

Profit Through Innovation

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13th World Conference on Investment Casting

The logo for MPI Total Automation, featuring the letters 'MPI' in a stylized font with a registered trademark symbol, followed by the words 'Total Automation' in a sans-serif font. The logo is set against a dark red, curved background that resembles a lens or a stylized wave.

Profit Through Innovation

Let's take a look at wax room
problems

Profit Through Innovation

The solution:

Innovative Automation

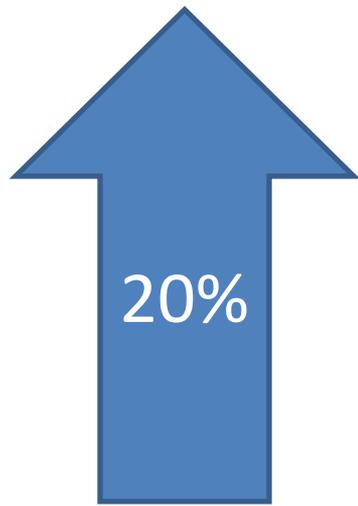
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Why Automate?

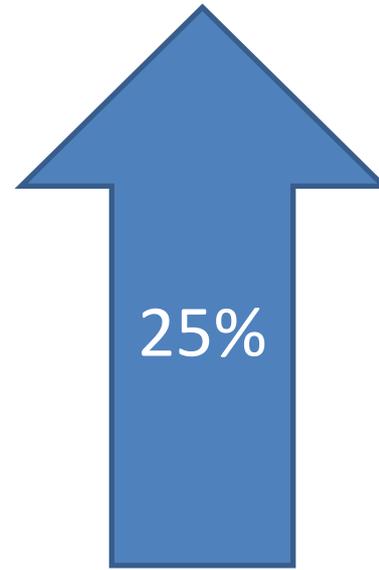
Automation = Repeatability!

- Pattern to Pattern Repeatability
- Assembly to Assembly Repeatability

Why Automate?

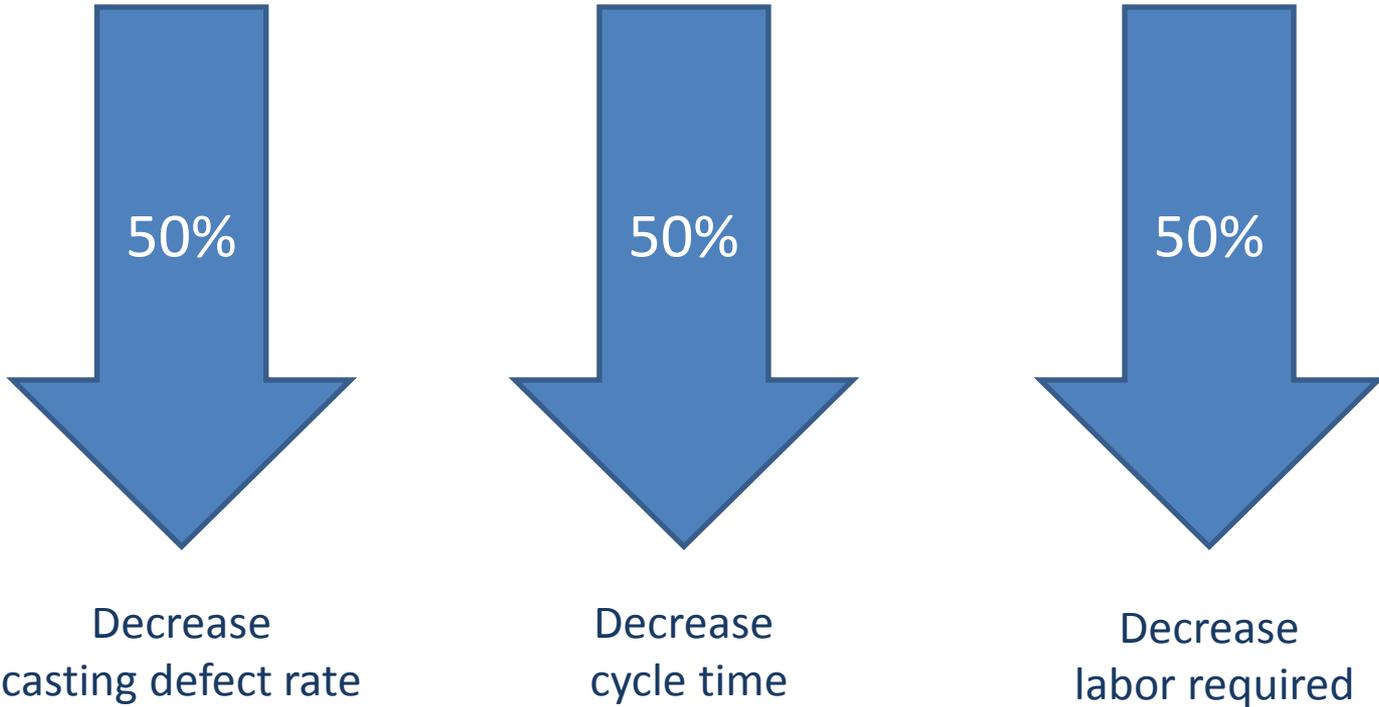


Patterns
per assembly



Casting to
raw materials

Why Automate?



