

From: Steven Adler
Sent: Monday, January 19, 2009 1:03 PM
To: sales@jet-wax.com; rp-ml@rapid.lpt.fi
Subject: RE: [rp-ml] Fwd: Jet Wax Materials for Solidscape 3D Systems

At the risk of opening Jet Wax materials up for public debate, I would like to offer my point of view on the offering.

As most of you know, I am a long time user of the Sanders/Solidscape technology going back nearly 15 years now. Over the years I have applauded and provided support for technology advancements being made in my field from a variety of companies and welcome that innovation. It has always been my hope that Solidscape would be able offer a wider range of materials for applications outside the realm of investment casting. Unfortunately, Jet Wax materials do not fit that description but seek merely to replace the role of the existing materials in the current application. I would have hoped that this debate would have been over a less opportunistic material development perhaps in the ceramic or metallic arena. Nonetheless, I will endeavor here to leave questions of business ethics and free markets to the consumer or law school professors and try to concentrate solely on the scientific aspects of the debate.

There are many factors that go into a successful build process and they require the developer to have a complete understanding of the proprietary aspects. In the Jet-Wax assertions of universal solubility and compatibility with all Solidscape machines they demonstrate a lack of understanding in that complete process.

Compatibility

There have been more than 8 different machines created that use the Sanders/Solidscape process. The system evolution, developed over more than a decade, required in excess of 150 database configurations. These configurations define line types and/or dot pitch specific to operating temperatures, viscosity, and cooling rate. As the Solidscape materials changed over time, the configurations also changed to adapt to the new material properties. It has been documented that the evolution of these materials has not provided for backward compatibility with older machine configurations.

In order to confirm compatibility with all platforms, Jet Wax developers would have needed to test all of the machine types using a variety of configurations on each machine, and have measured each line type using the prescribed operating temperatures. In particular, the matrix fill line types of both build and support materials are particularly vulnerable to changes in viscosity and need to be recalculated to provide sufficient material for close-off. It is naive to think that if Jet Wax materials were combined with other materials in any ratio, it would provide precise properties for all of the exact same line types. As well, it is unlikely that Jet Wax material by itself could produce the same line types as all Solidscape materials because those materials each have different properties when compared with each other. Further, the process cooling times prior to milling are hard coded on Solidscape machines based on the material and configuration database. Any recommended changes in operating temperature for Jet Wax material would need to be accommodated by an appropriate increase or decrease in cooling time in the configuration database

Another concern I note is that there is a narrow range of thermal expansion which must be maintained between the build and support materials. This factor is important for two aspects of the process. During the support removal phase, if the support material expands too quickly in advance of the build material, small delicate features can be dislodged and thin walled features can fracture. We also pay particular attention to hygroscopic and thermal expansion in the investment and burnout stages of investment casting. We have performed several studies where material expansion has been shown to cause fractures and inclusions in the metal by-product. Solidscape materials have been tested and compared to all other RP materials and found to be the closest CTE to injection wax.

Solubility

In a recent reply to this RPML thread, Jet Wax developers state "there are no intrinsic problems of self-compatibility between Solidscape materials". I can assure users that there are dozens of Solidscape users who would dispute this assertion. I know of many who tried to jump from ProtoBuild to InduraCast and experienced a chemical reaction which clogged the entire material delivery system. Anyone who has operated a Sanders/Solidscape system also knows that the build materials in particular are subject to out-gassing and a persistent crystalline precipitation, indicative of the instability of minority compounds to remain in solution. In the real world, there are degrees of solubility and a visual hot plate test method, in my opinion, would be insufficient to prove the assertion of consistent universal solubility. Lastly, to suggest that Solidscape has a lucrative fear campaign to extort thousands of dollars from its loyal clients is just ridiculous. Conversions include considerably more than one hour of work and a replacement filter. It is a complete review of the systems with replacements made of any components that do not meet specifications. The upgrade also includes a new configuration software database that is designed for the new material properties which both improve quality and decrease build times.

Summary

Jet-Wax is an unproven commodity across the Solidscape platform. Users who anticipate converting to this gray market material will do so at the risk of performance at best and of significant damage at worst to their material deliver systems. The developers do not appear to provide a value added benefit to the end user for new applications but instead seek to act as a parasite on an already successful process. My council to the principals at Jet-Wax is that they should consider this material for their own internal use and refocus their marketing efforts on new materials for applications outside investment casting. In this endeavor they would have my full support in development and testing.

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