SEPTEMBER 2025

Quantified Design for Manufacture

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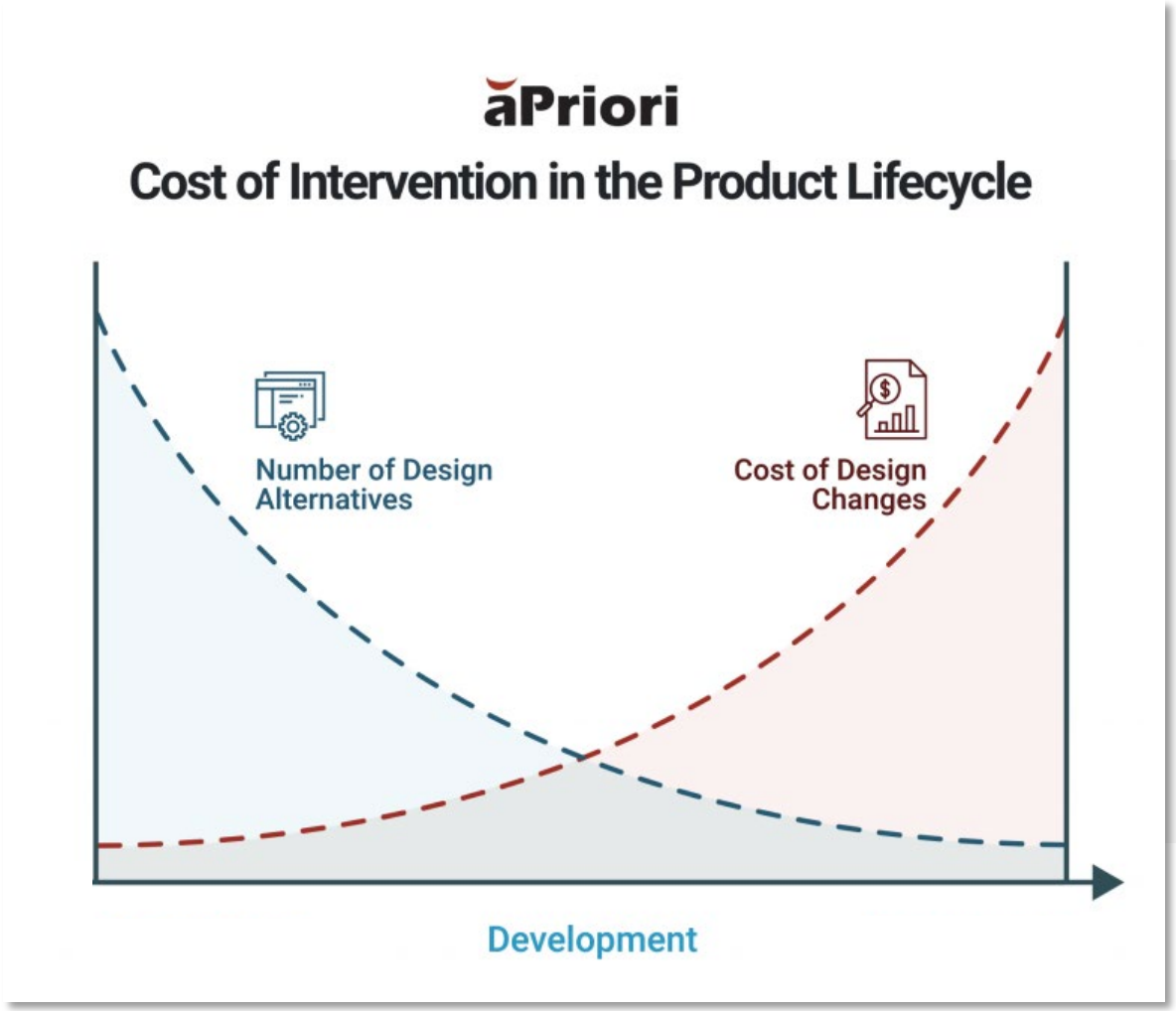
Manufacturing Insights **2025**

DETROIT / SEPTEMBER 23 - 24

Quantified Design for Manufacture

1. The Need for *Quantified* DFM
2. How aPriori can help
3. What's new in aP Design
4. • Summary

Design Impact



80%

of a product's cost & environmental impact is determined in the design phase.

The Current Situation

Skills Gap/ Staff Shortages

"…57% of manufacturers surveyed say students have been prepared for CAD…"

…65% indicate students have not been prepared well to create designs that are manufacturable"

Forbes Tech-Clarity

Increased competition & complexity

Products are more complex than ever

Decision Support is vital

"92% of Design and Engineering Professionals reported their products increased in complexity over the last five years"

engineering.com

Sustainability/ Net Zero Goals

"Design and Manufacturing are Core to Sustainability"

"Engineers have a lot to consider for Design for Sustainability"

DesignNews

Lack of Visibility into Cost at Design Phase

At a Design Event in February 2023, when asked, "How involved are you in evaluating the cost of designs?"

93% said either nothing was formally in place, or they simply "tried to design cost-effectively"

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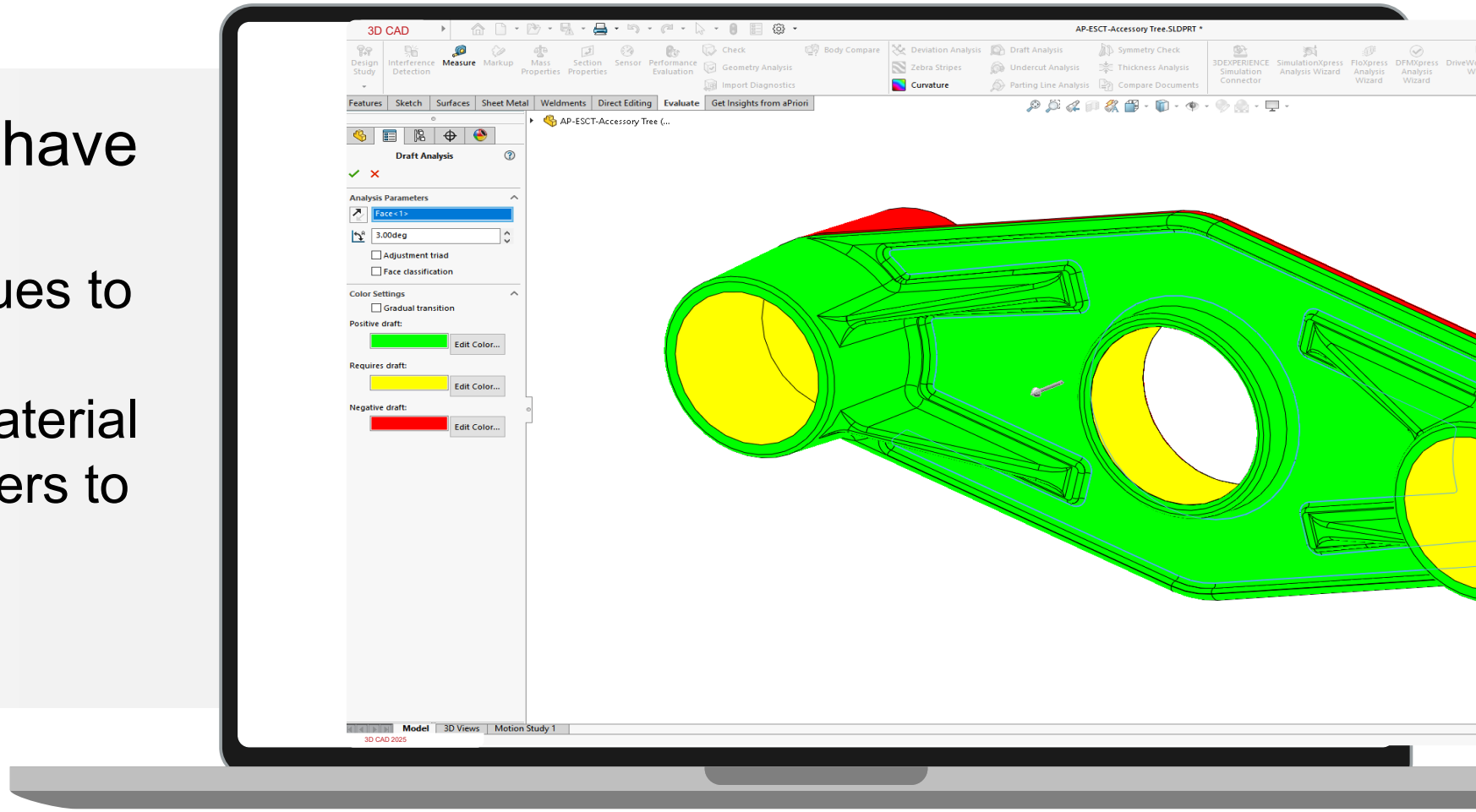
3D CAD DFM Checks are Lacking