Customer Results

INCREASED YIELDS + DECREASED SCRAP = INCREASED PROFITS



Who can Automate?

- Small Parts long runs
- Complicated High Value Assemblies
- Companies ready to buy more Equipment

Automation Experience:

Successful Automation Projects:

1. Automated Injection of Turbine Blades
2. Automated the Assembly of DS and Single Crystal Turbine Blades
3. Automated Pattern Assembly

Sharing Facts

Foundry Success Stories

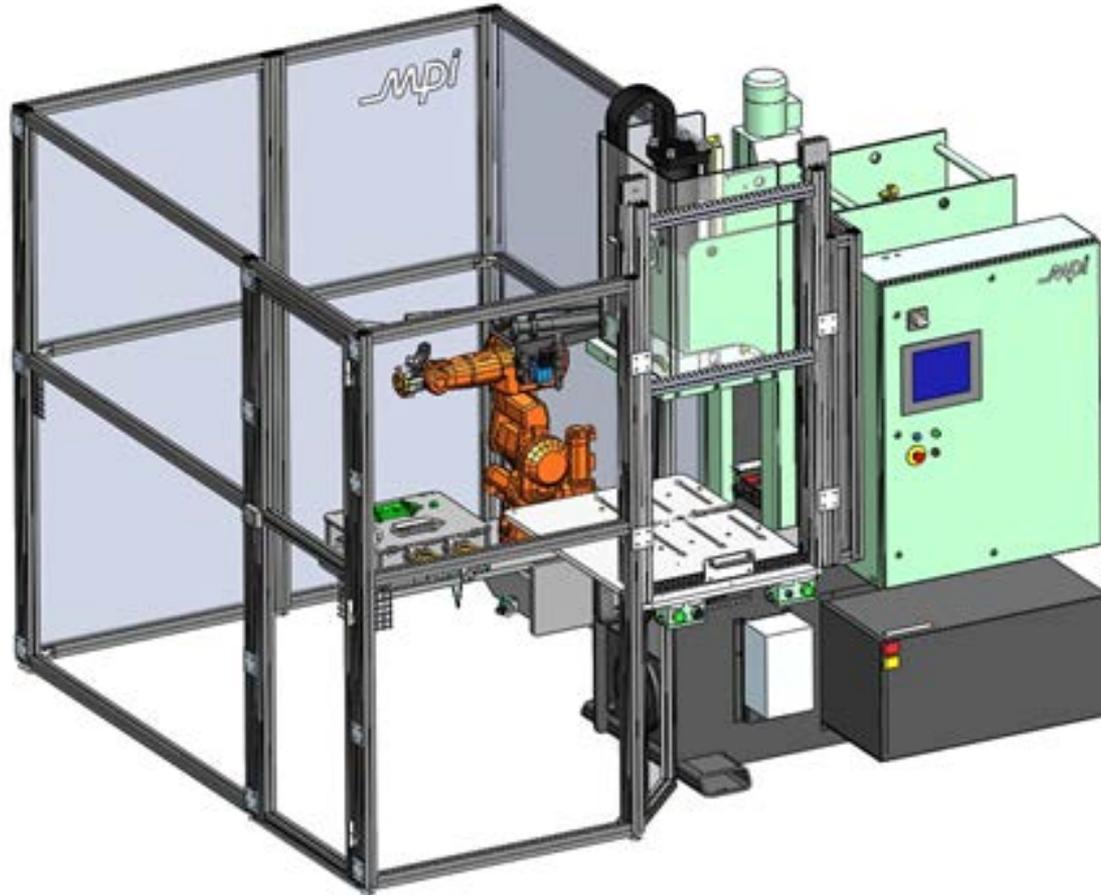
Example #1

Automating a Wax Injection Machine

- **PROBLEM:**
 - manual handling of wax pattern; greatest cause for pattern to pattern variation
 - as much as **50% of the metal scrap**
- **SOLUTION:**
 - automating the injection process
- **RESULT:**
 - much of variation *eliminated*

Example #1

Automating a Wax Injection Machine



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Robotic Injection - Automation



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Customer Results

- Double the number of patterns injected per day
- Pattern yields increased 10 to 20%
 - Reduced pattern distortion
 - Reduced pattern defects
 - Uniform pattern trimming, minimal variation
- Higher casting yields

Customer Results

INCREASED YIELDS + DECREASED SCRAP = INCREASED PROFITS



Example #2: Automated Assembly of DS and Single Crystal Turbine Blades



Example #2:

Automated Assembly of DS and Single Crystal Turbine Blades

Foundries' Goals:

Reduce costs and improve profits.

