Products

At Barnes Group, we continued to make progress in 2019 on our transformational journey to position the Company as a leading global provider of engineered products and diversified industrial technologies. Ongoing key strategic investments in the Barnes Enterprise System, Innovation, and Talent Management continued to be instrumental in enabling us to achieve our goals. By leveraging the Barnes Enterprise System to "Power Performance Excellence," our Company is excelling at selling, delivering, and realizing the value we bring to the marketplace. Part of that value proposition involves our ability to consistently deliver high-quality products to our customers.

In the last year, many of the products we delivered and the processes we used to manufacture these products embodied socially and environmentally responsible concepts and methods.

Barnes Industrial

Molding Solutions:
Our Molding Solutions strategic business unit develops plastic injection molding technology used to produce cutting-edge structural and cosmetic components that reduce vehicle mass, improve aerodynamics, and improve fuel efficiency which directly reduces vehicle emissions.

In the FOBOHA division, we engineer, develop and manufacture high-quality injection molds for the plastics industry, and have garnered international recognition for our proprietary and patented multi-component cube-mold technology. With the use of its advanced cube-mold technology, FOBOHA products not only enable significant reduction in cycle time, but also streamline the manufacture of mass-produced parts, in some cases reducing customer production cycle time significantly and generating increases in overall production.

The use of cube-mold technology represents a significant leap forward in injection molding processes which, in turn, yields substantial reductions in our customers energy consumption while directly improving the manufacturability of products made with plastic injection molding in the consumer, healthcare, packaging and automotive industries around the world.

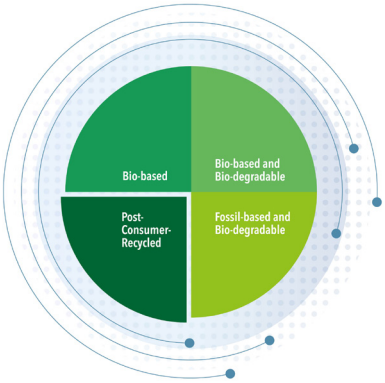
Given the growing concern around the environmental impacts of plastic waste, Molding Solutions is focusing heavily on the research and development in the processing of sustainable polymers. In partnership with leading customers and polymer material developers, Männer is using advancements in hot runner and injection molding technology to help convert new bio-based and recyclable polymers into products for its customers. In the single use packaging space, Männer's research and development team is constantly testing new bio-based, bio-degradable and post-consumer resin (PCR) materials. With variability in developing raw materials, Männer has advanced its hot runner and molding technology and is ready to support ecologically-friendly plastic products targeted for introduction into the marketplace.

Molding Solutions exhibited at the K 2019 Trade Show in Düsseldorf, Germany, one of the world's foremost trade fairs for the latest developments and groundbreaking innovations in the plastics and rubber industry. The Molding Solutions team – FOBOHA, Gammaflux, Männer, Priamus, Synventive and Thermoplay – was focused exclusively on customer applications, and solutions were presented for the implementation of demanding customer projects in the areas of medical/pharmaceuticals, personal care, packaging, automotive and technical parts.

A huge attraction for visitors and a technology highlight for many journalists was the REVERSECUBE from FOBOHA, a counter-rotating double cube system on an Arburg molding machine that replaces several molding machines and automated assembly units with a single system.

Männer, Thermoplay and Synventive showcased the latest innovations and projects in hot runner technology in the specialist fields mentioned above. Thermoplay presented its new range of thermal gate hot runner systems, for multi-cavity molds having up to 144 cavities. The new systems deliver significant improvements in the process window, and an improved thermal profile. This contributes to a high degree of molding process reliability and consistent quality of molded parts, even at the high speeds and volumes specifically required for caps and closures, packaging and personal care applications. Synventive presented the new generation of its eGate® system for the first time at a European trade fair. The electric-drive valve gate solution is now also available for larger components and ensures complete pin movement control at each individual nozzle, thus achieving the highest performance levels for flawless surfaces and outstanding part-to-part consistency – and reducing waste for our customers.

"Environmentally friendly resins" and the "circular economy" were also a key focus of the exhibits by our Molding Solutions businesses at the K Show. A central topic in the processing of biopolymers and recycled materials is process control. The exhibits showcased the ability of our Molding Solutions business to bring together Gammaflux, an expert in temperature control systems, and Priamus, a pioneer in advanced process control systems, to effectively process many recycled bio-based and/or biodegradable materials. The exhibit also highlighted our ability to conduct efficient material test collection as well as seamlessly implement customer projects. By integrating expert knowledge for mold and hot runner technology together with its know-how in process control, Molding Solutions companies are poised to offer solutions for processing biopolymers and recyclates that will drive safety and sustainability into the future.