- Most 3D CAD tools have DFM checks, with:
  - Manual entry of values to check
  - No knowledge of material or process parameters to influence results



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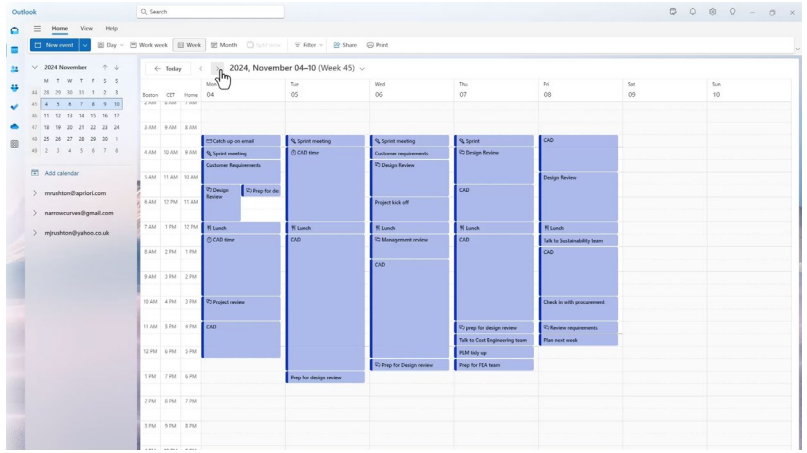
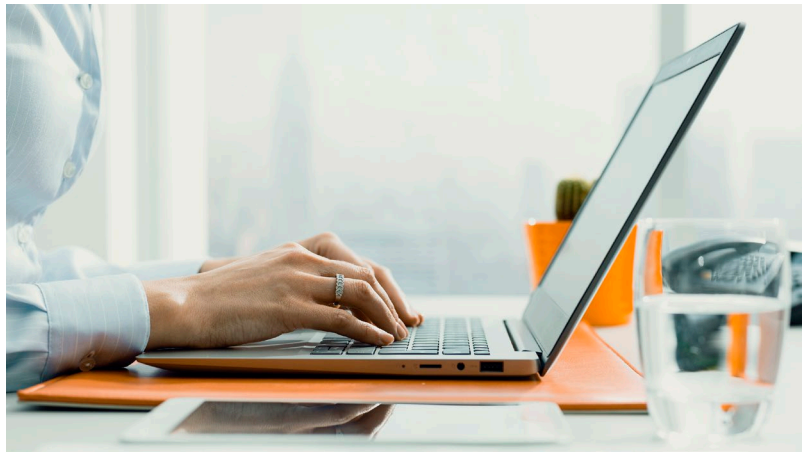
Design Reviews take too long



Finding time to meet



Preparing to meet

Lack of insights

Difference of Opinion

Aging Workforce

Supplier Feedback

- Too late
- What is the motivation behind the feedback?
  - Based on *their* capabilities
  - Based on *their* equipment
  - Based on *their* workload/schedule
- Subjective and rarely quantified

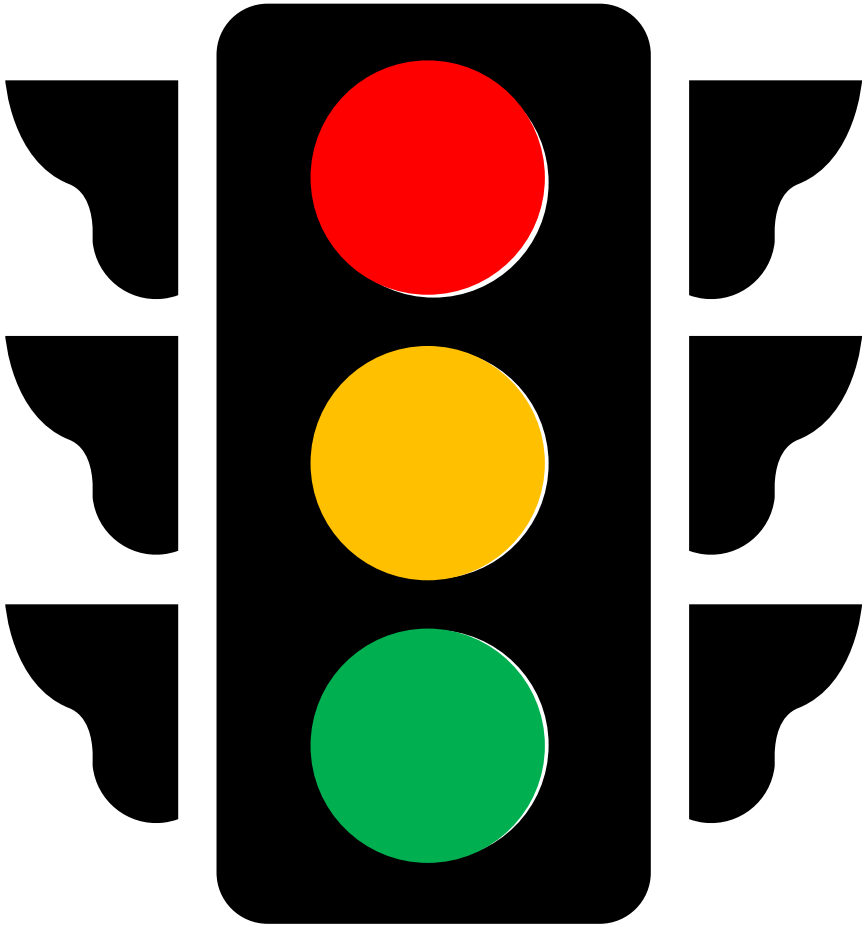
DFM Feedback doesn’t tell the full story

- Additional DFM tools lack insights
- Catch “issues” without impact

“Why is it an issue?”

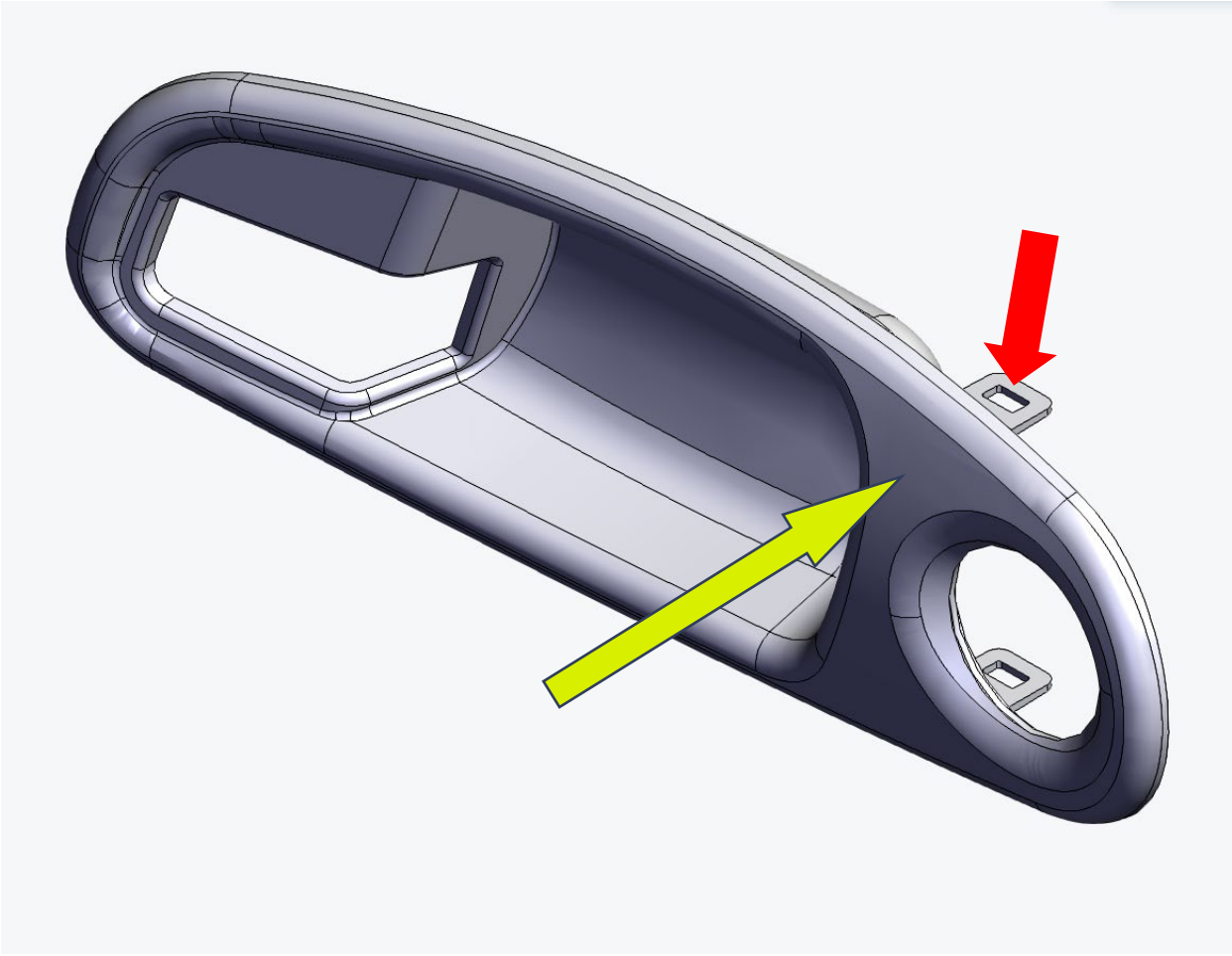
“Is it worth the time to address?”