Solution:

Automate the wax assembly

Result:

Eliminate the variability that comes from manual assembly.

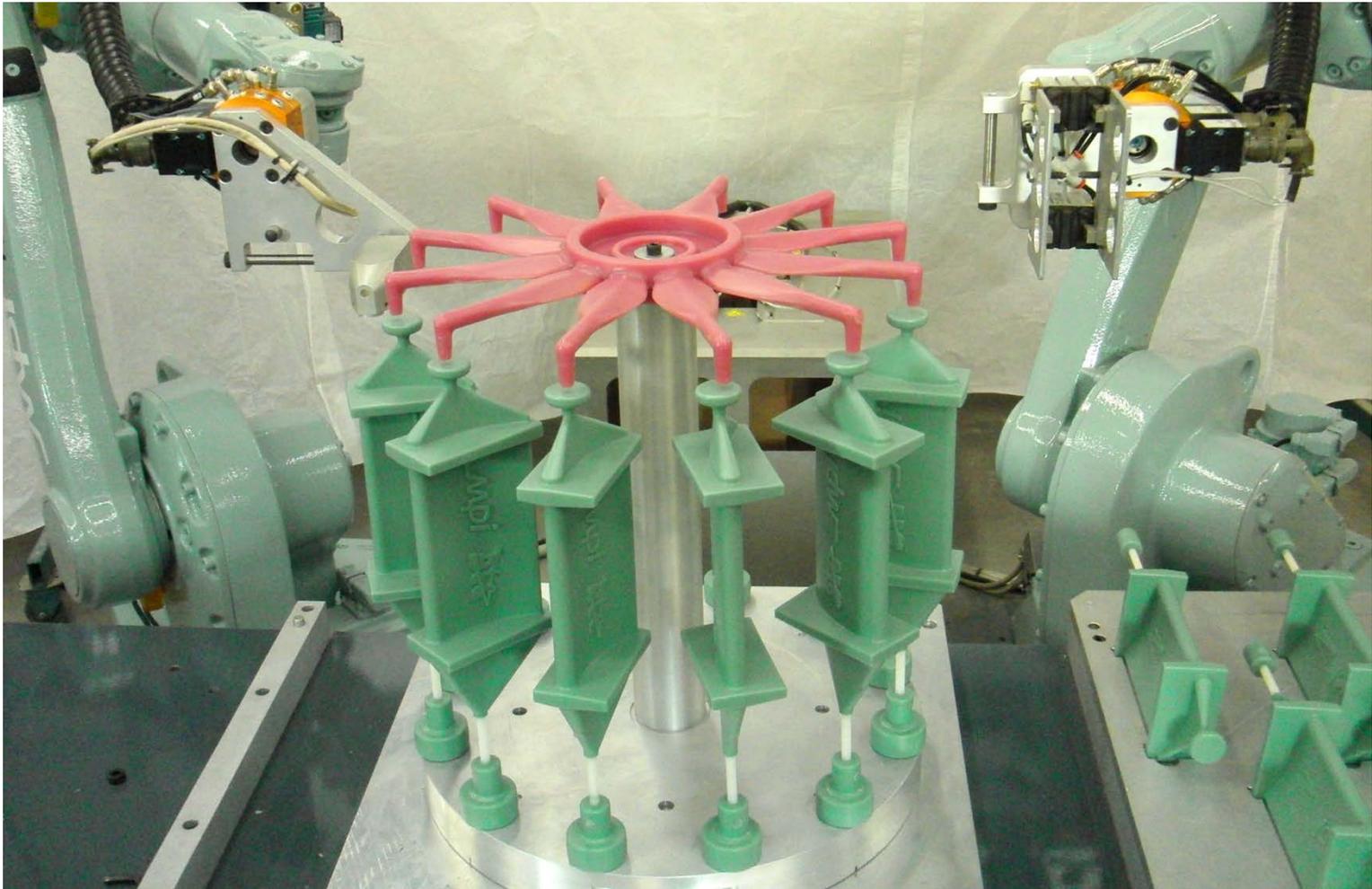
Example #2:

Automated Assembly of DS and Single Crystal Turbine Blades

Steps:

- Elimination of variation caused by use of extrusions.
- Elimination of variation caused by manual assembly of sub-assembly components.
- Grain selectors are assembled in the injection process.