Force & Motion Control:
Our Force & Motion Control strategic business unit develops advanced metal and metal-alloy forming technology that allows vehicle designers and manufacturers to introduce highly complex shapes and structures, ultimately reducing vehicle weight and optimizing the use of materials. Our products and systems allow for flexible transfer of force and motion from one place to another yielding enhanced production rates and efficiencies for our customers, including those customers engaged in the manufacturing of electric vehicles.

Engineered Components:
Our Engineered Components strategic business unit offers unconventional vehicle components using advanced alloys and manufacturing principles, delivering leading engine and powertrain components to improve fuel efficiency and lead the way to vehicle electrification.

Automation
Our Automation strategic business unit designs and develops robotic grippers, advanced end-of-arm tooling systems, sensors and other automation components for intelligent robotic handling solutions and industrial automation applications in end markets such as packaging, healthcare, transportation, and food and beverage. Advancements in robotic technology are rapidly increasing the ability to accomplish more complex tasks at higher speeds and with improved control and repeatability. With greater affordability of robotics, Gimatic's customized mission-critical systems directly benefit from a large and growing global installed base of over two million industrial robots.

Barnes Aerospace

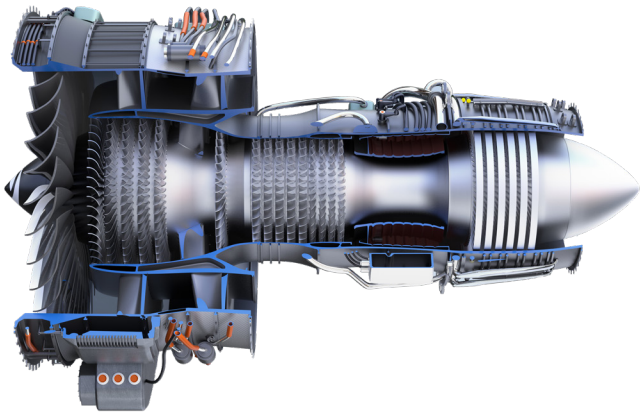
OEM:

Our Barnes Aerospace OEM strategic business unit's divisions which manufacture new components are continuing their work with our aerospace customers to introduce new component designs that will reduce the weight of the aircraft and engine parts. For airlines, reducing the weight of the aircraft or its engines, through lower-weight parts and components, drives lower fuel usage and lower carbon emissions. We have several projects focused on reducing the weight of the components without sacrificing strength, durability or safety. As an example, our Ogden facility has worked with one of our customers to implement a new design of a large structural fairing with lower weight due to new optimized support structure design and use of carbon fiber. These examples of new part design refinements will reduce part weight which will, in turn, contribute to a reduction in fuel usage for this type of airplane each year. We are proud that our employees continuously support our customers to help lower the industry's fuel usage and reduce emissions.

Our sites are also working with our customers to reduce the amount of excess raw material that is consumed in the manufacturing processes. Forgings and castings must be machined to the final part dimensions and the closer to the final part dimensions the initial forging or casting form can be, the lower the level of waste that must be recycled. Our Windsor site has partnered with a large engine OEM on several projects to implement optimized casting and forging designs which require less machining and therefore less material waste each year. Our Lansing site developed a hybrid manufacturing process utilizing our fabrication expertise along with additive manufacturing to produce a part with significantly less material waste than the traditional machining process for this engine component. We recognize the importance of working with our customers to be more efficient with our material usage as an industry and partner actively with our end customers and our raw material suppliers.

MRO:

Within the Barnes Aerospace Aftermarket strategic business unit, our divisions are focused on component repair work and collaborate closely with our engine OEM and airline customers to develop new and innovative repair methods for the various engine components that become worn as the airplane is flown. In many cases, our highly-trained MRO repair engineering teams have helped to develop approaches to repair components back to the original new component conditions instead of scrapping the worn part and replacing with a brand new part. Our new repairs reduce the waste and conserve the usage of exotic alloy metals. This year, our East Granby facility developed a new repair for a very large wide-body engine structure casing that had previously been typically scrapped by engine overhaul shops due to lack of a viable repair option. In these situations, the airline would have no choice but to purchase a new casing. Our new repairs allow this part to avoid being scrapped and avoid all the material waste associated with manufacturing a new part. These types of novel repairs provide value for our customers and also value for the environment reducing the amount of waste in material and resources.



www.BGInc.com

Sustainability Contact:

For further questions or concerns related to Barnes Group's sustainability work, please contact:

Susan McFarland
Director, HSE
Barnes Group Inc.
123 Main Street
Bristol, CT 06010
hse@bginc.com