“What will the cost difference be?”



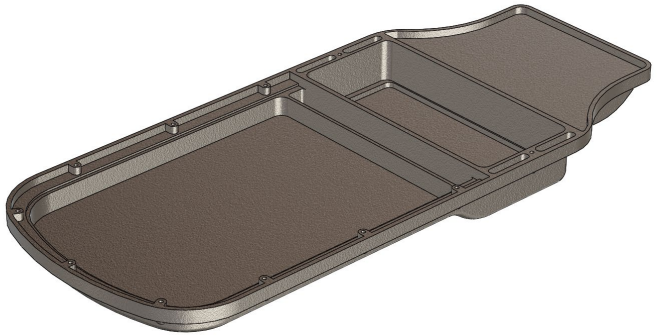
The Need for Quantification of DFM

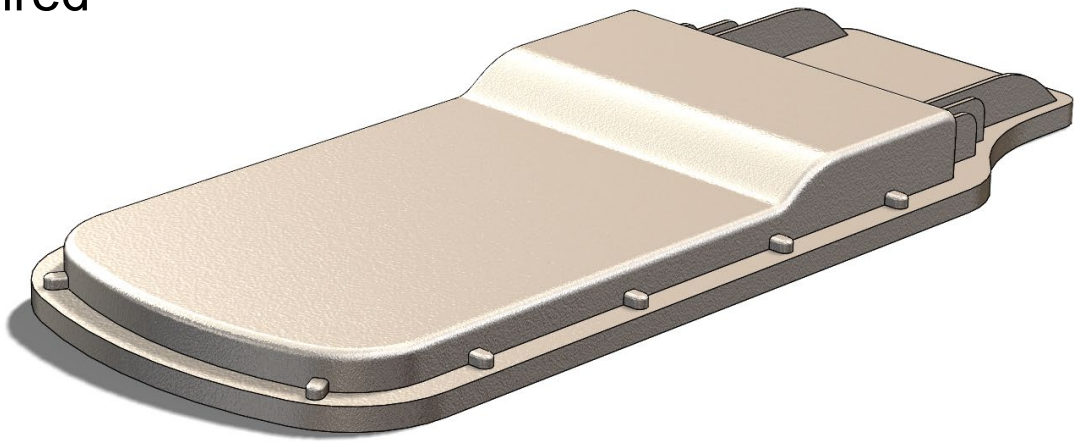
- Undercuts identified
  - What is the impact?
    - Cycle time?
    - Tooling cost?
- Do we want to compromise performance or aesthetics?
- What is the trade-off?



The Need for Quantification of DFM

- Material Selection
  - Aluminum
    - Inexpensive, needs to be powder-coated
  - Zinc
    - More expensive, stronger, no coating required
- What is the trade-off?





The Need for Quantification of DFM

- Finalized Design is handed off to Manufacturer

A

- Comes back with list of issues
- Redesign Time
  - Additional time & cost on project
  - Delay to production means lost market share/revenue
  - Penalties
  - Supplier Relations

B

- Goes into production
- Costs more than needed
  - Reduced profitability
  - Production Scrap & Rework
    - Supplier Relations
    - Customer Satisfaction
    - Market Reputation

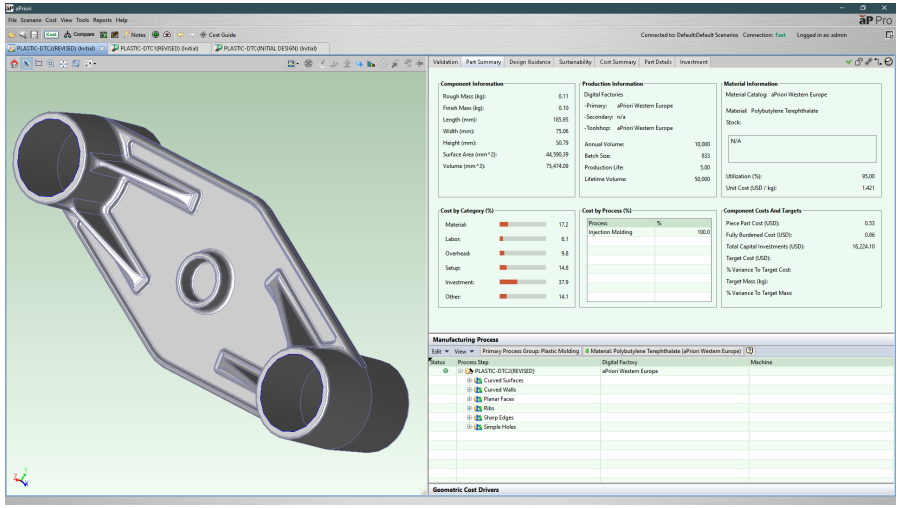
What would more time mean to you?

COST
(Profitability)

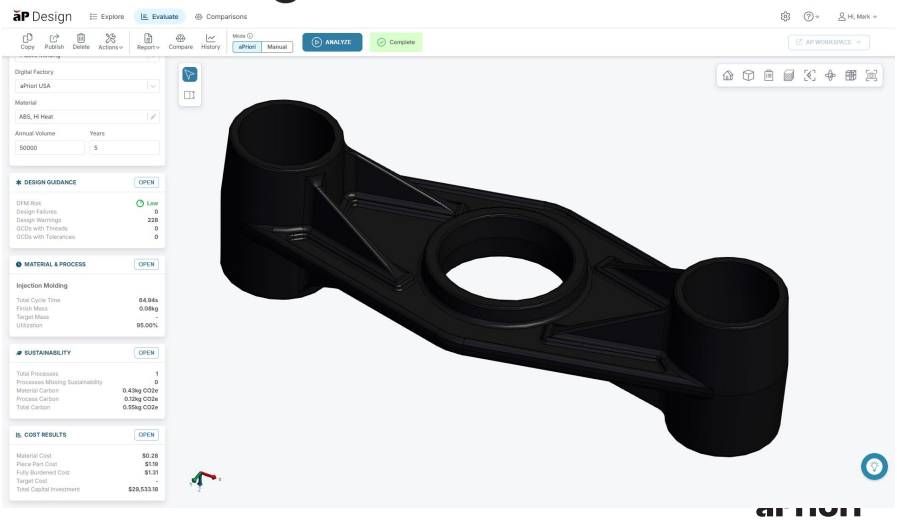
How aPriori can help

- aPriori analyzes 3D CAD in seconds
- Provides *Quantified* DFM feedback
  - Design for Manufacturability
  - Design for Cost
  - Design for Sustainability
- Quantifying:
  - Part Cost
  - Assembly Cost
  - Tooling Cost
  - Setup time
  - Number of setups
  - Cycle time
  - Embodied CO_2e
  - Secondary Operations and Processes
  - And much more

