

Creating digitally manufactured jigs and fixtures saves time, labor, money and resources.

For car enthusiasts there can be no greater satisfaction than seeing their dream car come to life. Building people's dream cars is what the folks at Roaring Forties (www.roaringforties.com.au) do best. Jonathan Klopsteins and Paul Bottomley, co-owners of Roaring Forties have been using RedEye On Demand services for years. Why? Because with RedEye's direct digital manufacturing, the Roaring Forties team can get jigs and fixtures produced easily and cost effectively - accelerating production time.

The Ford GT40, built from 1966 to 1969, was a high performance race car winning the 24 hours of Le Mans four times in a row. This lightweight, aerodynamic beauty was affectionately named after Grand Tourisme (GT) with 40 representing its overall height in inches. The rarity of this beloved, sporty model has increased and with it, the demand for accurate high quality replicas.

The Challenge

Recently the Roaring Forties team was faced with a familiar challenge, redesign in a short period of time. Due to a change in emission regulation a new engine for the RF GT40 was required and needed to be fitted into the existing chassis. One of the critical changes was to the brake and fuel line harness. "Fuel handling is something we have to get 110% right. Not only for performance on the track, but also to reduce the risk of thermal incident," says Bottomley. "After all, it's not just a pipe. We also needed to be mindful of its durability due to fatigue."

The ability to manufacture parts like jigs, fixtures and tools on-demand means processes can be optimized and implemented in shorter periods of time. Parts for fixturing and tooling in the automotive manufacturing environment need to withstand the harsh environment of high temperatures and vibrations. Additionally, they often need to be lightweight and portable. Lastly, as design components change, the fixture needs to be altered – often in a short amount of time.

"We go to great lengths to make sure that our design is fully tested before we consider going to market," says Bottomley. We know that RedEye's digital manufacturing is great for building parts for development testing – even end use. But because of its accuracy and dimensional stability we now appreciate that we can build all of our jigs and fixtures with thermoplastics as well. RedEye calls it Direct Digital Manufacturing, we call it cost effective."



Figure 1: This RF GT40's chassis was custom built using jigs and fixtures produced by RedEye On Demand.



Figure 2: PC Test Fixture with ABS Trial Part

Bottomley adds, “Just one of the areas we improved was a simple jig for the fuel line which we use both as a fixture for aligning assemblies and as our ‘go/no go’ gauge.”

The most commonly used manufacturing technique for jigs and fixtures is machining; however, changes can be costly. When a quality problem or production delay occurs, the cause is often the fixture, and engineers must move quickly to devise a plan to keep production moving forward.

Typical turn around time of traditionally manufactured fixtures is approximately 2 to 4 weeks. With digital manufacturing, you can get new fixtures in days – not weeks.

The use of digitally manufactured fixtures eliminates these constraints by giving you the freedom to easily change your design at any time. With RedEye’s digital manufacturing process, they can build exactly what you design in 3D, eliminating miscommunication of requirements. No need to translate 2D drawings to the machining process. And a low-cost, quality fixture can be turned-around in a matter of days.

The Solution

Fixtures are most frequently used in: holding, assembly & alignment, calibration, test hardware and prototyping. RedEye On Demand saved the Roaring Forties team time and money on fabrication and assembly tools allowing them to deliver an improved reproduction of the powerful Ford GT40. Digital manufacturing technology eliminates machining, shaving days off production schedules and improving bottom lines. And, because RedEye On Demand produces these tools in production-grade thermoplastics, they not only save money – but best of all, they are durable.

“Once you hand over a part to a customer, there is a multitude of ways to perceive quality. Parts not only need to look good and be fit for purpose; they need to work well as part of an overall assembly. If one part doesn’t mate up with another, it will result in an unhappy customer – something we strive to avoid,” says Klopsteins.

The Result

The additive fabrication process used at RedEye is ideal for many fixtures because it offers a significantly shorter lead time compared to machining and assembling metal, wood and other common fixture materials. Additionally, when the fixture needs replacing, RedEye can produce a new one in days – compared to 4 to 6 weeks with machining or sheet metal respectively.

“Being cost effective we now use a number of jigs during assembly where we used to have none. It saves us many man hours during a build but also improves on quality. Everybody wins,” Bottomley concluded.

“When Paul and Jonathan heard that we could apply digital manufacturing technology for jigs and fixtures they were keen to give us a try.” says Simon Bartlett, RedEye Engineering Manager. “We looked at the ABS prototype of the harness and how it was manufactured and suggested using polycarbonate (PC). The higher melting point allowed Roaring Forties to solder on brackets prior to brazing. Since the jig is not stressed during use, we also suggested building it with a sparse fill – saving build time, piece cost and materials”

Finally, manufacturing parts with complex geometries is much simpler and requires less engineering resources compared to traditional machining methods. Because thermoplastics are durable, this same technology is evolving from modeling to an alternative for low volume manufacturing of end-use parts.



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