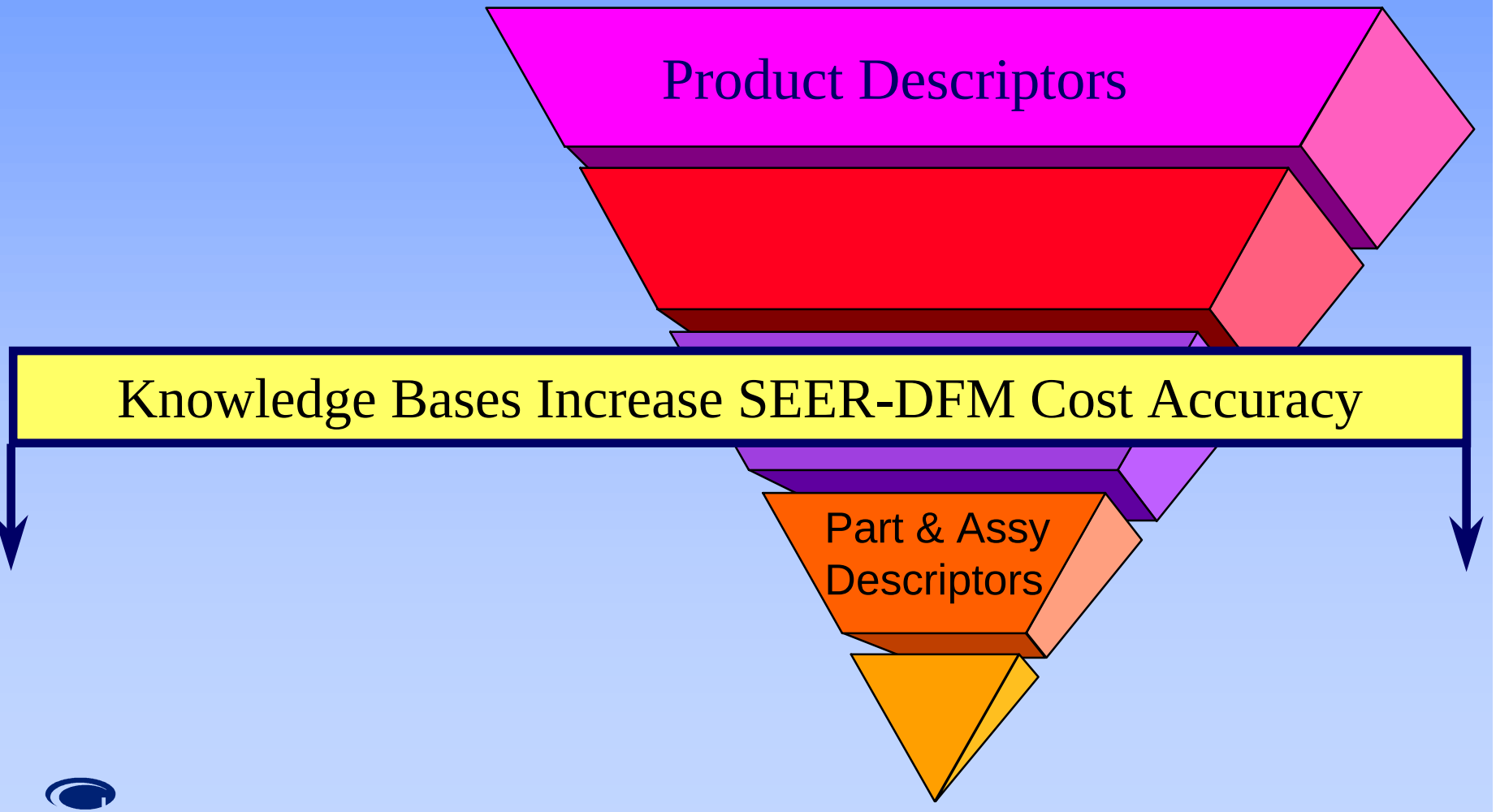
SEER-DFM Provides Detailed Cost *Without* Detailed Work Measurement