aP Pro



aP Design



Quantified DFM Examples

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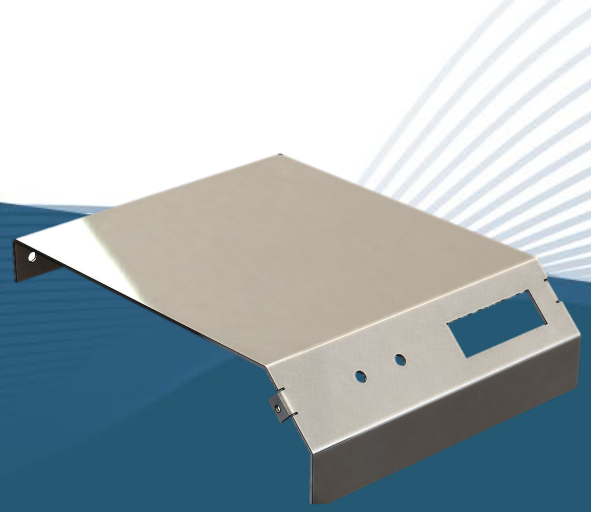
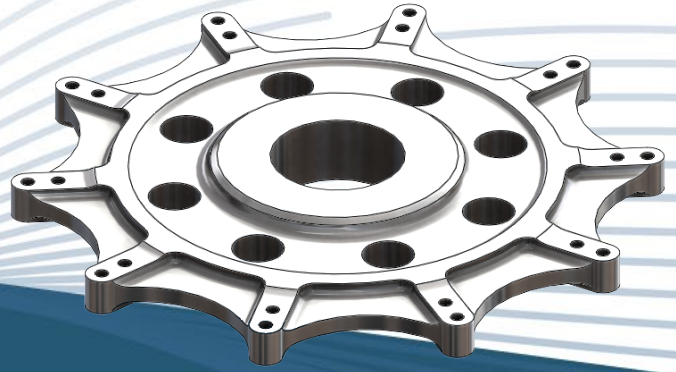
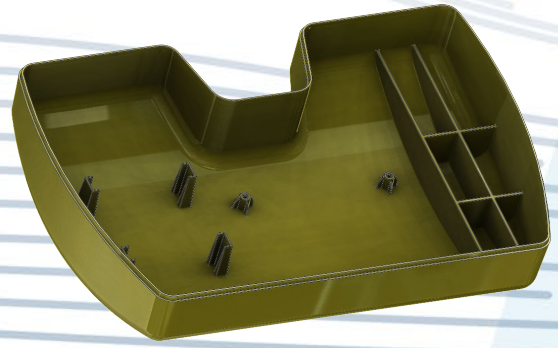
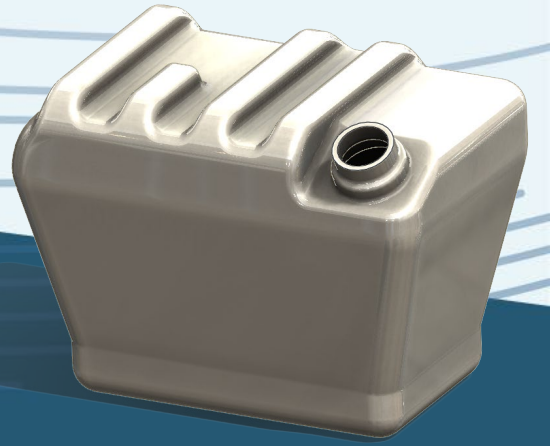
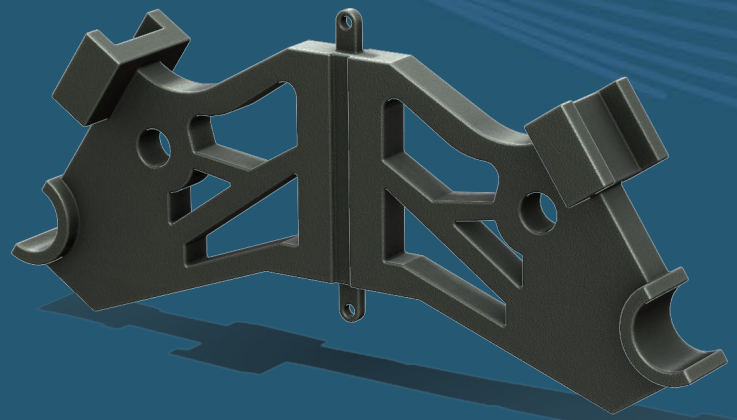
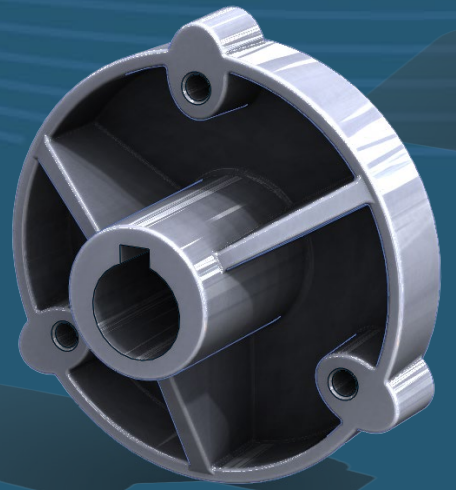




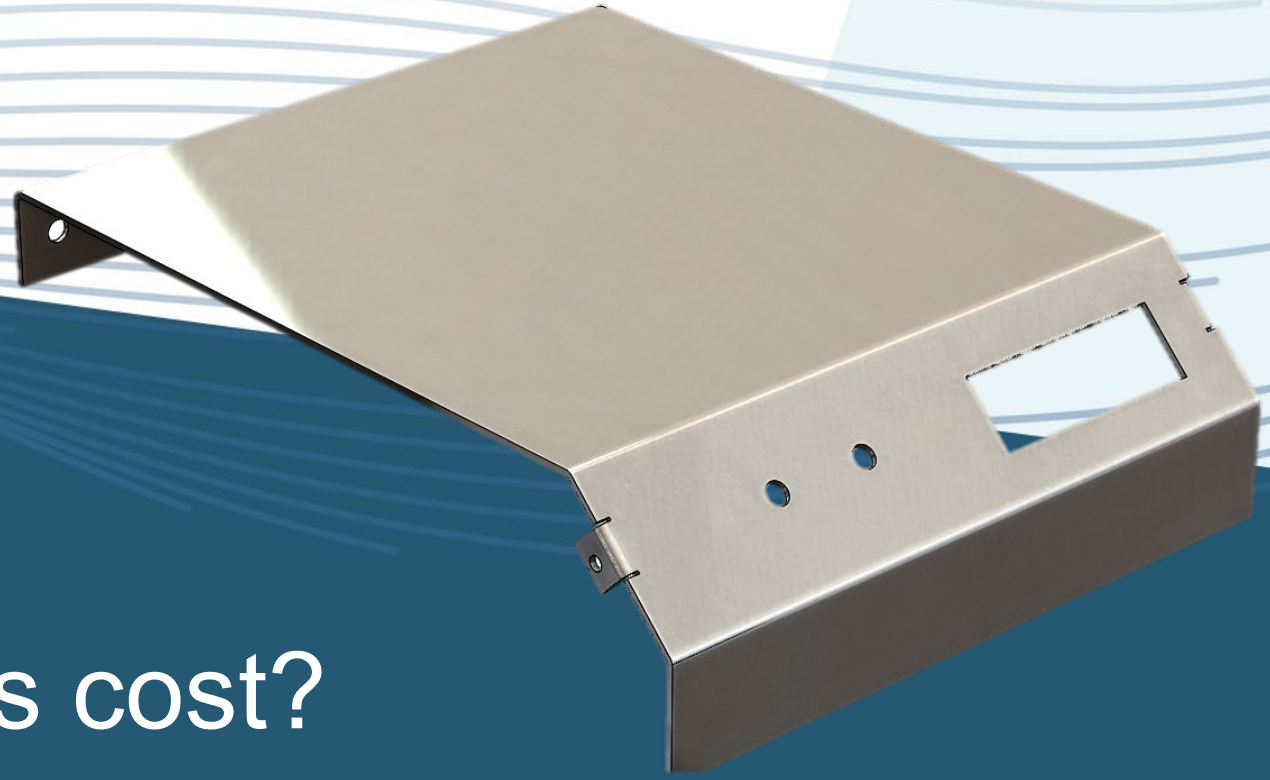








Quantified DFM with aPriori



Example 1:
How much *should* this cost?

Quantified DFM with aPriori

- What *should* this design Cost?

- $50.37

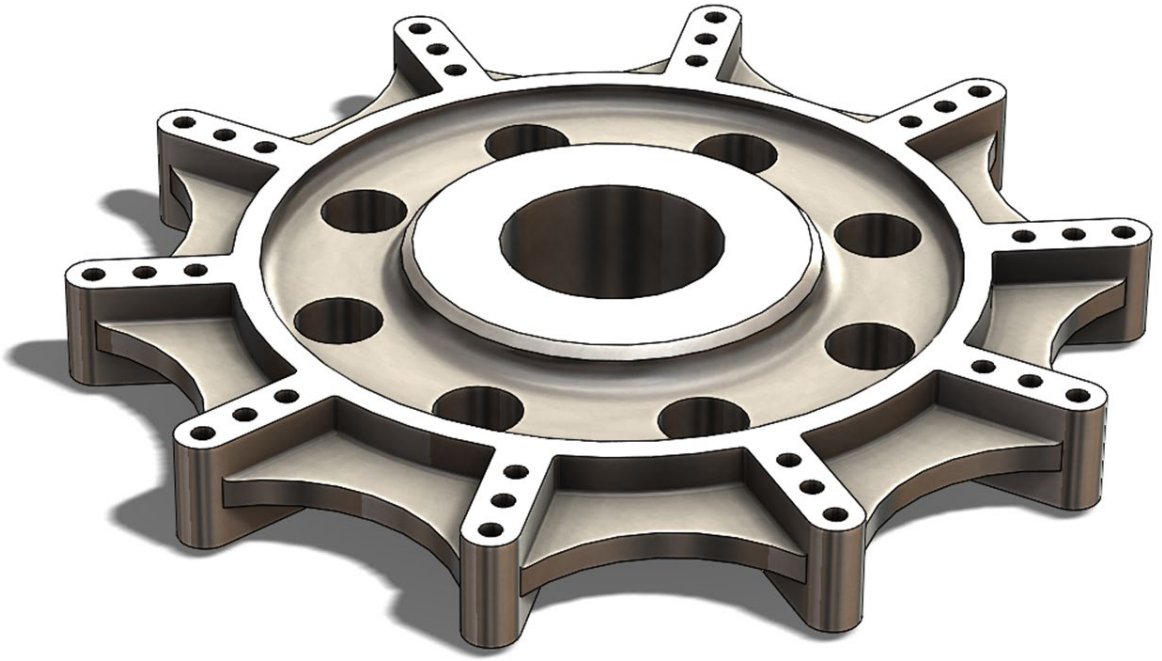
Quantified DFM with aPriori

Example 2: How long should this take to manufacture?

