



# **Low Volume Automation, Challenges and Advantages**

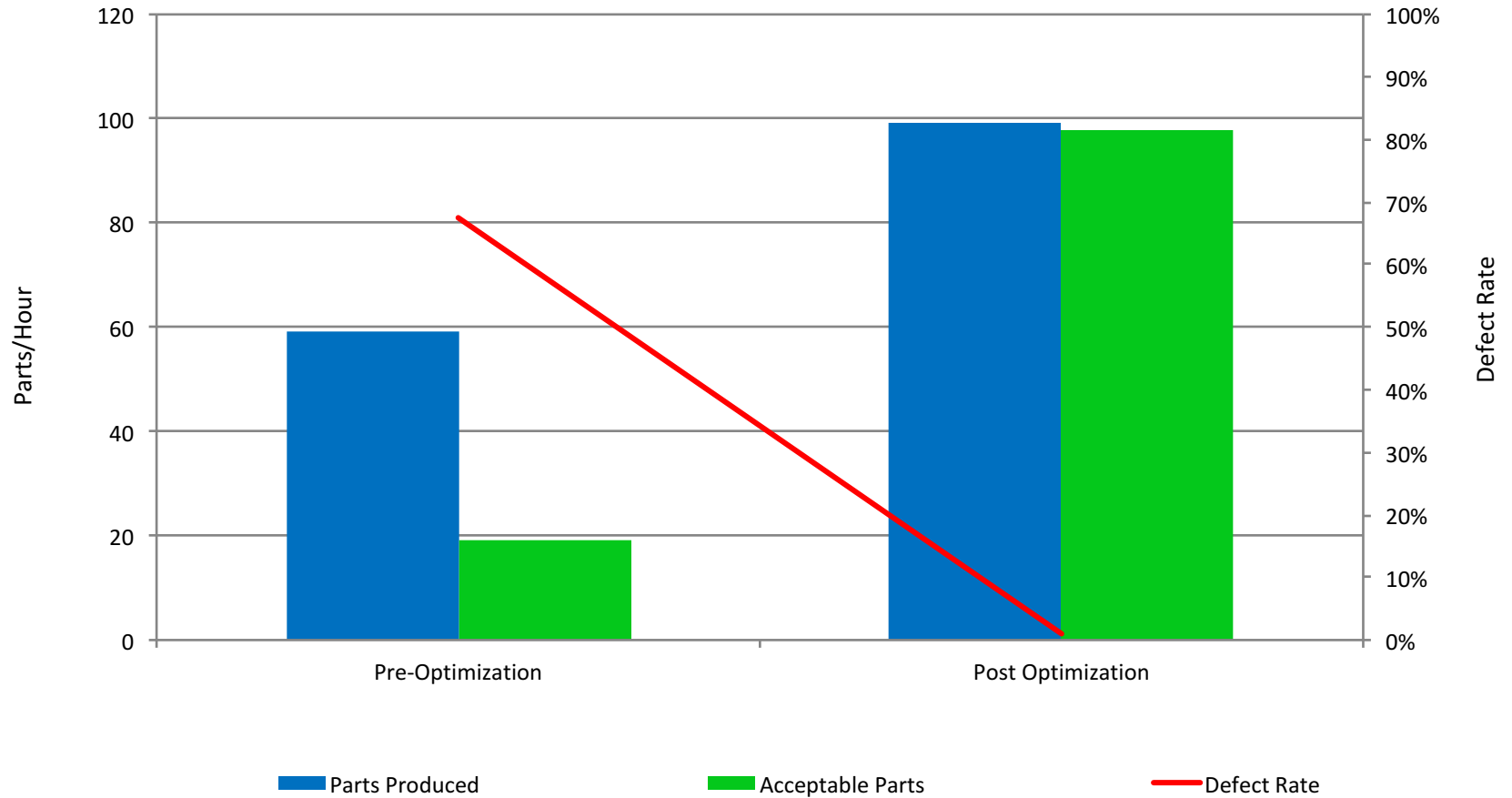
**Presented during the 63<sup>nd</sup> ICI Technical Conference October, 2016**

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# Introduction

- 3<sup>rd</sup> paper in a series focusing on the wax room
- This Presentation focuses on Automated Assembly

# Flash Back



Part Injection Optimization (Data taken from Paper #2)

# Automated Assembly

## The Customers Challenge

- No major die modifications were allowed
- No major runner modifications were acceptable
- Short set up time on new jobs
- Seamless job changeover is a must
- No set up for repeat work

# Production Challenges

- There is no such thing as a standard runner in a foundry.
  - Even small changes provide big challenges
- Runners are second class patterns
- Patterns are often not similar or have no commonality
- Pattern gates and runners are mismatched
- Pattern Dies are not built to produce defect free parts
- Non standard die design
- injection runners and gating runners tend to be vary from tool to tool
- Rather, they are ideas an engineer tried one time before coming up with a new unique solution
- Injection feeds are secondary to pattern shape having dramatic impacts on fill and quality.

