



riven

Engineering
Brief



— MIM —

**Resolve MIM NPI
Problems with 3D
Scanning and Cloud
Software**

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COMPANY INTRODUCTION

Riven makes first article inspection and NPI communication easy. Riven helps you create accurate 3D data at the push of a button. Our cloud platform makes it simple to annotate, measure and communicate with distributed teams so you can save iterations, trips and cost.

**Understand
manufacturing problems
quickly and solve them
efficiently - even with
distributed teams.**

ENGINEERING BRIEF: MIM



This is one of a series of engineering briefs highlighting the specific challenges faced in the application of particular production techniques. Should you use a different production method please inquire about our other briefs.



MANY STAGES MANY CHALLENGES

Ensuring MIM parts meet specs often requires multiple NPI iterations covering several process stages.

Part defects can occur at the green, sintered, or post-processed stages. The later the issue is identified, the greater the delays, uncertainty and waste. Further, if poor

quality parts get shipped, business risk multiplies. The current MIM NPI workflow can be slow, imprecise and open-ended which reduces efficiency and customer responsiveness and increases financial risk.

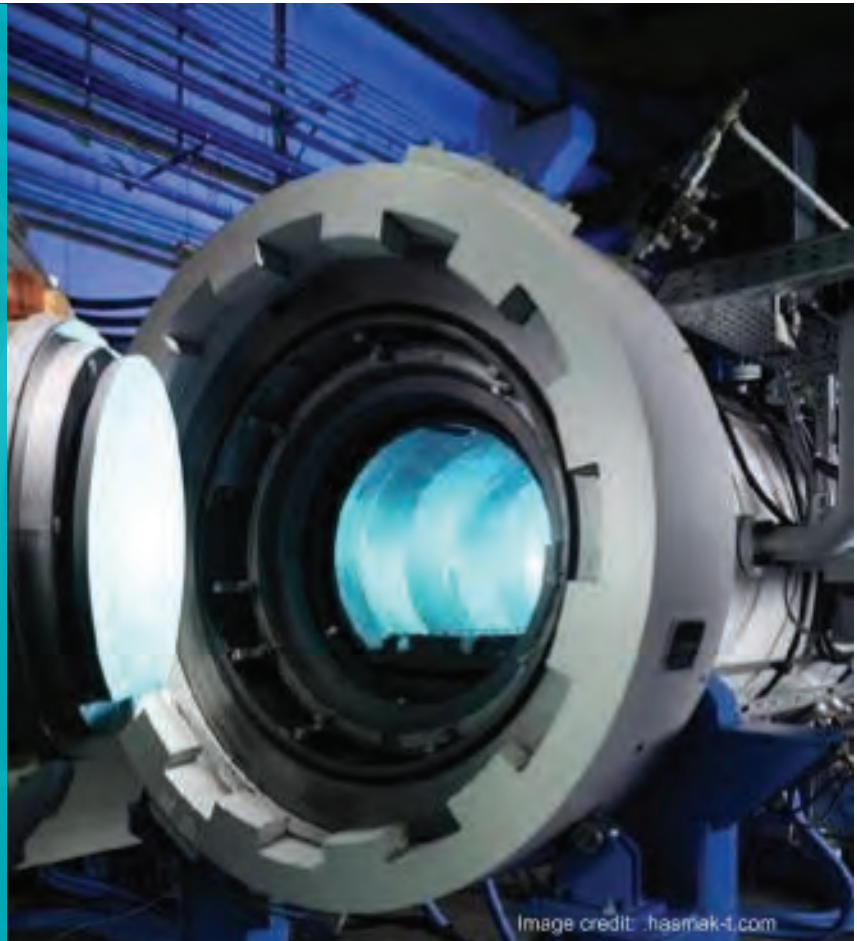


Accurately measuring complex geometry including warp, fillet radii and general surface profile is extremely difficult in many MIM parts using conventional tools such as CMMs.



DISTRIBUTED PRODUCT INTEGRITY

Ensuring MIM parts meet specs often requires multiple NPI iterations covering several process stages.