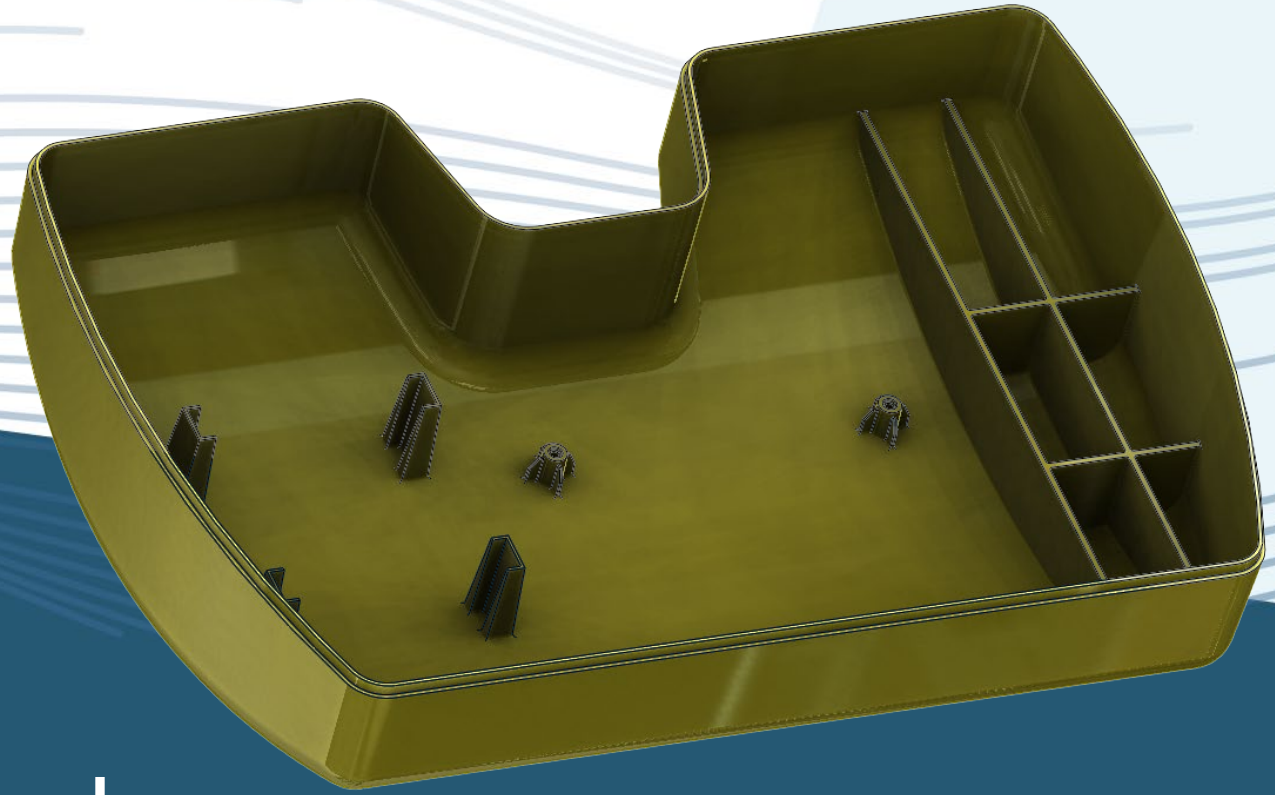
Quantified DFM with aPriori

- What *should* the Cycle time be?

- 1,976.63s
- ~33minutes



Quantified DFM with aPriori

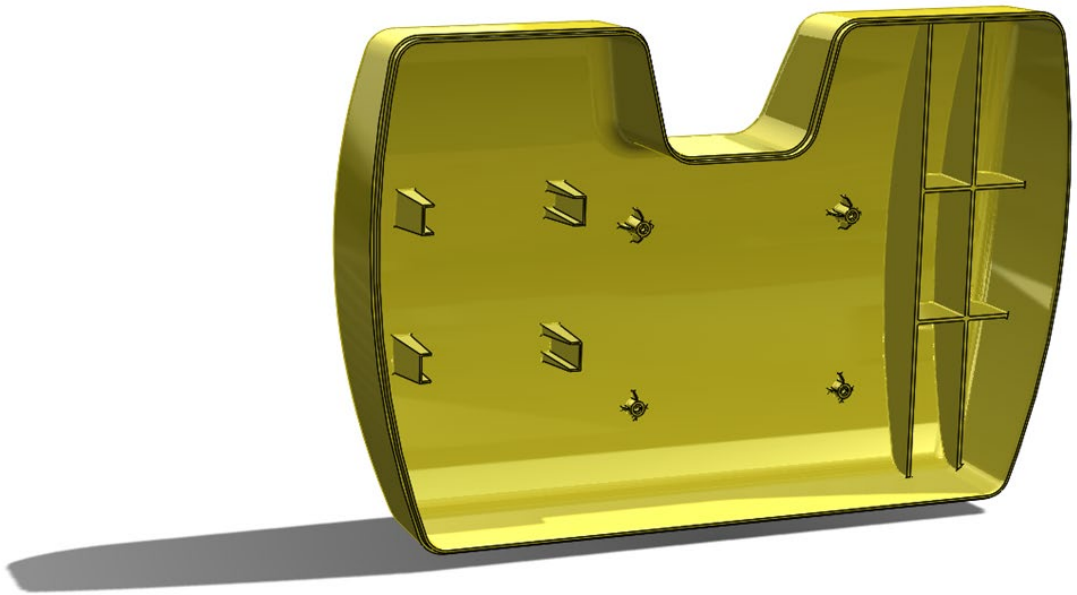


Example 3:
What is the optimal number of cavities to produce this?

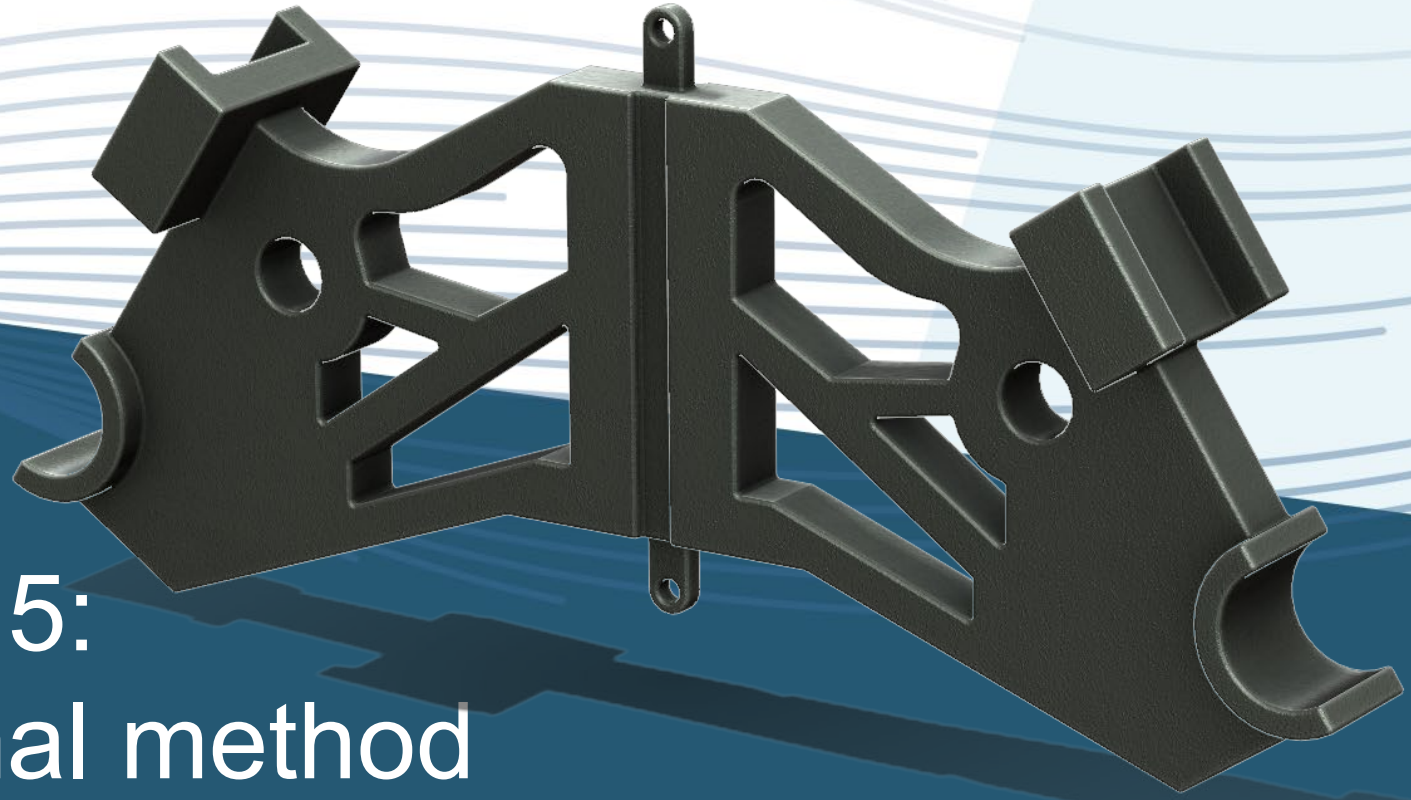
Quantified DFM with aPriori

- What *should* the Number of Cavities in the tool be?