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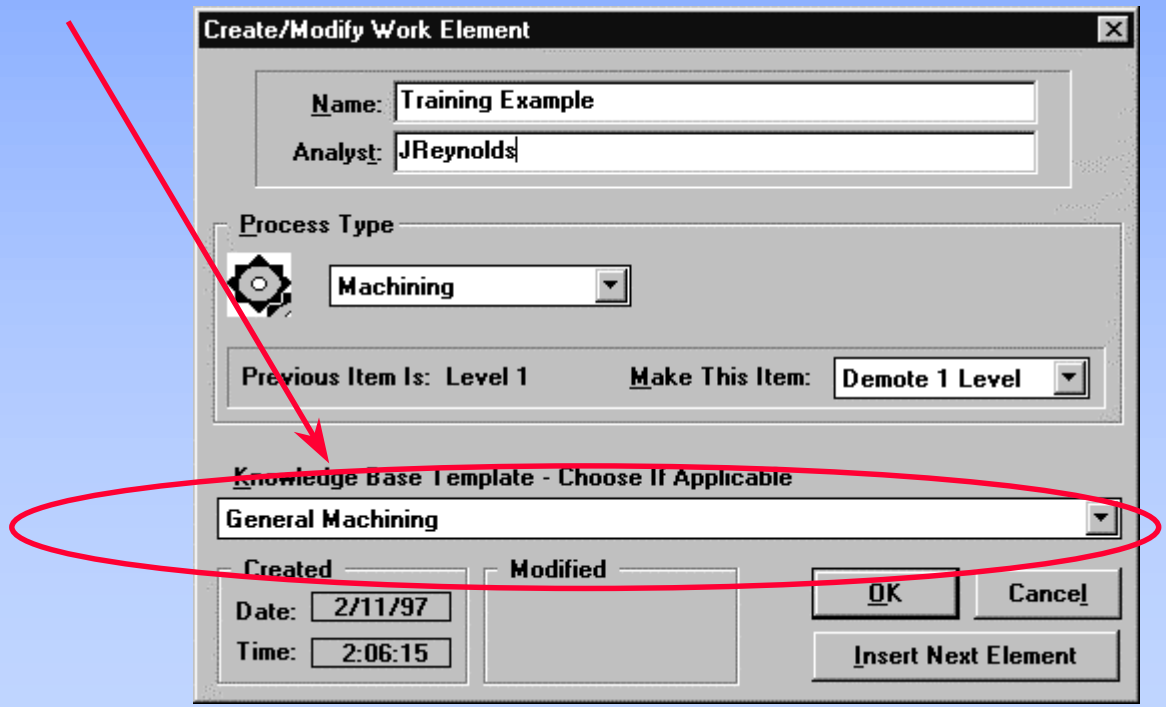
Using a SEER-DFM Knowledge Base

- Create/Modify Work Element Dialog Box
- If modifying an existing element, click Change
- For new element, select Process Type
- Knowledge Base list for specific process type



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Machining

- General Machining
- Remove Radius, EDM
- Gear Hobbing
- Gear Milling
- Machining an Aluminum Die Cast
- Machining an Armature Shaft
- Machining a Cast Iron Housing
- Rough Machining, Lathe
- Rough Machining, Milling
- Machine Screw, Production
- Surface Grinding

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Machining

- **General Machining**
- Remove Radius, EDM
- **Gear Hobbing**
- **Gear Milling**
- **Machining an Aluminum Die Cast**
- **Machining an Armature Shaft**
- **Machining a Cast Iron Housing**
- **Rough Machining, Lathe**
- **Rough Machining, Milling**
- **Machine Screw, Production**
- **Surface Grinding**