Robotic Assembly - Automation



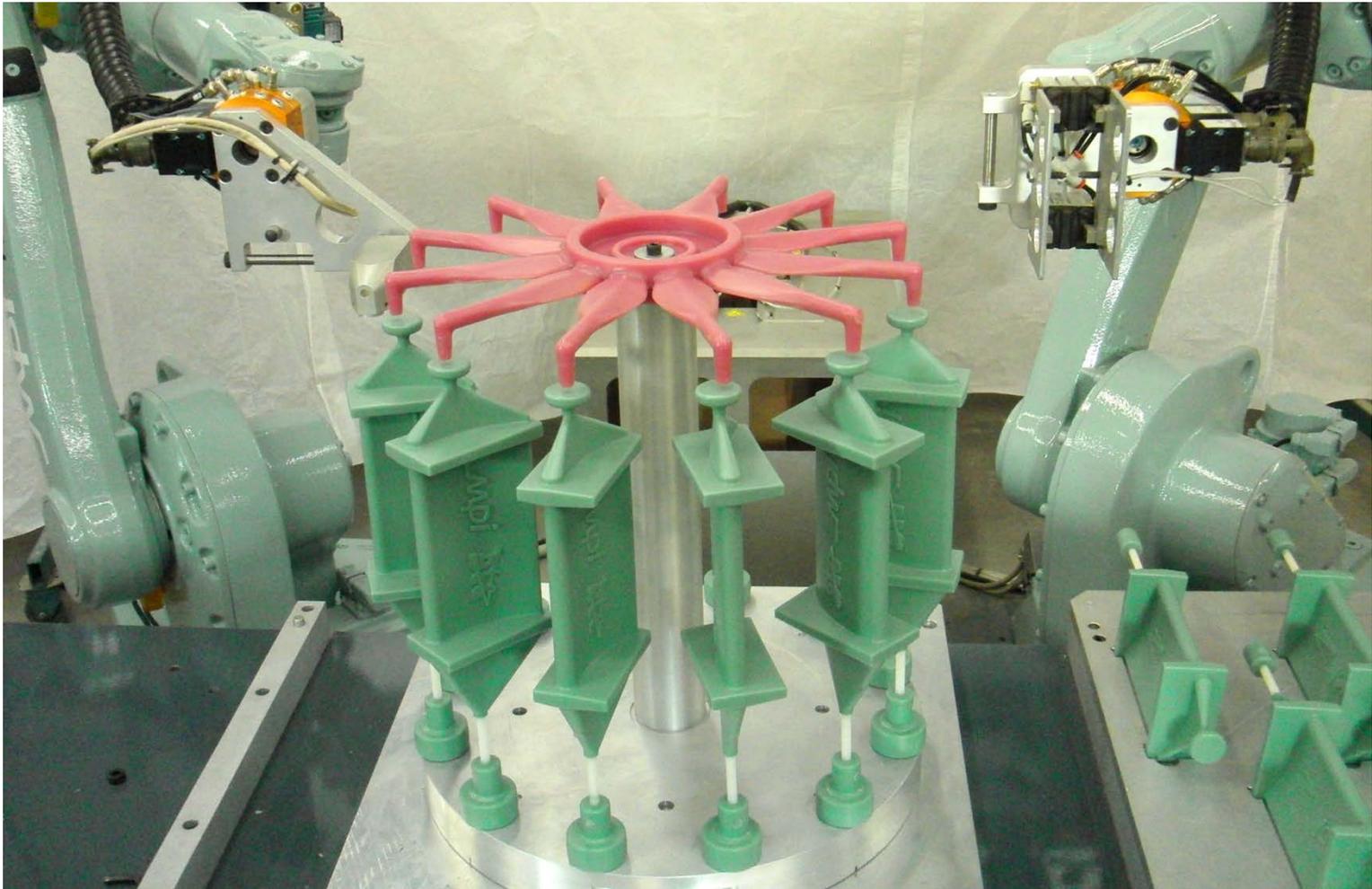
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Robotic Assembly - Automation