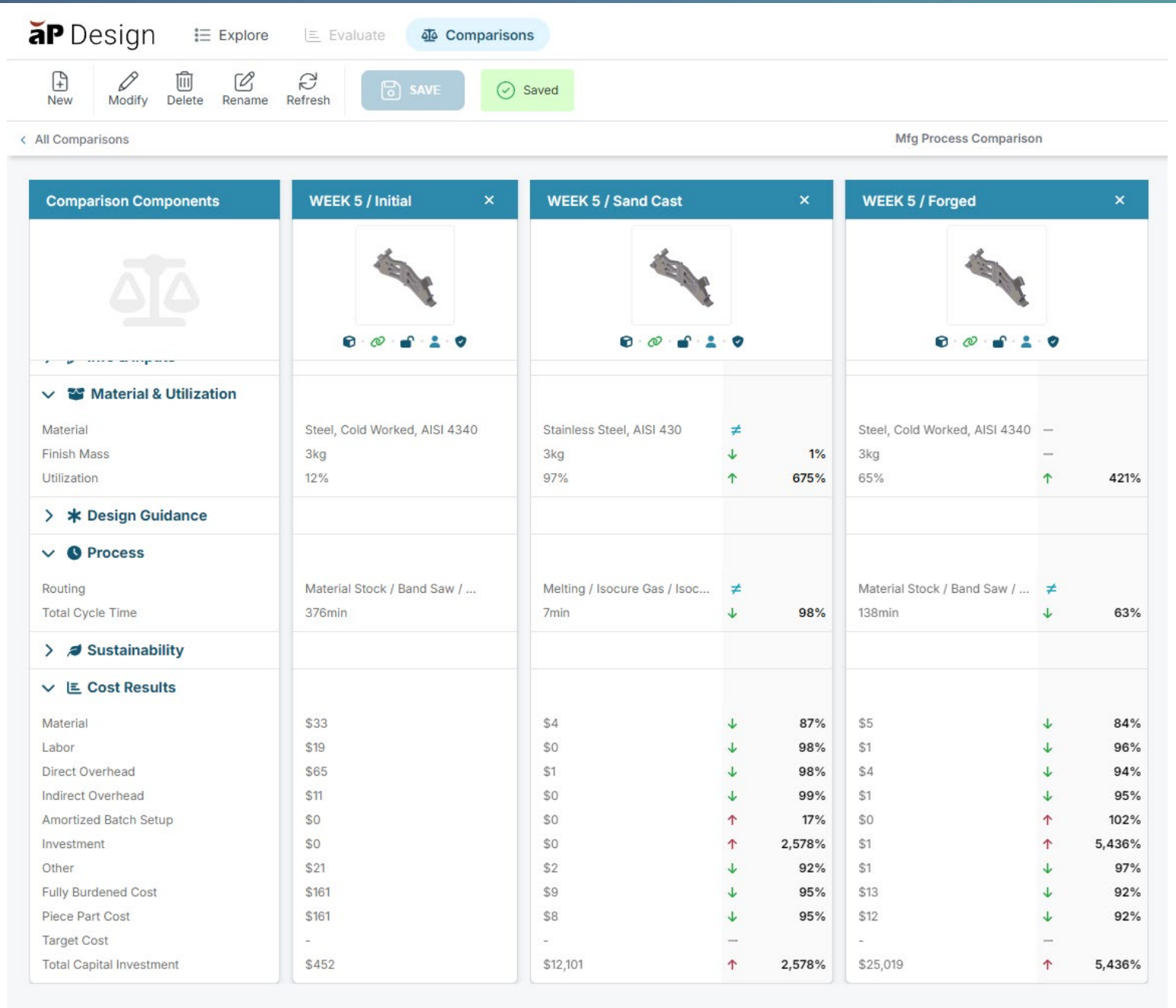
- 8



Quantified DFM with aPriori



Example 5:
What is the optimal method to manufacture this?



Comparison Components	WEEK 5 / Initial	WEEK 5 / Sand Cast			WEEK 5 / Forged		
Material & Utilization							
Material	Steel, Cold Worked, AISI 4340	Stainless Steel, AISI 430	≠		Steel, Cold Worked, AISI 4340	—	
Finish Mass	3kg	3kg	↓	1%	3kg	—	
Utilization	12%	97%	↑	675%	65%	↑	421%
Design Guidance							
Process							
Routing	Material Stock / Band Saw / ...	Melting / Isocure Gas / Isoc...	≠		Material Stock / Band Saw / ...	≠	
Total Cycle Time	376min	7min	↓	98%	138min	↓	63%
Sustainability							
Cost Results							
Material	$33	$4	↓	87%	$5	↓	84%
Labor	$19	$0	↓	98%	$1	↓	96%
Direct Overhead	$65	$1	↓	98%	$4	↓	94%
Indirect Overhead	$11	$0	↓	99%	$1	↓	95%
Amortized Batch Setup	$0	$0	↑	17%	$0	↑	102%
Investment	$0	$0	↑	2,578%	$1	↑	5,436%
Other	$21	$2	↓	92%	$1	↓	97%
Fully Burdened Cost	$161	$9	↓	95%	$13	↓	92%
Piece Part Cost	$161	$8	↓	95%	$12	↓	92%
Target Cost	-	-	—		-	—	
Total Capital Investment	$452	$12,101	↑	2,578%	$25,019	↑	5,436%

Quantified DFM with aPriori

- What manufacturing process *should* we use?

- Sand casting

Quantified DFM

- Cost as a measure of DFM
- From Concept to Measurable Advantage
- Cost driven design decisions
- Designing a profitable and efficient manufacturing process
- Ensuring Designs
  - Fit
  - Form
  - Functional
  - *and* Financially viable

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What’s New in aP Design

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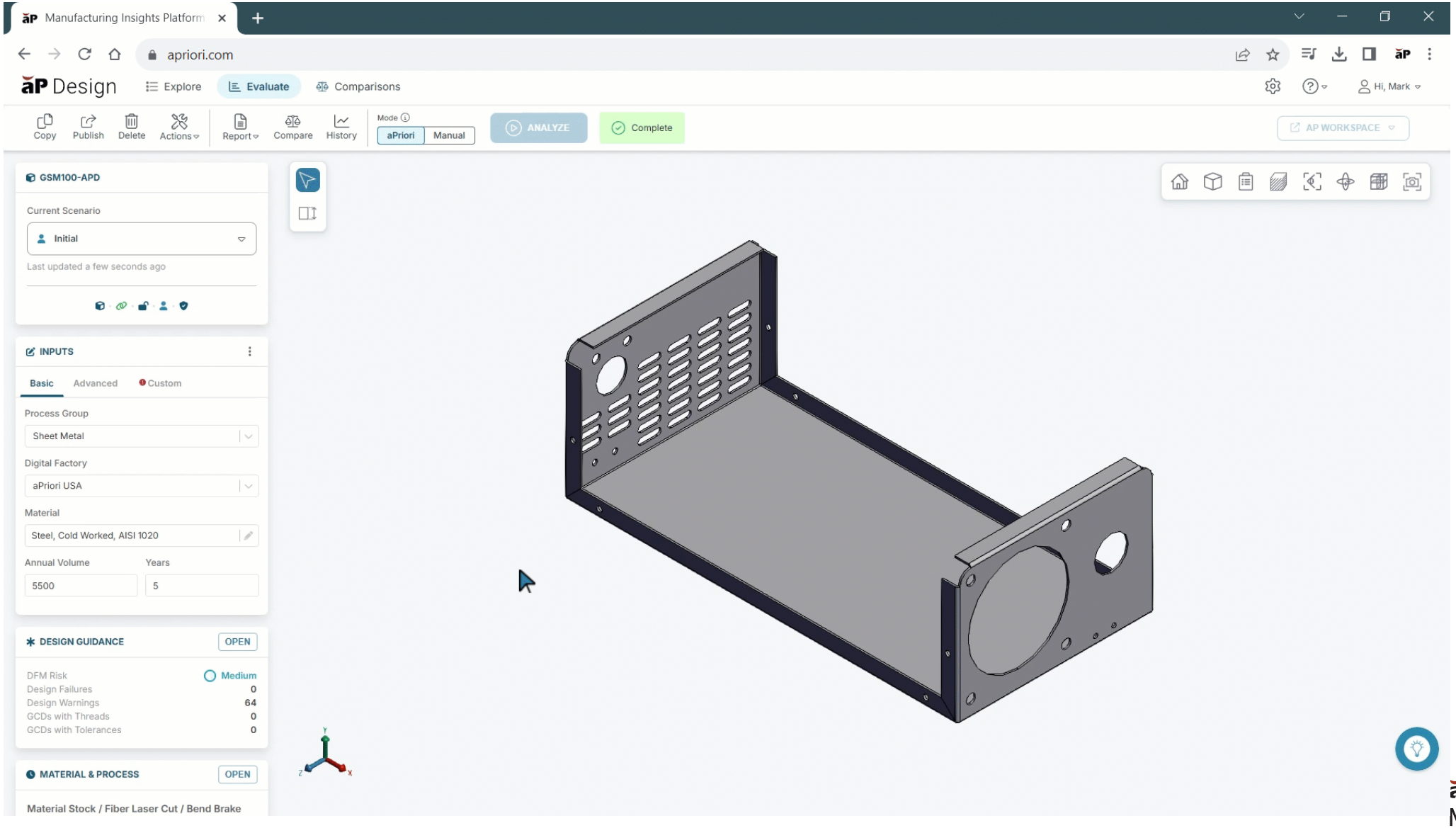
Fewer inputs, faster to get results – Copy Inputs