+ PRODUCT DESCRIPTION			
- Material Origin		Raw Stock	
- Production Quantity		0	
- Quantity Per Next Higher Assembly		1	
- Hourly Labor Rate		50.00	
- Production Experience/Optimization	Hi	Hi	Hi
- Manufacturing Environment		Consumer	
- Material		Steel, Tool	
- Material Cost Per Lb.		1.2000	
- Raw Weight (lb)	0.0000	0.0000	0.0000
- Raw Shape		Rectangular	
- Raw Dimensions (in)	0.000	0.000	0.000
- Finished Weight (lb)	0.0000	0.0000	0.0000
+ OPERATIONS			
- Add Next Operation Here			
+ MANUFACTURING DESCRIPTION			
- Set-up Complexity	Nom	Nom	Nom
- Tooling Complexity	Nom	Nom	Nom
- Machine/Tooling Process Capability	Nom	Nom	Nom
- Machine Tool Condition	Nom	Nom	Nom
+ OPTIONAL COST INPUTS			
- Tooling Cost (Optional)		0.00	
- Tooling Amort. Quantity (Optional)		0	
- Other Cost (Optional)		0.00	
+ LABOR CALIBRATION		1.00	
- Start Learning		10,000	
- Stop Learning		10,000	
- PROBABILITY (RISK)		50.00%	

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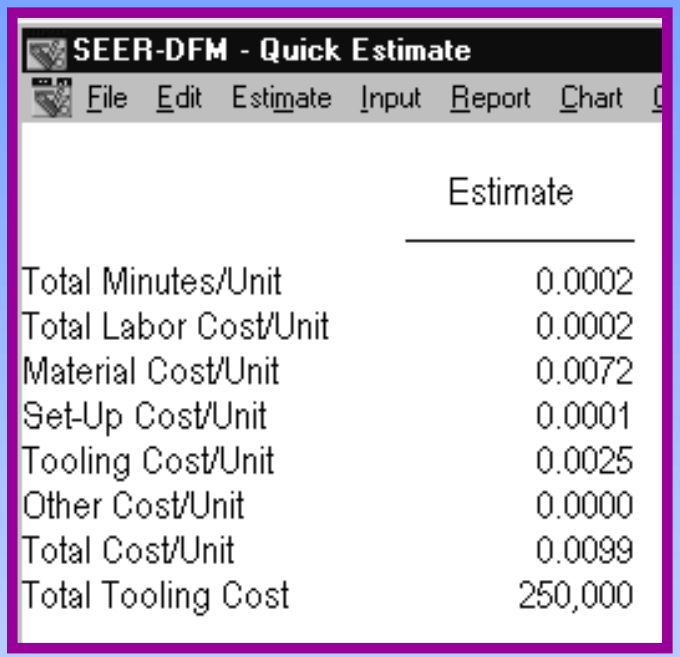
Instant Cost Information



	Estimate
Total Minutes/Unit	0.0002
Total Labor Cost/Unit	0.0002
Material Cost/Unit	0.0072
Set-Up Cost/Unit	0.0001
Tooling Cost/Unit	0.0025
Other Cost/Unit	0.0000
Total Cost/Unit	0.0099
Total Tooling Cost	250,000