Metal Injection Molding (MIM)



GREEN PART STAGE

Molding defects may pass un-noticed

SINTERED PART STAGE

Parts often exhibit warp

POST-PROCESSED STAGE

Coining, grinding, machining, heat-treat and coating all may introduce defects

WORKFLOW CHALLENGES

CRACKING

Assessment of green parts is challenging because parts are small, fragile, hard to fixture and difficult to adequately measure. Perfecting molding parameters to eliminate sink, short shot and warping may require sintering iterations with days per cycle.

Post-sintering operations to de-warp parts typically require several iterations and adjustments before parts come out perfect.



WARPAGE

SHORT SHOT

CURRENT STATE

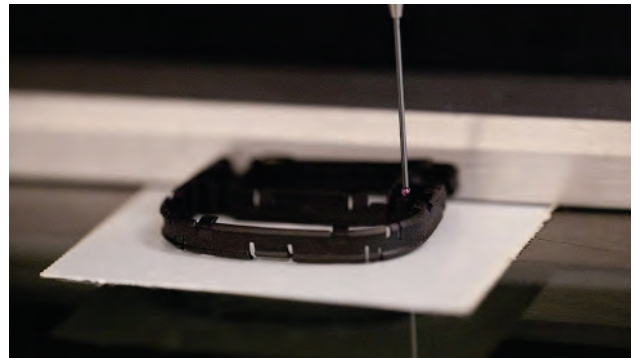
SLOW, IMPRECISE AND OPEN-ENDED

Inspecting final MIM parts is challenging with manual tools and with coordinate measuring machines because parts are small, complex, difficult to fixture and difficult to probe.



JIGS & FIXTURES

Iterations of tooling, jigs, fixtures and process can delay start of volume production by weeks and add thousands to NPI costs.



COMPLEX MEASUREMENTS

Checking complex part geometry with a CMM requires hours to days of setup and still only provides sparse point data

Do you need help solving mid process NPI problems?

A NEW DIGITAL APPROACH

Recent advancements in 3D scanning and cloud-based data analysis dramatically simplify defect detection, measurement and remediation.



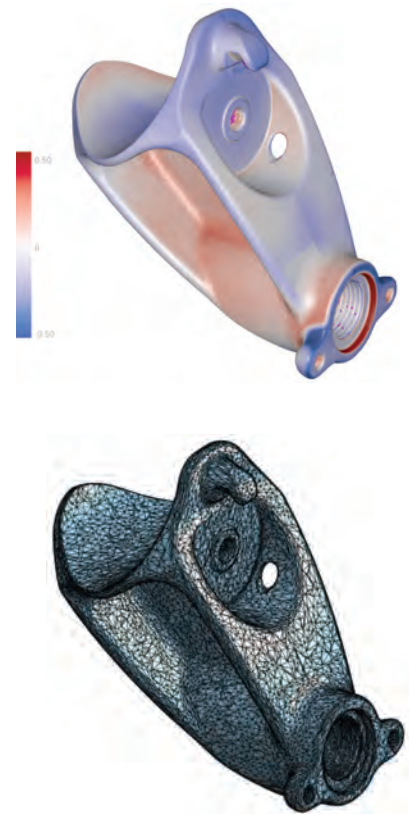
◀ CLOUD CONNECTED WORKBENCH SETUP

These solutions enable NPI teams to see exactly how the whole part matches specs in minutes.

