# Tempest Tool & Machine, Inc.

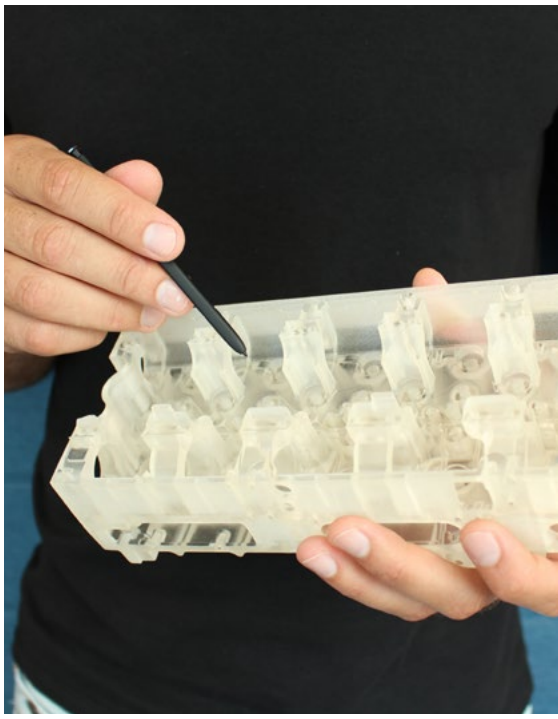
## Use Case - Tempest Tool & Machine, Inc. making an impact with water soluble support material

### Customer Profile

Tempest Tool & Machine, Inc. has been in the business of metrology for over 40 years. During this time, they have partnered with some of the biggest names in the automotive industry, including Cummins Inc. Tempest is headquartered in Indiana, which is also home to a large portion of Cummins' manufacturing and engineering operations. This proximity has allowed Tempest to gain a wealth of knowledge about gaging through their partnership with Cummins, who is a very metrology-intensive company. Over the years, Tempest has used this knowledge to develop and improve their own products and services, making them one of the leading suppliers of gages and quality control equipment.

### Challenge

One of the many parts Tempest produces is a small-scale engine component that is a 3D printed in a transparent material. These parts, that are copies of larger, real life components, are often 3D printed as retirement gifts, but they are also used as a training tool. They are color-coded to help operators learn the various checks that must be made at different stages of the manufacturing process. Once they have mastered the assembly process, they will be able to work on the real engine components with confidence. These training tools are essential; however, Tempest have never before managed to completely remove all of the support material from the internal cavities of these parts. These diesel engine cylinder heads are full of cavities and long channels that hold support in places that simply cannot be reached, even with water-jet.



3D Printed small-scale engine component used for training.

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## Solution

Tempest decided to 3D print these engine components on the Stratasys J55™ Prime 3D printer using WSS™150 (water-soluble support), and by leaving them overnight to soak in a bucket of regular tap water, the parts were clean and clear of support by morning. In addition, once the WSS150 support had dissolved, the remaining solution was solidified using Stratasys L2S™ powder which was then easily disposed of as non-hazardous, solid waste, in line with local regulations, for increased efficiency and sustainability.

Through rigorous testing, Tempest found that WSS150 support material allowed for easy removal of support structures from larger engineering parts too, saving both time and money. WSS150 has already made a significant impact in the 3D printing industry, and Tempest is poised to continue leading the way in this rapidly growing field. Tempest is at the forefront of the automotive industry, constantly searching for new ways to improve their products and services. WSS150 is just one example of how they are pushing the boundaries of what is possible with 3D printing.

## Impact

“Printing one of our small engine parts and using the water-soluble support has been a game changer for us.” Brian Tempest, Design Engineer – Tempest Tool & Machine, Inc. “We just left it overnight in a bucket of tap water and the part was 100% clean and clear of support. That speaks volumes for what that support material can do for us. It has completely changed what we can do as far as clean up. It’s really unbelievably simple. We’ve got a $5 bucket of tap water and it’s totally hands-off. We have not changed out the WSS support material in the J55 and are using it with all prints because it is so convenient. We have also tested the Stratasys L2S™ liquid to solid powder with a 10 gallon barrel and can report great success. It’s very simple to use and a great option.” Tempest can now stay ahead of the competition and continue providing their customers with high-quality products.

WSS™150 (water-soluble support) removal using tap water.

**Labor Cost Savings**

**95%**

**$12 vs. $240**

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