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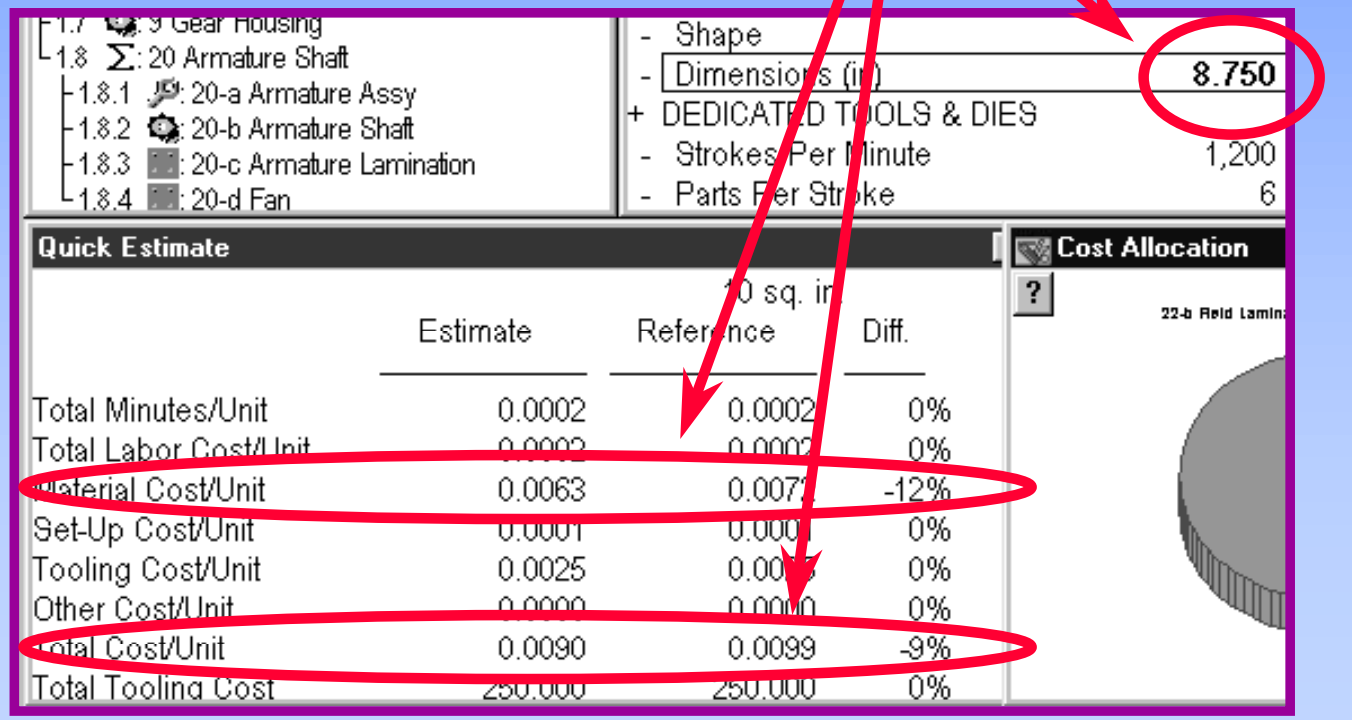
Fast and accurate cost informationfor Designers with limited Manufacturing Experience



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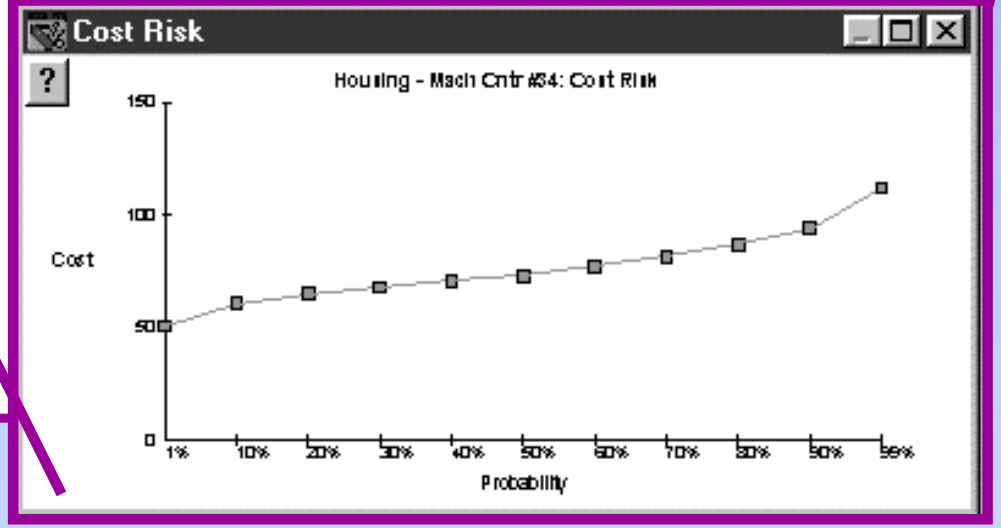
Parametric Cost Parameters Deliver Risk Analysis