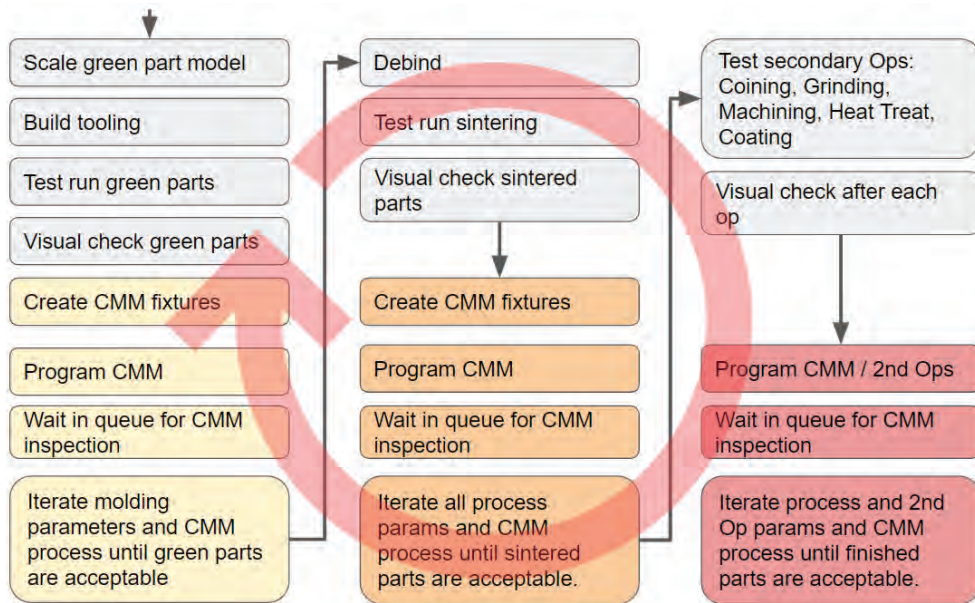
To check green, sintered or post processed parts, simply place the part on the turntable and hit the button. Our browser software can automatically compare the manufactured part to the original CAD or to a “golden part”. A heatmap shows devia-

tions at-a-glance. If parts are warped engineers will see exactly where and by how much.

They can also export the as-built shape in CAD format. Using the real geometry in CAD avoids guesswork so corrective fixtures and tooling turn out right the first time.

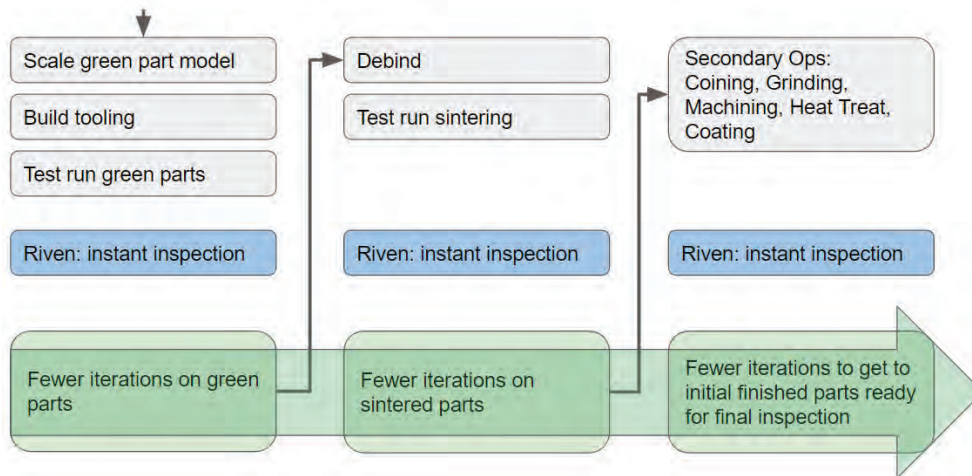


A NEW NPI WORKFLOW



CURRENT MIM NPI

Many iterations with incomplete information often cause delays.



MIM NPI WITH RIVEN

At-a-glance complete, rapid feedback saves steps and reduces the iterations.

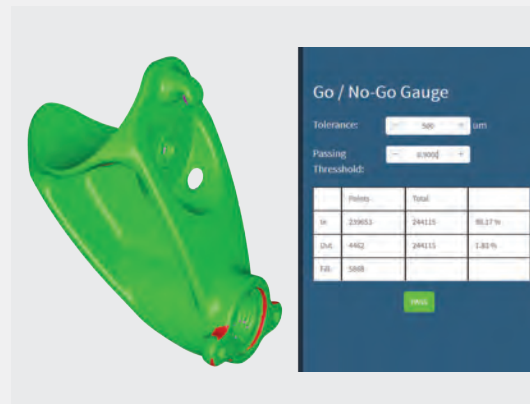
Would you like to simplify your workflow?

THE RIVEN VALUE



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Many companies producing sintered metal parts have found that they can save several iterations in the process of getting new parts to production. This can equate to saving thousands of dollars of engineering time and accelerating delivery by days or weeks for every part.



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