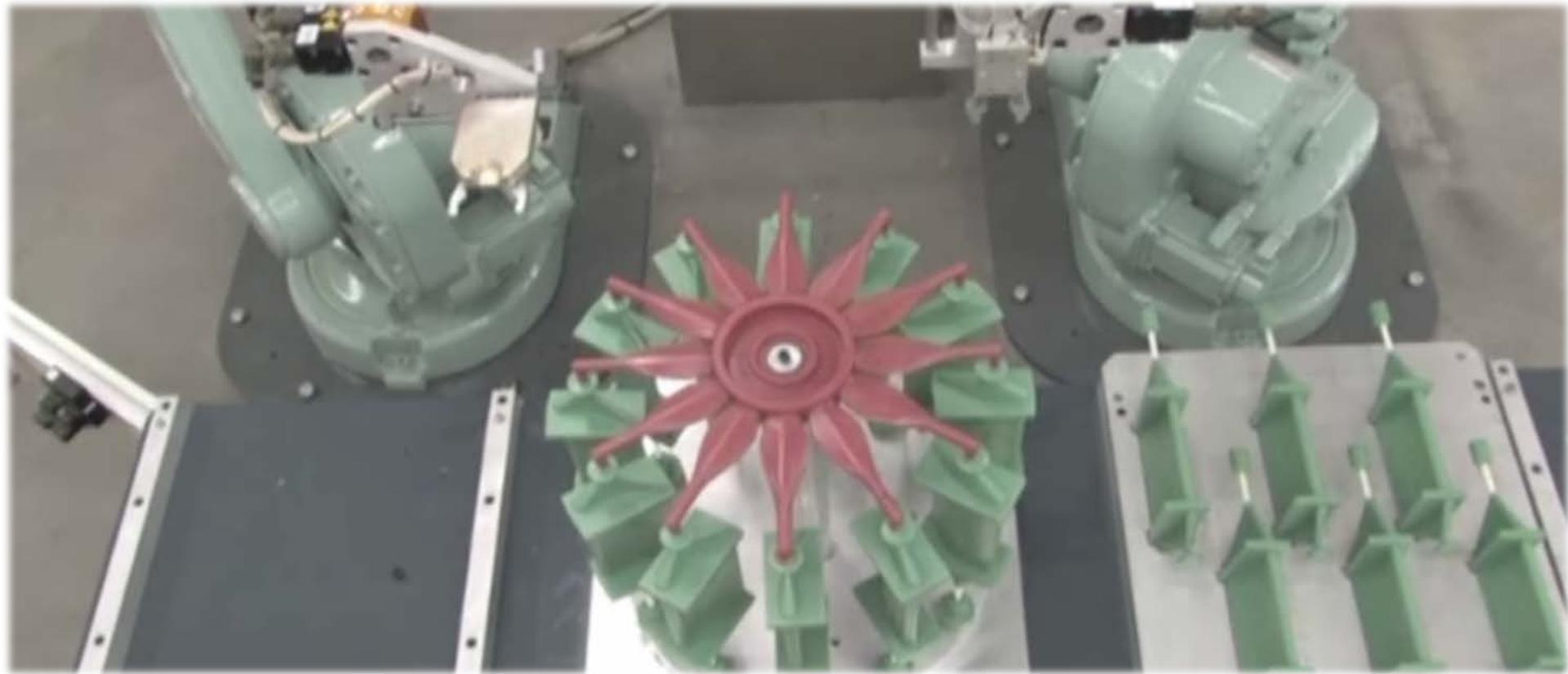
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Robotic Assembly - Automation



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Robotic Assembly - Automation



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Example #2: Automated Assembly of DS and Single Crystal Turbine Blades

Results:

- Extremely uniform and repeatable assemblies
 - Increased strength of the wax assembly
 - Repeatability in Process
- A more uniform shell coverage due to accurate spacing
- Improved thermal gradient of the final shell
- Improved metallurgical properties
- Higher casting yields
- Decreased cycle times
- Reduced labor

Customer Results

INCREASED YIELDS + DECREASED SCRAP = INCREASED PROFITS



Example #3 - Avalon Precision Casting

Outsourced Automated Pattern and Assembly

a v a l o n
Precision Casting Company



.....Where the future is taking shape.

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Example #3 - Avalon Precision Casting

Outsourced Automated Pattern and Assembly

Avalon is a job shop foundry specializing in commercial and aerospace hardware components.

I want to thank Avalon for allowing us share their name, and specifics.