+ PRODUCT DESCRIPTION			
- Material Origin		**Sand Casting**	
- Production Quantity		**2,000**	
- Quantity Per Next Higher Assembly		1	
- Hourly Labor Rate		**54.00**	
- Production Experience/Optimization	**Low**	Hi	**EHi**
- Manufacturing Environment		Consumer	
- Material Selection		**Grey Cast Irons**	
- Raw Sandcast Part Cost (Optional)		0.0000	
- Finished Weight (lb)	300.0000	340.0000	380.0000
- Shape		**Irregular Cross Section**	
- Dimensions (in)	0.000	0.000	
+ OPERATIONS			
- Mill Locating Pad (Radial Mill Rough)			
- Rough Front Mtg. Flg (End Mill Rough)			
- Finish Front Mtg Flg (End Mill Finish)	0.0100	0.00	
- Drill Mtg Holes (Drill)	**7**	**0.7500**	
- Tap Mtg Holes (Tap)	**7**		
- Bore Pilot Hole (Bore Finish)	**0.005**	0.00	
- Drill Holes (Drill)	**19**	**1.2500**	
- Tap Holes (Tap)	**11**		
- Ream Holes (Ream)	**8**		
- Operation (Next)			
+ MANUFACTURING DESCRIPTION			
- Tooling Type	**Hi**	**Hi**	
- Tooling Complexity	**Low**	**ow**	
- Machine Tool Condition	Nom	om	
+ OPTIONAL COST INPUTS			
- Tooling Cost (Optional)		**2,500.0**	
- Tooling Amort. Quantity (Optional)		**5,000**	
- Other Cost (Optional)		**700.00**	
+ LABOR CALIBRATION		1.00	
- Start Learning (Optional)		**10,000**	
- Stop Learning (Optional)		0	
- PROBABILITY (RISK)		50.00%	



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ABC & Cash Flow Costing

ABC Costing

	Minutes/Unit
LABOR TOTAL	3.0644
Set-up	0.0271
Direct	2.9205
Inspection	0.1168
Rework	0.0000

The ability to look at setup costs separately, inspection, rework, etc. Plus any other activity costs that the finance department may desire.

Cash Flow Costing

	Estimate	Progressive die Reference	Diff.
Total Minutes/Unit	2.7764	0.0501	5441%
Total Labor Cost/Unit	2.2211	0.0401	5441%
Material Cost/Unit	9.5619	9.5619	0%
Set-Up Cost/Unit	0.0022	0.0249	-91%
Tooling Cost/Unit	0.0000	2.4805	-100%
Other Cost/Unit	0.0000	0.0000	0%
Total Cost/Unit	11.7830	12.0824	-2%
Total Tooling Cost	0	310,060	-100%

Costs include amortized tooling costs, other costs, setup costs, etc.

Plus

ABC cost drivers can be maintained in Knowledge Bases

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Make vs Buy
and Evaluating Purchased Costs

Compare Manufactured Costs vs Vendor Costs

Hourly Labor Rate
vs
Hourly Vendor Rate

+ PRODUCT DESCRIPTION			
- Production Quantity		5,000	
- Quantity Per Next Higher Assembly		1	
- Hourly Labor Rate		50.00	
- Hourly Vendor Rate		0.00	
- Production Experience/Optimization	Nom	Nom	Nom
- Material Selection		**ABS**	
- Raw Material Cost Per Lb. (Optional)		1.3500	
+ Process		Injection Molding	
- Finished Weight (oz)	**0.0468**	**0.0468**	**0.0468**
	8	**8**	**8**
apacity (Injections/Hour)	**200**	**200**	**200**
ness	Nom	Nom	Nom
ness Uniformity	Nom	Nom	Nom
mplexity	Nom	Nom	Nom
OST INPUTS			
t (Optional)		0.00	
rt. Quantity (Optional)		2,000,000	
Optional)		0.00	
BRATION		1.00	
ng (Optional)		0	
ng (Optional)		0	
Y (RISK)		50.00%	

	Estimate	In-House Reference	Diff.
Total Minutes/Unit	0.0401	0.0401	0%
Total Labor Cost/Unit	0.0000	0.0334	-100%
Material Cost/Unit	0.0632	0.0632	0%
Molding Cost/Unit	0.1001	0.0000	100%
Set-Up Cost/Unit	0.0000	0.0262	-100%
Tooling Cost/Unit	0.0286	0.0286	0%
Other Cost/Unit	0.0000	0.0000	0%
Total Cost/Unit	0.1919	0.1252	53%
Total Tooling Cost	57,215	57,215	0%