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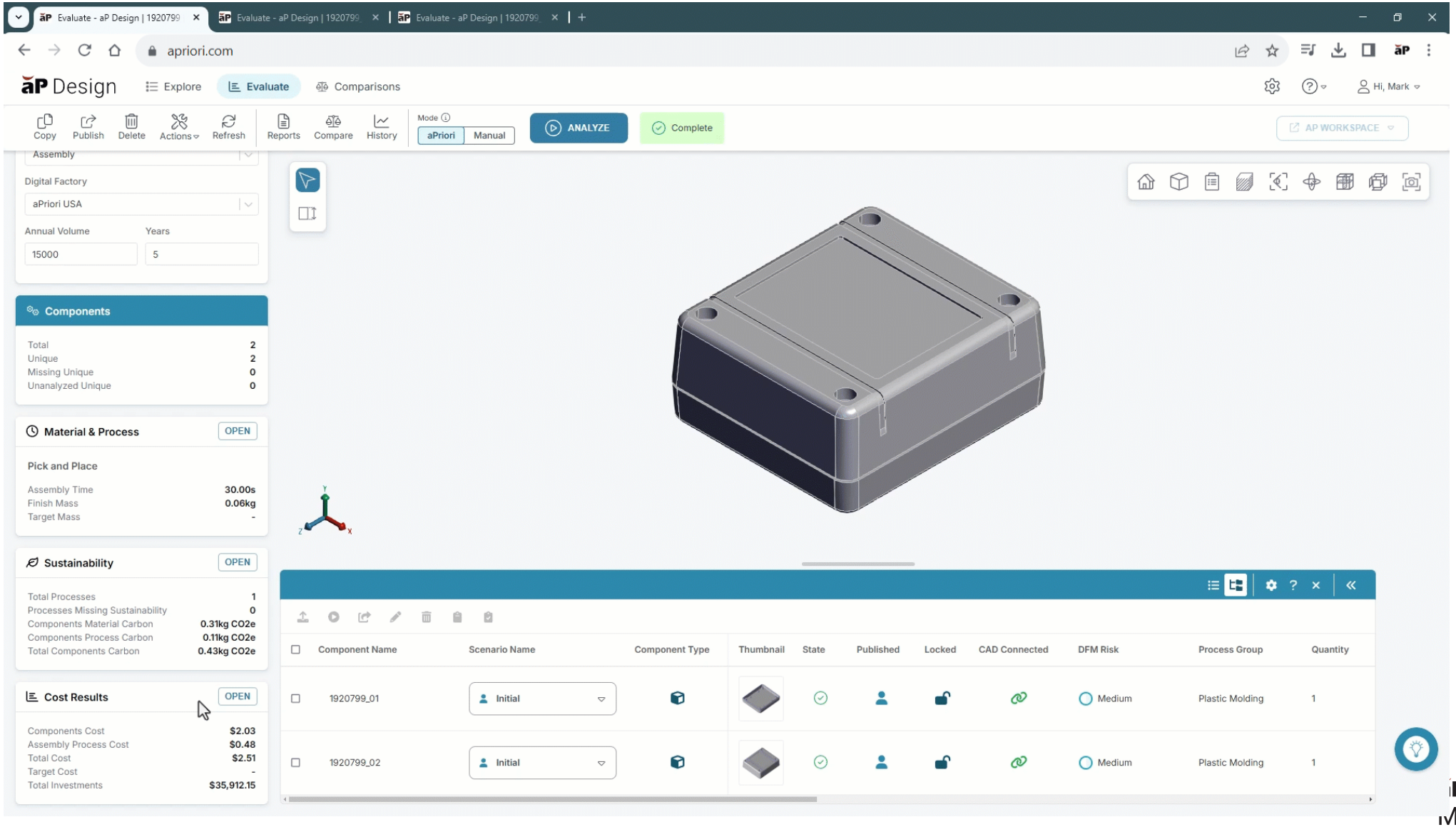
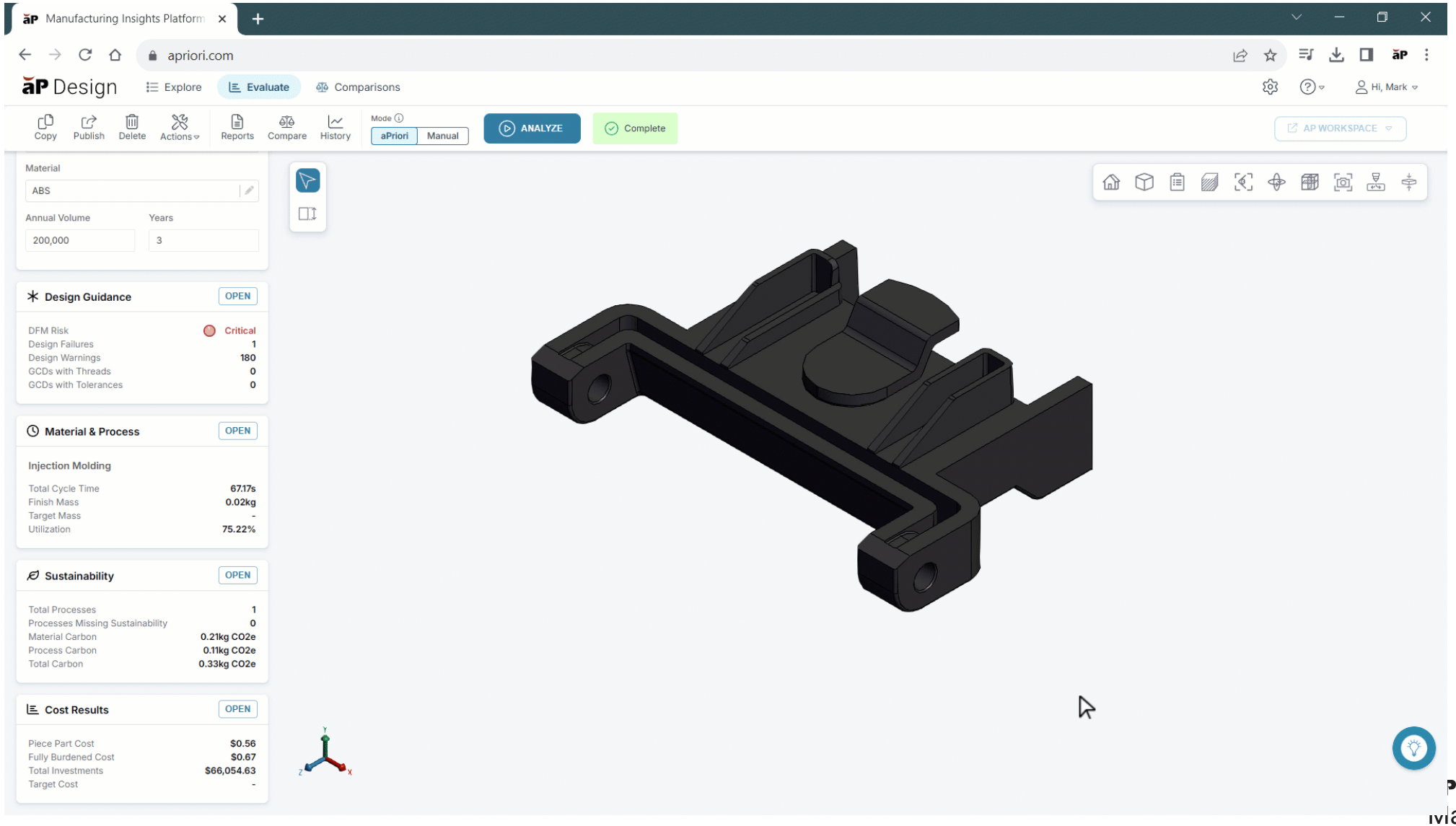
Share Comprehensive Results with Reports