Example #3 - Avalon Precision Casting

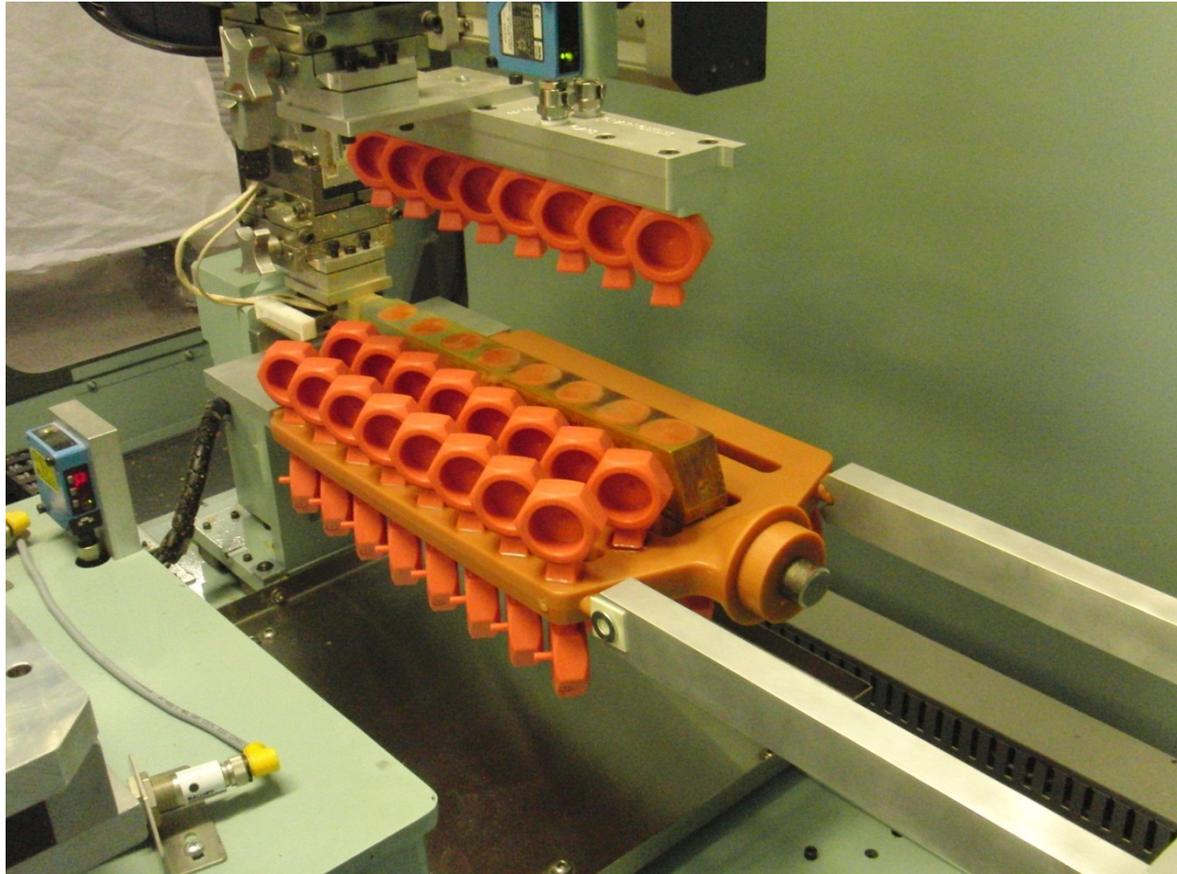
Outsourced Automated Pattern and Assembly



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Example #3 - Avalon Precision Casting

Outsourced Automated Pattern and Assembly

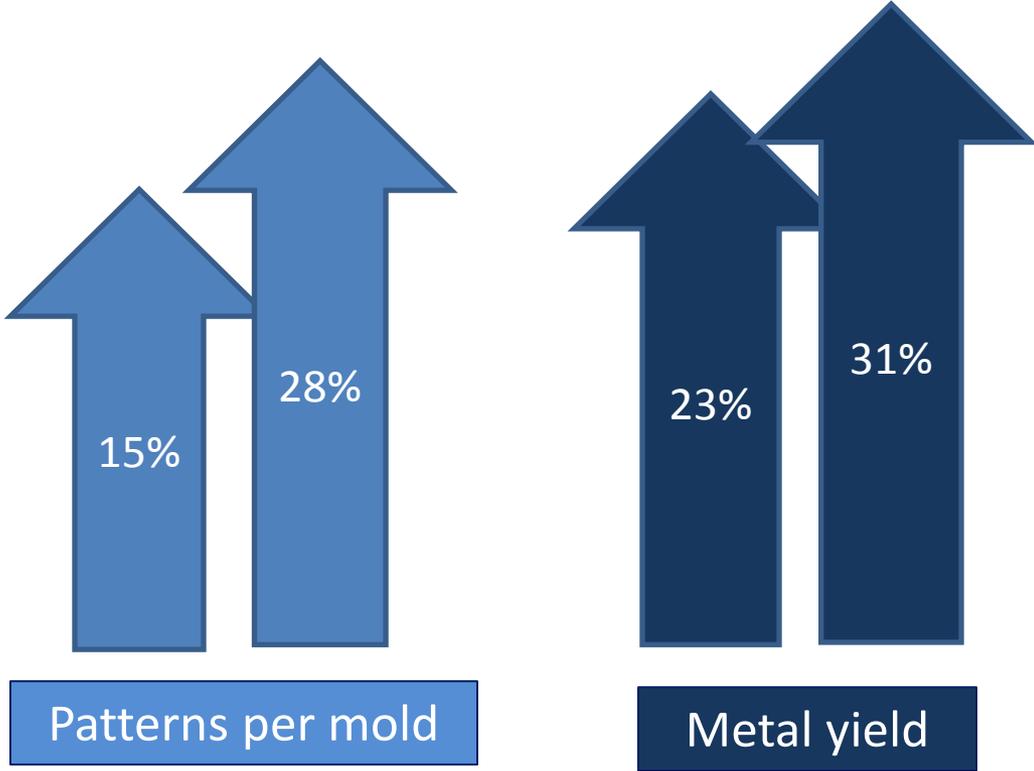


Outsourced Automated Pattern and Assembly



Outsourced Automated Pattern and Assembly

Results:

