

**PRESS RELEASE**  
**FOR IMMEDIATE RELEASE**

**CONTACT:**

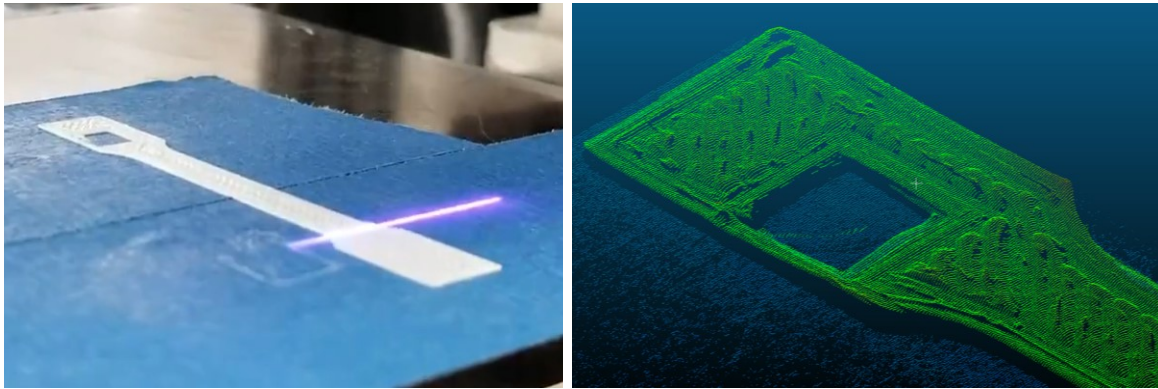
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**nScript In-Process Inspection Produces Perfect 3D Printed Parts, Every Time**



*Figure 1: nScript Inspection Process*

nScript, a Florida-based manufacturer of high-precision Microdispensing and Direct Digital Manufacturing equipment and solutions, has developed an in-process inspection system for its 3Dn printers that obtains data that can only be seen during the printing process. The inspection system uses a high-resolution laser profile scanner to inspect up to 640,000 data points per second. The data points are collected for each layer during the printing process and are then sorted and classified into printed and missing volumes. All the geometric data is automatically outputted to an inspection report containing the part's information, including printed volume, missing volume, location of missing material, and each layer's scanned data. The scan resolution is down to 10 $\mu$ m in the XY axis and 5 $\mu$ m in the Z axis, which allows the user to produce a highly accurate inspection report of the entire printed part. The generated data is in perfect alignment with the part by synchronizing nScript's high-precision linear motion gantry system with the laser readings. This *in-situ* process only adds 3% - 12% to the total print time, depending on the part's geometry.

According to nScript Software Engineer, Connor Roggero:

*"The inspection system was developed with our machine's position feedback and real time kernel to accurately align the data. Once the aligned data is received, we are able to process it to warn the user of any defects that occurred before moving on to the next part of the print."*

The inspection system is designed to find defects during the printing process for metal parts printed by nScript systems. By finding defects early in the printing process, waste material is reduced and hours of machine time are saved by stopping the failed part before completion, adjusting any settings, and restarting a new print. Additionally, when a part is completed, the user has complete confidence the part is properly printed, along with an inspection report linked with the part. The nScript system eliminates the need for expensive non-destructive testing, such as x-ray CT, resonance, or ultrasonic testing, to ensure part quality.

According to Paul I. Deffenbaugh, nScript R&D Manager:

*“Inspection reports are commonplace in industries that require meeting strict quality standards, such as aerospace and automotive. Traceability is frequently necessary and ensures that root causes of failures can be determined. This in-process inspection system fulfills all of these goals and produces results more detailed than any other system available.”*

nScript is currently expanding the inspection system to conduct *in-situ* layer repair to achieve a perfect print every time. Using the data received during the inspection process, nScript plans to repairs defects when found, then continue printing the part as normal.