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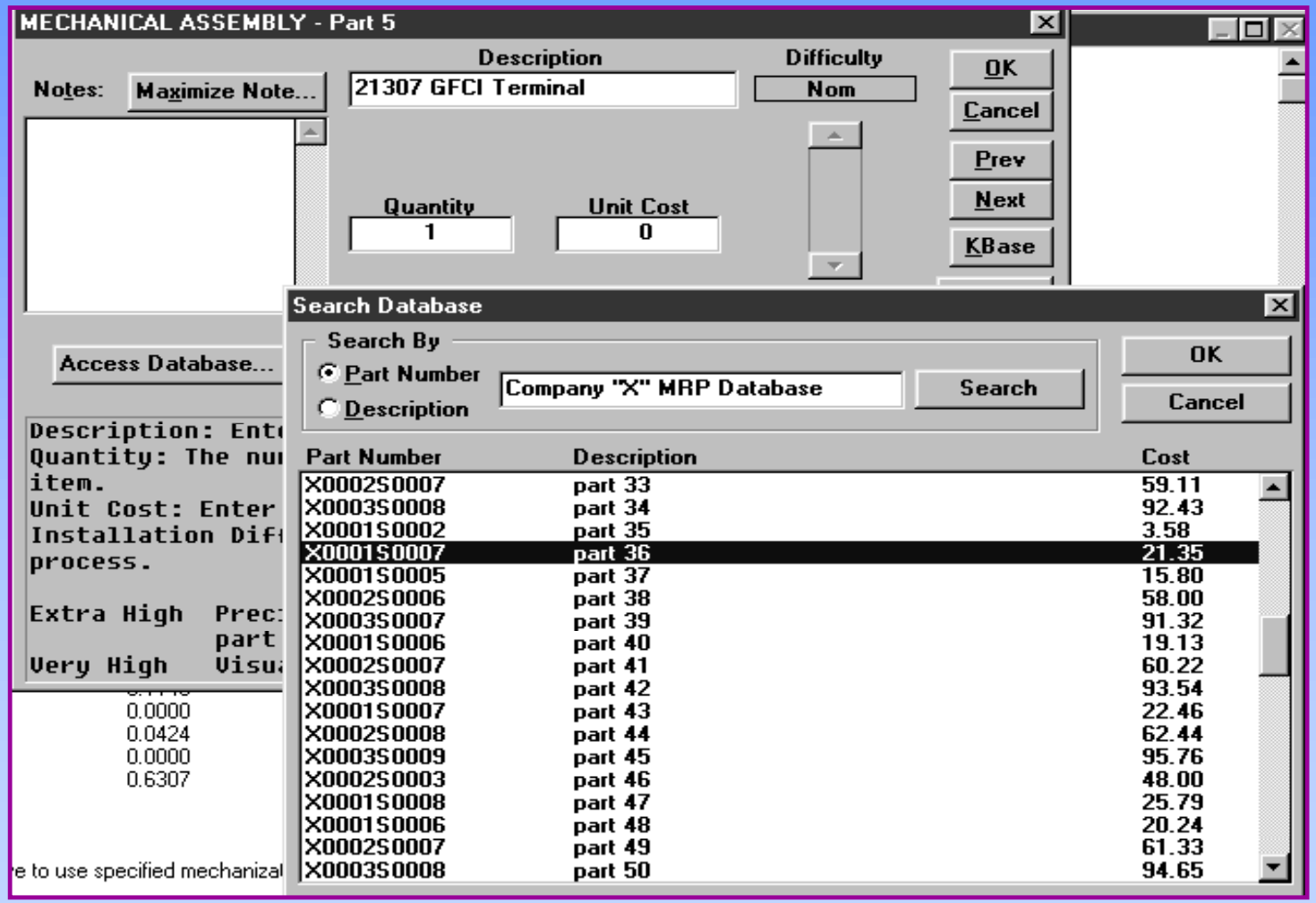
Easily Import & Export Data



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Highlights of SEER-DFM

- Makes it Fast & Easy to Reduce Costs
- Justify Capital & Tooling
- Uses Knowledge Bases to Improve Accuracy, Save Valuable History & Work Unassisted
- Shows Risk Analysis
- Does ABC or Cash Flow Costing
- Documents Make vs Buy Decisions
- Flexible & Easy to Use Import and Export Capabilities

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