

ReThink. ReEngineer. **RESULTS.**

INTELLIHOT: Smart Tooling + 3D Printing Brings Next-Gen Innovation to Intellihot

CUSTOMER SPOTLIGHT... For this project, SAY Plastics worked with Intellihot, a U.S. energy company that manufactures tankless water heating systems. Their energy-efficient products are used in the high-rise residential market, lodging and hotels, education food processing and many other large-scale residential and commercial applications.

BACKGROUND

As Intellihot, an innovator in the commercial water heater industry, began design and development for their next-generation commercial tankless water heating system, they needed a door assembly solution that was lightweight, highly aesthetic, and met stringent UL 746C f1 requirements.

Intellihot's plan was to purchase fabricated steel door structures from a Chinese manufacturer. But their accelerated delivery schedule and need for a lighter-weight, highly aesthetic door drove them to look for an alternate manufacturer that could provide a new door assembly solution.

Intellihot posted an RFQ on MFG.com for a metal door, which SAY Plastics saw. Their Applications Engineering team contacted Intellihot to see if they would consider converting the door from metal to plastic. Intellihot was interested, but only if SAY Plastics could meet their tight deadline, since the door was being used on a new water heater model that was already marketed with a firm launch date.

After meeting with SAY Plastics to discuss the advantages thermoformed plastic offers over traditional manufacturing materials, **Intellihot chose to partner with SAY Plastics. Their thermoformed assemblies and proprietary SAYtooling System delivered the most cost-effective, efficient solution available.**



Continues on page 2...

Continued from page 1...

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THE CHALLENGE

For the Intellihot project, several critical design and production elements needed to be executed on a short production timeline. **SAY Plastics was responsible for redesigning the water heater door and converting it from metal to thermoformed plastic**, which required the following (see Fig. 1):

- Mold design & manufacturing
- Aesthetic presentation of the Intellihot brand name & logo
- Trim and assembly fixture design & manufacturing
- Stringent manufacturing controls & technique development
- Work cell and quality plan design
- 3D printing integration
- FAI completion
- Expedited production – part shipment was needed in less than 10 weeks.

(SAY Plastics first met with Intellihot in late February 2017, who agreed to the plastic door in early March 2017. The first prototype was delivered April 2017, and production began May 2017.)

THE PLAN – SAYTOOLING SYSTEM

Given the schedule, number of required parts, and stringent material and UL requirements, budget, and application needs, **SAY Plastics’ proprietary SAYtooling System offered the ideal solution.**

SAYtooling recognizes that rapid tooling is often needed to get a product into the marketplace, and its unique approach to tooling development makes it possible. The process starts with a comprehensive evaluation to determine the best



Figure 1: Wall Hung Unit



Figure 2: Door (Back) Floor-Standing Unit



Figure 3: Door (Front) Floor-Standing Unit

approach for the project and ends with a highly innovative tooling development plan.

SAYtooling not only takes mold material into consideration but also considers the process control and technique, which is unique to each design. **Another distinct advantage of SAYtooling is that it accommodates both short-term/temporary tooling and long-term/production tooling.**

For the Intellihot project, the tooling required for the initial production startup was (2) one-cavity epoxy CNC-machined molds, with CNC-machined trim and assembly fixtures that en-sured proper component location and bond strength.

The door assembly consists of (5) thermoformed parts – 1 inner, 1 outer and 3 hinge covers – produced out of custom, color-matched Kydex 100. This material was chosen to meet the 746C f1 UL requirements and project timeline. Material thicknesses designed are 0.060” for outer, 0.110” for inner, and .110” for the hinges (**See Fig. 2, 3, 4.**)

Continues on page 3...

Continued from page 2...

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The door’s inner panel provides a sharp color contrast to the door’s outer panel, which showcases the Intellihot name and logo through CNC-machined cut-outs (see Fig. 5).

Intellihot’s advanced water heating systems are now equipped with touch screen technology, so the door assembly also features a 3D printed mounting bracket that accommodates the LED screen.

SAY Plastics’ in-house 3D printing capabilities complemented their corporate-branded SAYtooling System as a vehicle to give the customer quick project turnaround. This provided an excellent opportunity for SAY Plastics’ 3D printing to add value to their thermoforming processing (see Fig. 6).

THE RESULTS

Intellihot was very satisfied with the door assembly and SAY Plastics’ ability to meet the many requirements of the project – from its lightweight and highly cosmetic features to its stringent UL requirements and expedited delivery schedule.

Today, SAY Plastics continues to produce doors for Intellihot’s entire line of iQ and i Series products.

The door assembly with its many value-added features was also accepted for competition and display at the 2018 SPE European Thermoforming Conference in Rome, Italy – demonstrating metal-to-plastic design conversion and collaborative processing. ■

SAY Plastics, Inc. re-thinks and re-engineers traditional manufacturing processes and the use of materials to help customers improve product quality, boost productivity, and reduce costs.



Figure 4: Two-Part Epoxy Assembly



Figure 5: Two-piece Gray/Orange Intellihot Door – Trimmed and Assembled to Create Offset Logo



Figure 6: 3D Printed Bracket (black frame – top half of photo)

3D Printing

The Intellihot project is an excellent example of how SAY Plastics’ in-house 3D printing capabilities complemented the SAYtooling System and contributed to quick product turnaround. All parts were assembled with a two-part epoxy aided by a CNC-machined assembly fixture, which ensured proper component location and bond strength.