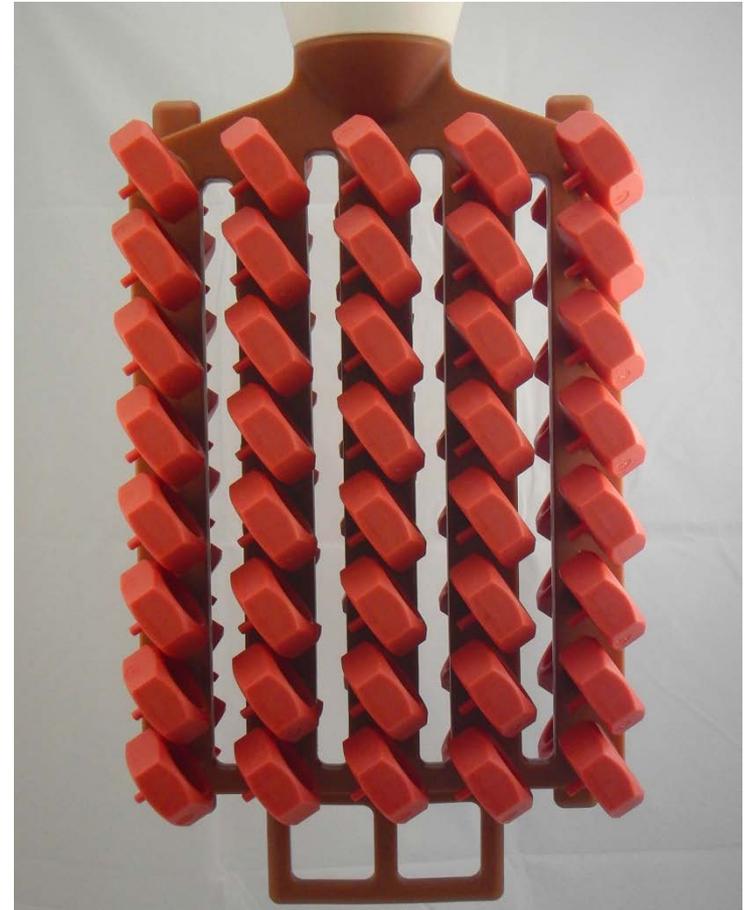


Outsourced Automated Pattern and Assembly

Unexpected benefit:

*“What **was** the **one finger rule**
now is the **one finger nail rule.**”*

Mel Kman



Outsourced Automated Pattern and Assembly 1st Coat



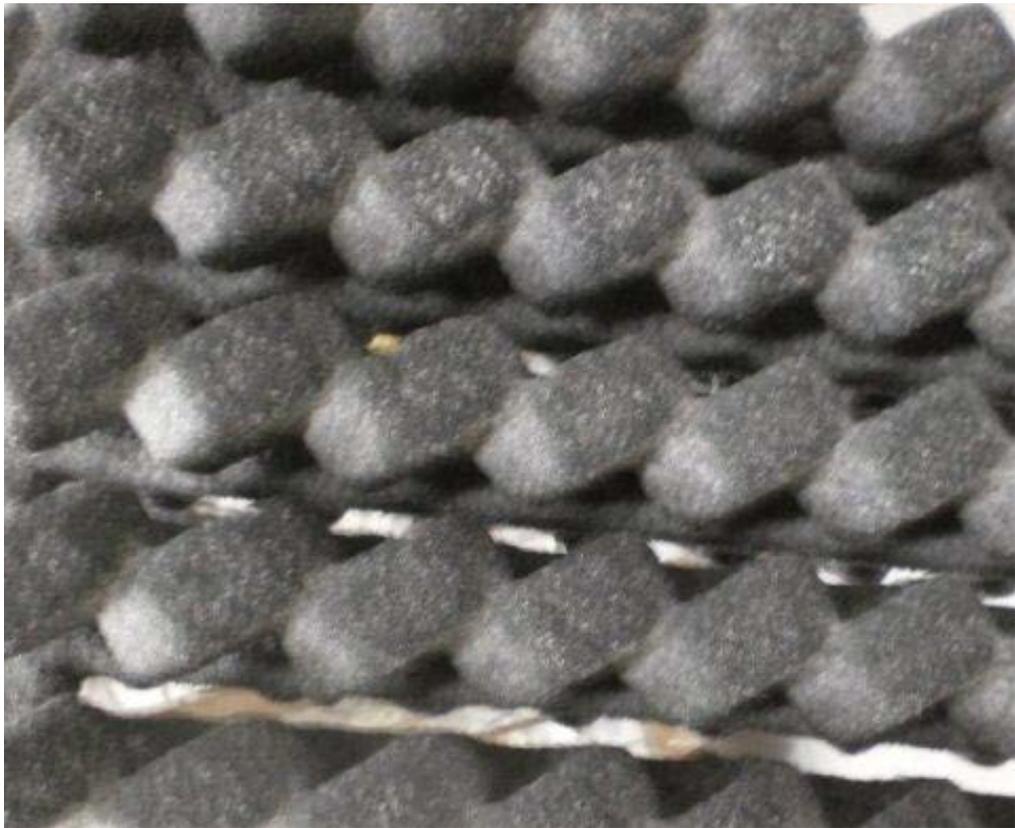
Outsourced Automated Pattern and Assembly