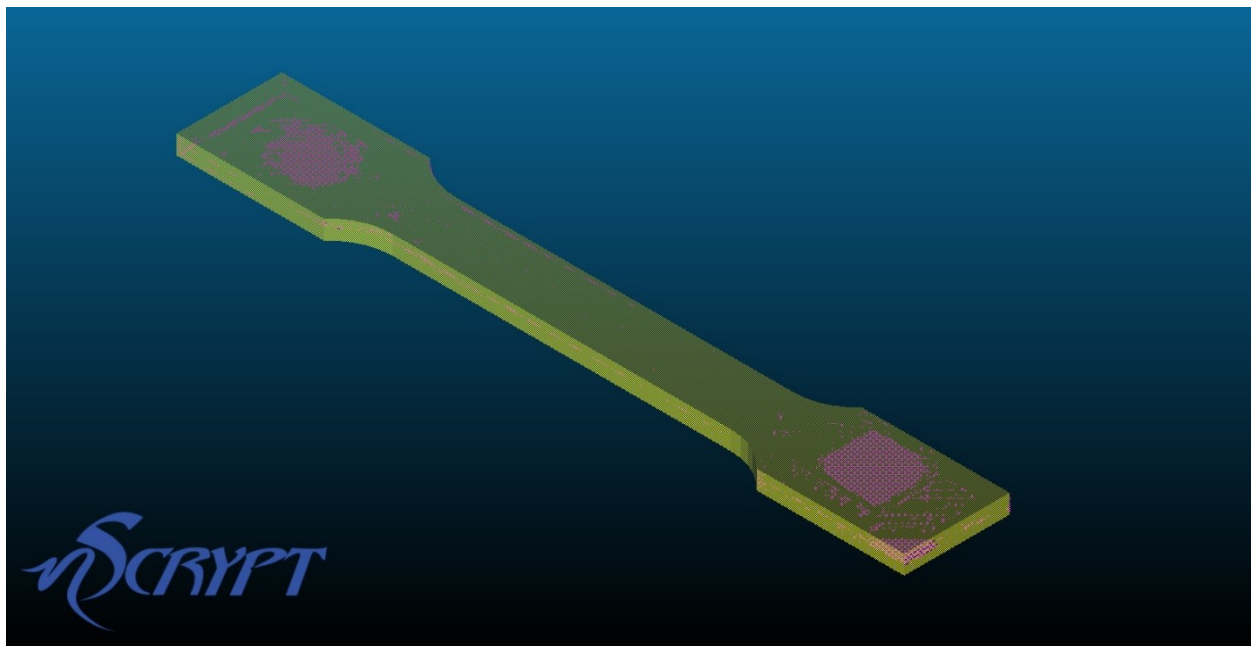


Figure 2: Missing material inside part detected by nScript's inspection system. (Actual Data)

