



COMPANY PROFILE

2019

Bold offers design and manufacturing services to motorsport, aerospace and industry. We specialise in supply of custom battery packs and structural composite & mechanical components.

Bold Valuable Technology Ltd

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- Pack layout to achieve minimum weight and volume.
 - Thermal management and cooling design.
 - Cell block design to electrical & thermal performance specifications.
 - Design for safe performance against high energy impact and transport.

Bold has earned experience in design and manufacturing from aerospace, motorsport and industry sectors for the last decade. These are extremely tough sectors that demand the highest standards for quality and know-how.

Motorsport has influenced our way of working towards a fast-engineered company that finds solutions to problems within the required time frame and cost. There is a can-do attitude in all we do because we are here to solve your problems and enable you to succeed in your products.

Services

Battery integration and packaging

Design of complete battery packs for vehicles and other applications such as robots. We offer the entire design from given specifications, e.g. power, capacity and other operational requirements, to select best type of cells, power electronics, BMS and cooling performance. Our experience in battery packs includes design of cooling systems, connectors, bus bars, electronics installation and venting.

Power electronics and enclosures

Design and integration of power electronics and enclosures with connectors, cooling and auxiliary servicing. For high end applications, we supply composite enclosures to reduce the overall package weight. The weight reduction of a CFRP enclosure compared to an all-aluminium enclosure ranges from 25% to 70% depending on the application.

In line with our continuous improvement philosophy we are pushing to get composite material processing costs down to offer comparable prices to machined aluminium.

Additionally, we design and supply CFRP EMC shields to protect sensitive electronics inside battery packs.

For high end applications where the overall battery pack integration volume to the chassis is critical, we have developed one of the smallest custom-made high voltage connectors set for battery pack to motors harnesses and quick disconnect cooling fittings.

Composites and mechanical components

We have strong experience in design and manufacture of composite and metallic components for a wide range of sectors. We are happy to help, whether it is a high-end motorsport structural component or sporting goods.

Composite materials offer unique strength and stiffness to weight ratio, that in addition to other properties, make them ideal for specific applications. These properties are often combined with metals parts: we work with any type of metals including

aerospace grade ones like Ti 6Al-4V, Al 7075, 13-8PH H950.



- Structural metallic and CFRP components
- Prototypes to high volume.
- Autoclave, RTM, hot press.
- Motorsport, automotive, marine, aerospace, industry sectors.
- CAD with Catia v5 or Fusion 360
- FEA with Hyperworks and Optistruct

We use Catia v5 or Fusion 360 for CAD and HyperWorks with Optistruct solver for FEA. File sharing with our customers can be made through standard formats (e.g. step) or corresponding native file formats.

If your organization has a variable work load, Bold can support you in peak load periods. Our customers enjoy the flexibility to only pay for design resources when they are used. We can work autonomously to deliver design drawings or supply finished parts by your required date.

Moulds, jigs and fixtures

As experts in tooling, we have designed hundreds of mould tools from motorsport, to marine, or aerospace sectors., With our



experience we can supply designs or ready to use moulds in a short amount of time and at fair cost. Since the design is so influenced by the tooling method, we are happy to also assist our customers from an early design stage. Furthermore, we have experience in advanced tooling materials and techniques. These include LMT alloys, sacrificial RP mandrels and inflatable bladders. Although these techniques are mostly found in motorsport, they might be of interest for other sectors where the advantages of composites materials in the final component,



- Pattern design for CFRP moulds
- Metallic mould tools in steel or aluminium
- MCP or removable RP mandrels
- Bladders and silicone mandrels
- Vacuum machining fixtures
- Bonding and assembly jigs

Free resources to focus on your core areas and we will take care of the rest – composite, metallic and tooling components.

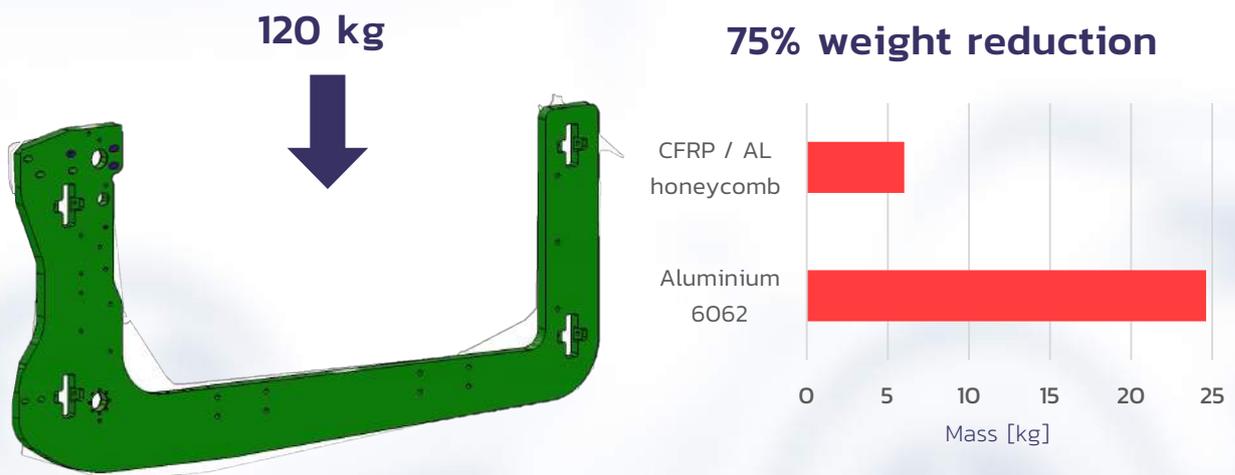
Case Studies

Composite EMC shielding

EMC shields are used to absorb, reflect or contain electromagnetic radiation emitted from a source to protect sensitive devices. Typically, these shields are made from metallic sheet or machined. However, for high performance applications, such as motorsport or aerospace, Bold has experience with EMC shields made from composite materials that are lighter and include electrical insulating properties.