2nd Coat



Outsourced Automated Pattern and Assembly

3rd Coat



Outsourced Automated Pattern and Assembly

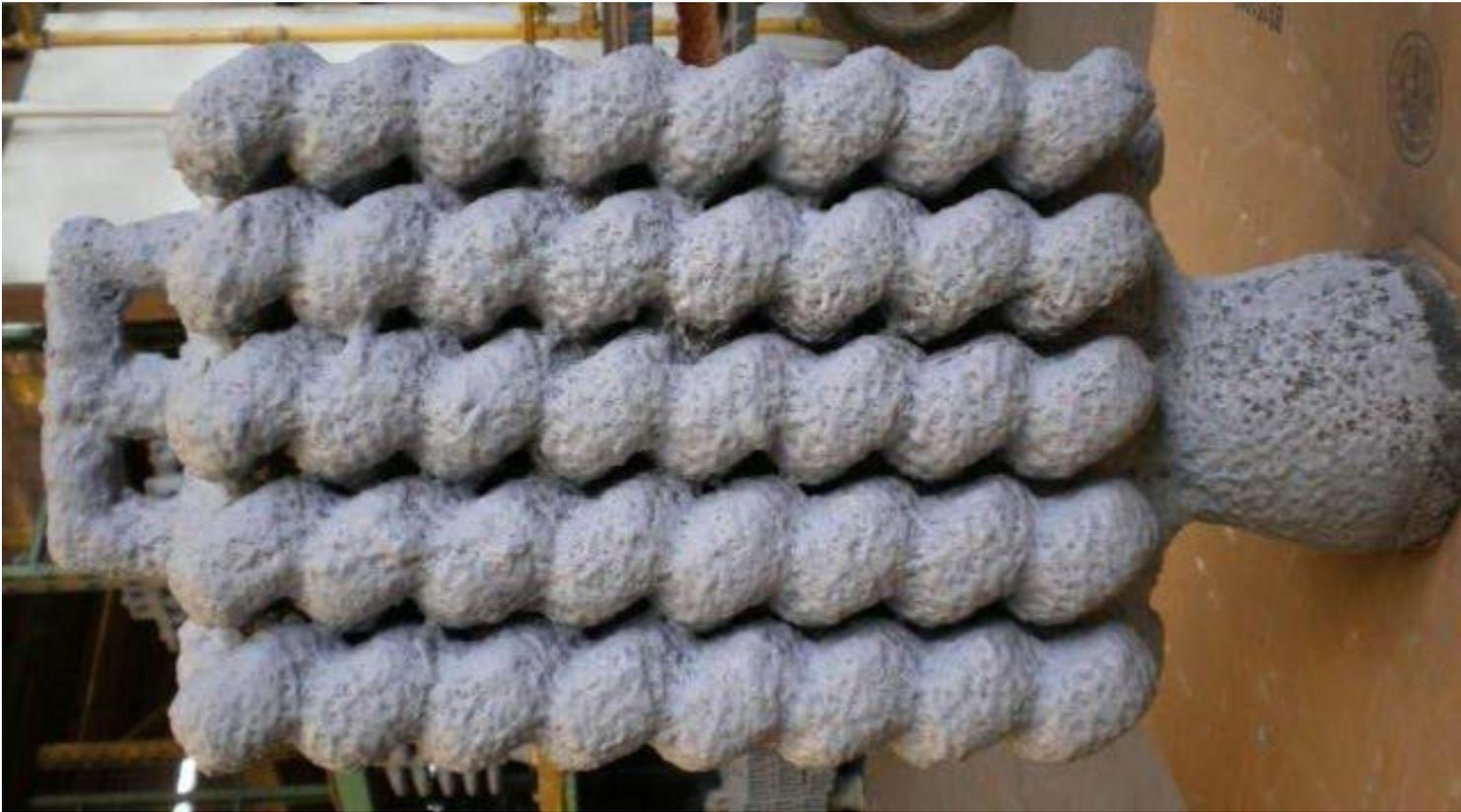
4th Coat



Outsourced Automated Pattern and Assembly 5th Coat



Outsourced Automated Pattern and Assembly 5th Coat with Seal Coat



Customer Results

INCREASED YIELDS + DECREASED SCRAP = INCREASED PROFITS



How can you approach Automation in your wax room?

- Be selective
- Foundry Friendly Assembly
- Partner with a proven innovator in Wax Room Automation

Conclusion

Automation = Repeatability!

- Pattern to Pattern Repeatability
- Assembly to Assembly Repeatability

Results:

- Decreased Casting Defects
 - Higher Casting Yields
- Reduced Operating Expense
 - Improved Safety
- Increased Customer Satisfaction

Automating Your Wax Room

Significantly Greater Profits

MPI Total Automation

Questions?