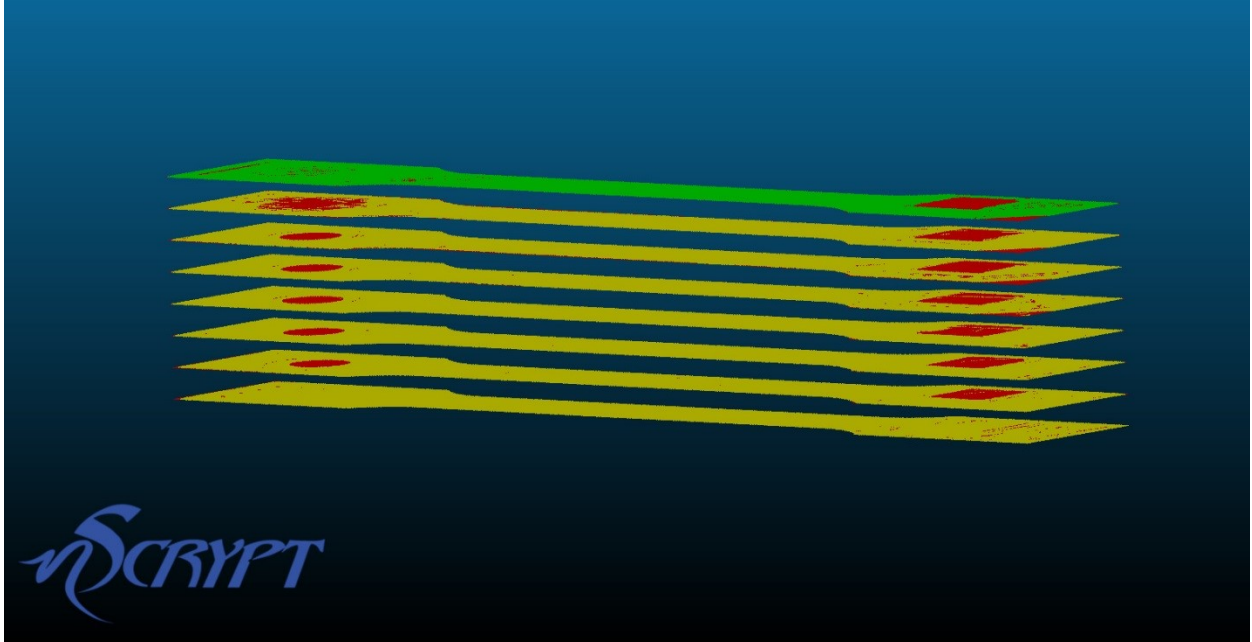


Figure 3: Layer by layer breakdown of scanned data. Green = Material, Red = Missing Material (Actual Data)

# Inspection Report

Printed File: ASTM E8-E8M Subsize Tensile Specimen\_2146.679.STL  
Report Created: 4/9/2019 11:28:24 AM  
Print Started: 4/9/2019 11:08:48 AM

## Overview

Missing Volume:	66.832 mm <sup>3</sup> or 7.1 %
# of Voids:	408
Most Voids in Single Layer:	81
Worst Layer Missing %:	13.0 %
Largest Missing Void Volume:	6.258 mm <sup>3</sup>
Total Time:	00:18:48

## Print

Part Size:	9.500 mm x 68.440 mm x 4.650 mm
Expected Volume:	939.662 mm <sup>3</sup>
Printed Volume:	872.830 mm <sup>3</sup>
Printed Progress:	100.0 %
Average Printing Rate:	2973.940 mm <sup>3</sup> /hr
Total Printing Time:	00:17:36

## Scan

Scan Resolution X:	0.100 mm
Scan Resolution Y:	0.100 mm
Scan Tolerance Z:	0.5 %
Expected Scan Volume:	947.691 mm <sup>3</sup>
Scanned Volume:	6816.183 mm <sup>3</sup>
Total Points Collected:	3115157
Total Scanning Time:	00:01:12 or 6.4% of Total Time

## Problem Layers

Most Voids	Layer #6
Most Volume Missing	Layer #7
Largest Void	Layer #7

Figure 4: First page of auto-generated inspection report



## About nScript

*Founded in 2002 and headquartered in Orlando, Florida, nScript designs and manufactures award-winning, next-generation, high-precision Micro-Dispensing and Direct Digital Manufacturing equipment and solutions for industrial applications, with unmatched accuracy and flexibility. Serving the printed electronics, electronics packaging, solar cell metallization, communications, printed antenna, life science, chemical/pharmaceutical, defense, space, and 3D printing industries, our equipment and solutions are widely used by the military, academic and research institutes, government agencies and national labs, and private companies. nScript is a 2002 spin out from Sciperio Inc., a research and development think tank specializing in cross-disciplinary solutions. The nScript BAT Series Bioprinter, which won the R&D 100 award in 2003, will travel to the International Space Station in 2019, in a joint program with Techshot. nScript Cyberfacturing Center is our direct digital contract design and manufacturing service.*