Visualize Component Thickness



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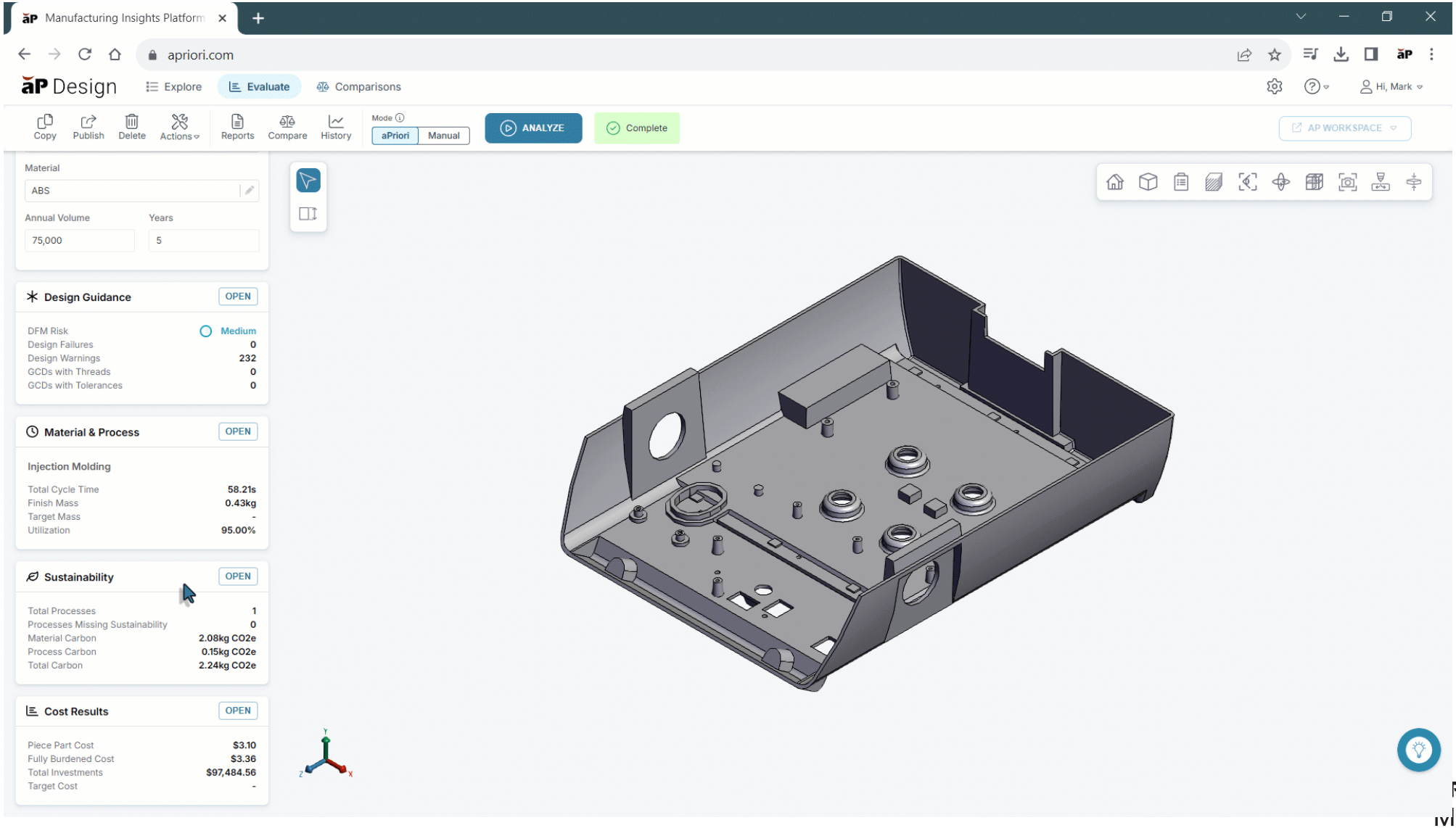
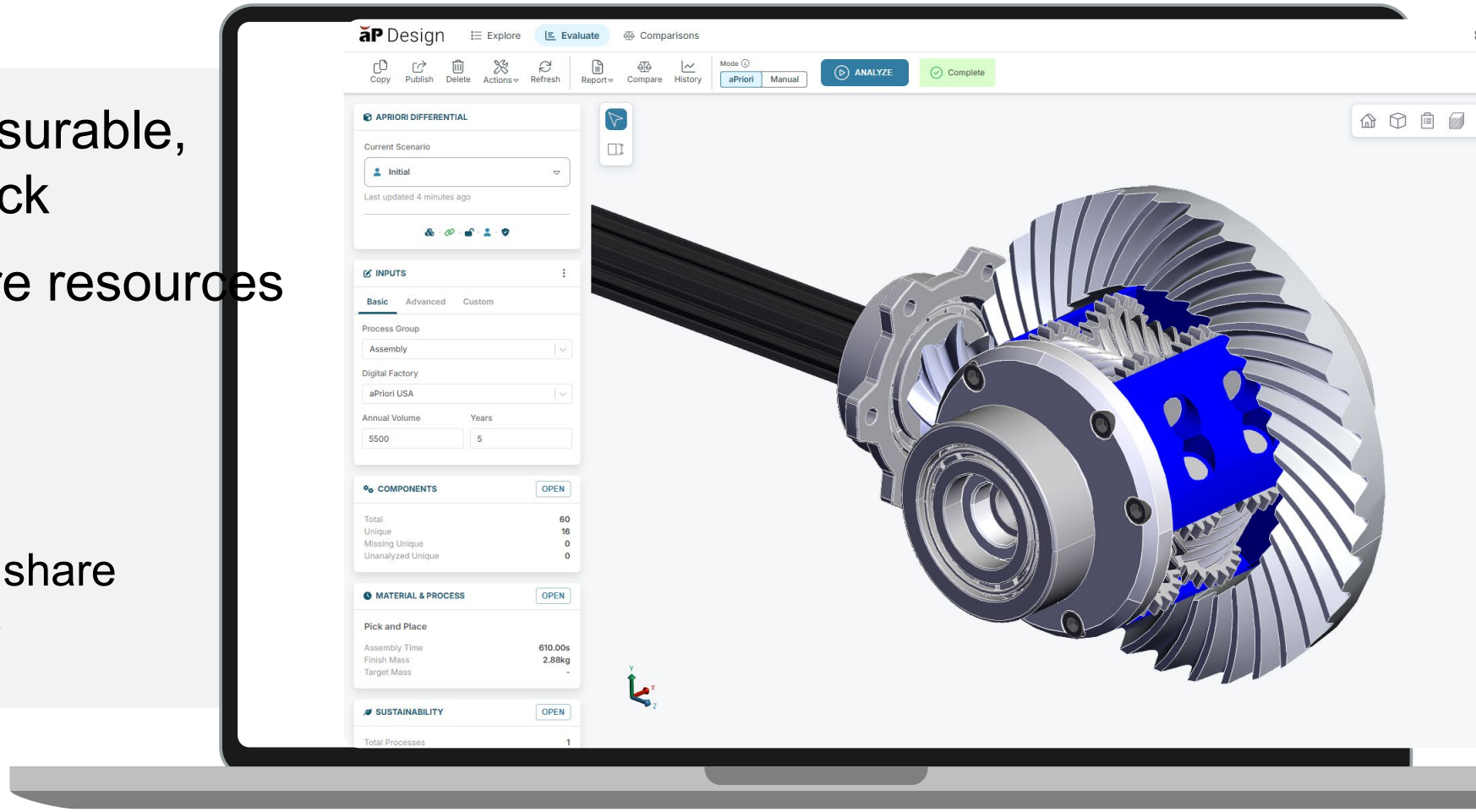
Visualize Flow Appraisals



Quantified DFM with aPriori

- Get the ultimate in measurable, actionable DFM feedback
- Save time, allocate more resources to NPI
- Improved:
  - Supplier Relations
  - Time to Market / Market share
  - Improve Product Quality
  - Improve Profitability



Thank you

Any Questions?

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