Weight reduction for a heavy-duty end effector

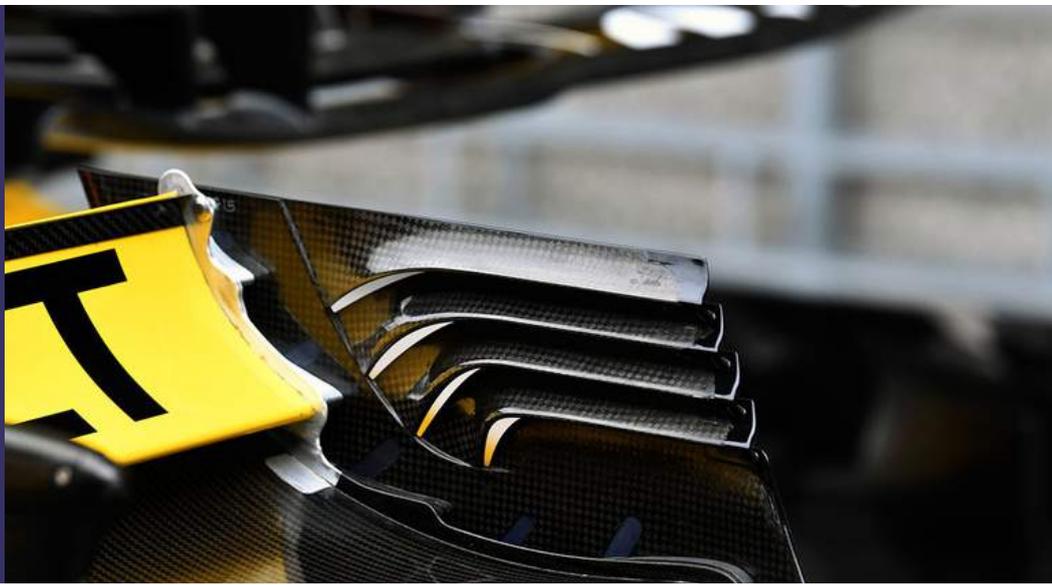
Carbon fibre epoxy components can be used in industry for several reasons. For example, weight reduction of the end effector increases the load capacity of a motor or robot system. Thus, for the same system cost, more goods can be handled. In this example, we designed and build the structure of the end effector for an automated storage system. The weight reduction was a massive 75% compared to the original design made from aluminium, which allowed carrying an extra pallet.



Aerodynamic composite structures with live pressure sensors for F1

The wings were designed concurrently with the structures department for the shortest development time. The CAD models were parametric to allow for several different wing versions to be produced using the same models in Catia v5. After the models were set up, the component, tools and inserts were designed in less than a week. The wing assembly consisted of a pair of end plates, a main plane and a flap. The ultimate test vertical load was 10.0 kN which exceeded FE predictions. Bold VT designed the structure of the wing, detail design of all the elements of the assembly and tooling.

- Aerostructure tested to 10kN weighs only 3,5 kg
- 12 pressure sensors feeding live data form the track back to HQ
- Modular design for quick update turnaround



F1 Composite oil catch tank and piping

Bold developed an all composite oil catch tank that incorporated a fitting with O-ring grooves – all in one piece. There was no post-machining or bonding required. This makes the component lighter, quicker to make, stronger and less chances of leaks especially at the operational temperature of 130 °C.

Additionally, we also developed pipes with irregular and variable cross sections that were easier to package and lighter than aluminium pressure pipes for the same application.

Humanoid robot leg demonstrator

Robots are being introduced in some industry environments to increase productivity through automation. Given the expected growth of this industry, Bold designed and manufactured a demonstrator to show the capabilities of composite structures in conjunction with embedded sensors to the structure. Additionally, the demonstrator showed the higher design and manufacturing possibilities that advanced tooling techniques offer in comparison to machining or DMLS / RP: Internal channels, sensors and pressure galleries can be integrated in the structure.

Power electronics enclosure

Formula E technology is being de-standardized as the series is maturing, Teams are now allowed to use nonstandard parts for inverters. Bold has done a preliminary design in composite materials to reduce the weight of an aluminium enclosure for an inverter.

The approximate weight reduction is in the order of 60%, which equates to saving in the region of 1750 g. This is a massive weight saving whilst keeping the performance of the aluminium enclosure in terms of structure and electrical properties.



High Power three-phase connector

Bold developed a set of three-phase plugs and sockets to connect the MGU-H and MGU-K motors to the battery pack and E-dyno testing equipment. These connectors are significantly smaller than commercially available solutions and allowed much better packaging between the chassis and the battery pack. These connectors have now been manufactured in the hundreds. The connectors are rated to 300A and 1000 VAC. The plug body dimensions are approximately 20 x 60 mm in cross section.

Let's work together! For further information don't hesitate to contact us

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