# Challenge Accepted

Mismatched families of parts to be assembled



# The Plan of Attack To Assemble

- Develop a new generation of tooling
  - Runner holders
  - Grippers
  - Hot Knives
- Collect Data on manual assemblies
- Create automated assemblies
- Conduct casting trials

# Automated Vs. Manual Assembly

- Original Manual assembly 7 parts / row
- Automated assembly 8 and 9 parts / row
- Total increase of 12 parts / pour

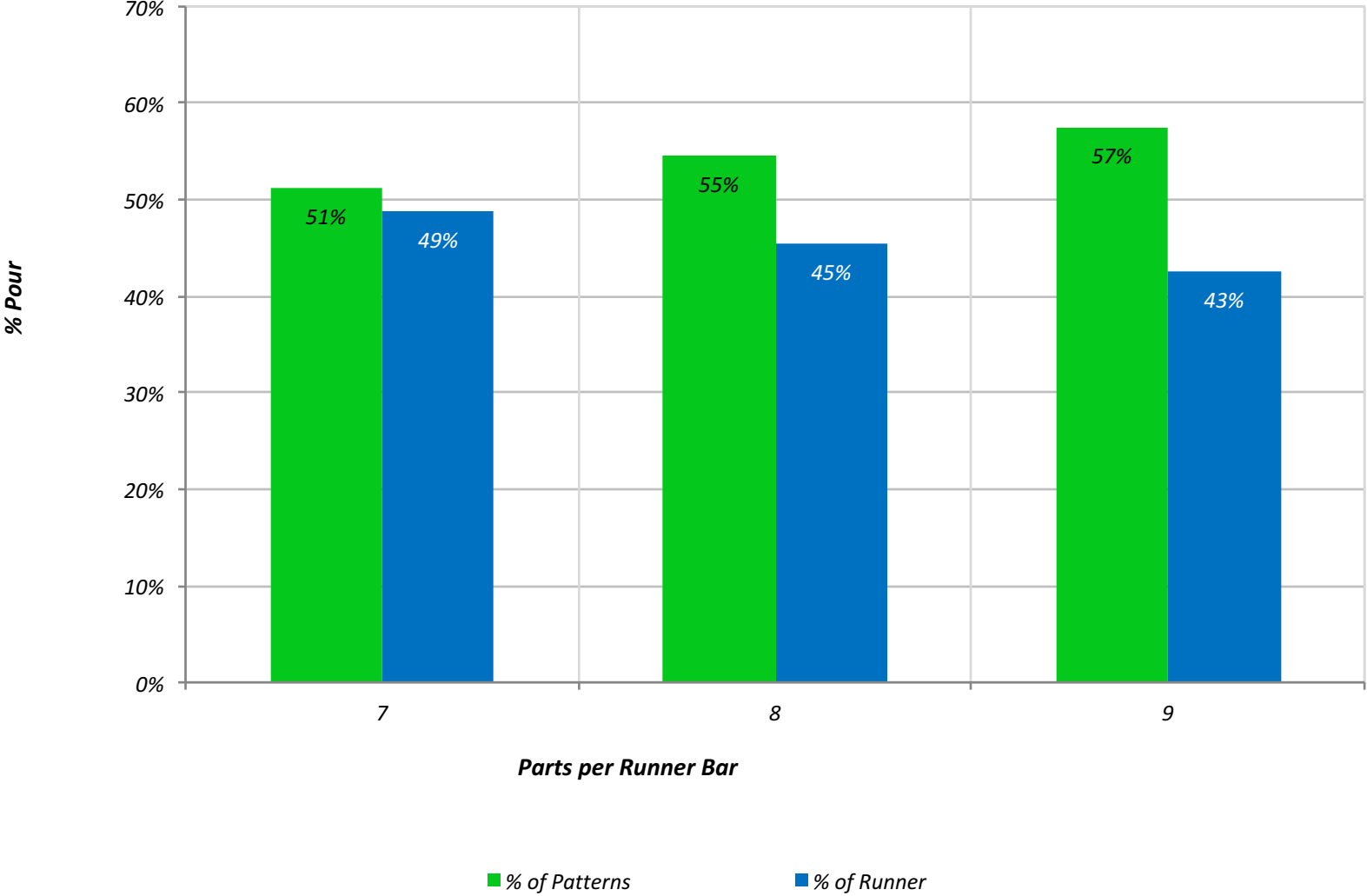
**22% Increase**

- Assembly time decrease from 14min to 7min

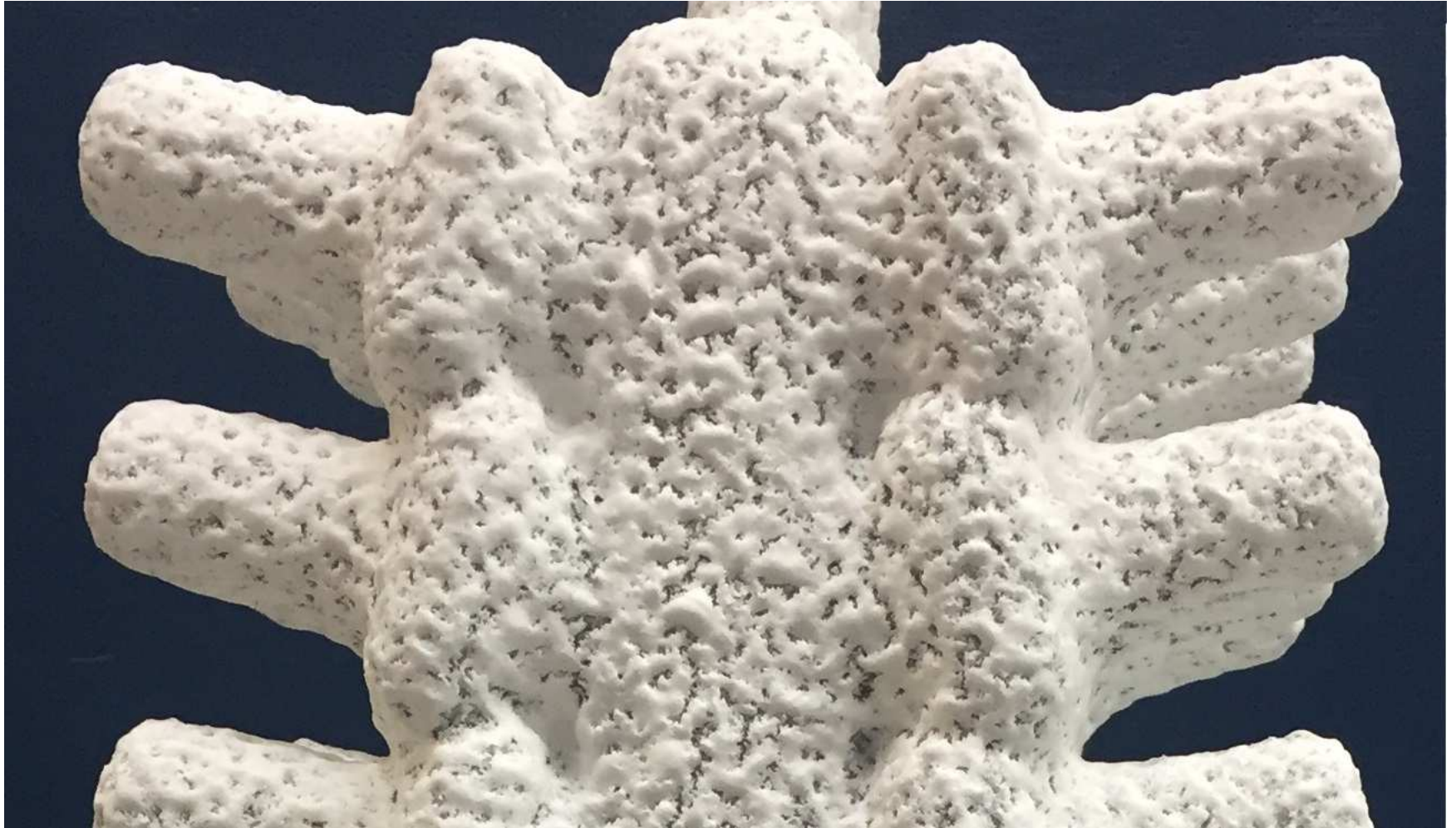
**50% Time Savings**

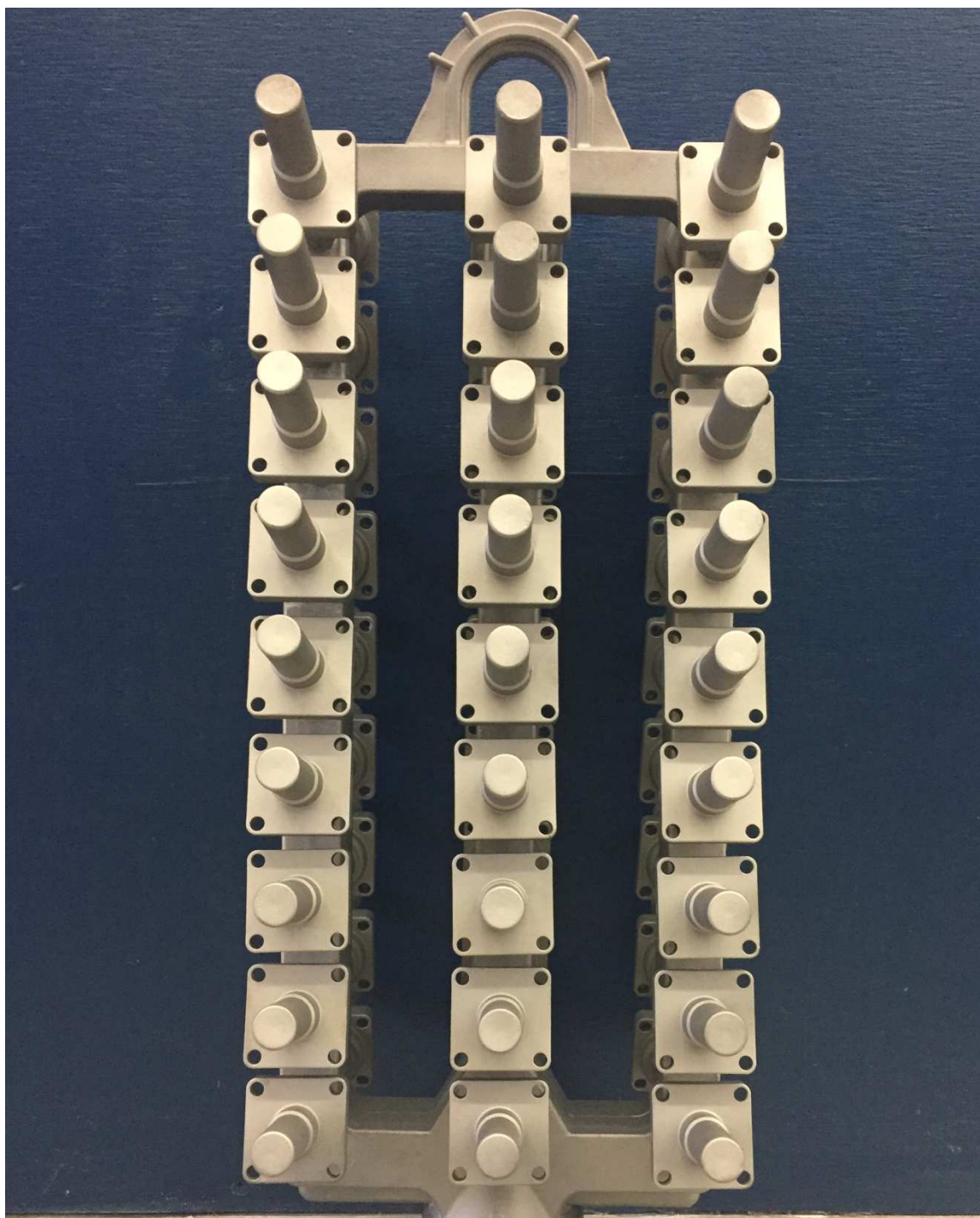


# Pour Ratio Gains



# Reduced Shell Material





# Lessons Learned

- Reduced shell material- the more parts you can put on an assembly the fewer assemblies you will need to dip
- Reduced part spacing and bridging.
- Uniform part coverage due to presentation of the part to the slurry
- Increased accuracy of solidification models
- More accurate part cut resulting in reduced gate grind
- Reduced cut off scrap
- Reduced scrap due to inclusions

# Take Away

- Automation reduces variability. Reduce in the Beginning reduce throughout
- These process gains allow your engineers to focus on corrective actions that focus on problems at the root of their origin

**Solve the problem one time!**

# Questions

