EIGHT YEARS STRONG:

AUTO21 partnership yields continuing results for one company

Dr. Jeff Wood of the University of Western Ontario has helped Meridian Lightweight Technologies strengthen their magnesium components.

Some relationships were meant to last. Since 2001, the collaboration between Meridian Lightweight Technologies Inc. and an AUTO21 research team has lasted through three AUTO21 projects and is still going strong.

Magnesium Casting was one of AUTO21's originally funded projects when the Network began in 2001. Led by Dr. Jeff Wood, an associate professor of mechanical and materials engineering at the University of Western Ontario, the project explored how to enhance magnesium die casting processes. As the project's main industry partner, Meridian Lightweight Technologies provided guidance to the project's development plus cash and in-kind support. Pleased with the results of the initial project that concluded in 2004, Meridian continued to provide support to subsequent projects, *Magnesium Casting II* (2004-2008) and *Magnesium Casting III*, funded in 2008 for a two-year period.

Magnesium offers many advantages over other automotive metals – it's the lightest of all structural materials and is 75 per cent lighter than traditional steels. As well, it offers high impact resistance, a high strength-to-weight ratio and can be cast to net shape. It can also offer faster production cycle times as it requires less processing than steel components. Currently, magnesium is used in several automotive components including instrument panel beams, rear sub frames, front end structures and seating. The metal is so promising that Canada, China and the U.S. are collaborating on a joint research initiative called the Magnesium Front-End Research and Development (MFERD) project.

With seven manufacturing facilities worldwide and a global technology centre located in Strathroy, Ontario, Meridian is a leading full service supplier of magnesium die cast components and assemblies. The Global Technology Centre provides in-house testing but as John Jekl, product development engineer at the Centre notes, the focus is on development and not necessarily on research. To better meet their customers' needs, Meridian decided to partner with academic researchers to help fill the gap.

Jekl explained that the initial AUTO21 project resulted from a need for Meridian to better understand the mechanical properties of its magnesium cast components. In consultation with Dr. Wood, *Magnesium Casting I* focused on developing a mechanical property map of the component that would allow Meridian to understand why properties changed across the part. A key challenge to magnesium casting is that the mechanical properties of large, high-pressure die casts can vary from one location to another. Using numerical simulation could help predict where critical casting defects might occur and how to move these spots to areas within the casting that don't compromise the part's integrity. It could also be possible to design the mould to keep the critical areas stronger and optimized before tooling begins, which would save time and money.

Based on the firm foundation developed in *Magnesium Casting I*, the second project yielded important information on testing magnesium cast prototypes. A traditional test to evaluate a cast component consists of cutting a smaller section (a coupon) from the cast and using the coupon to evaluate the component's integrity.

"Due to the microstructure that results from the die casting process, coupons cut from a casting are not an accurate way to evaluate the component itself," says Dr. Wood. "The effects of small pores particularly in magnesium-based castings, can be exaggerated in coupon tests when in reality, they would make little difference to the behaviour of the component."

Meridian has been able to incorporate the findings of the projects into customer presentations and marketing materials that highlight the company's understanding of magnesium's mechanical properties. Jekl expects useable results from *Magnesium Casting III*, which began in April 2008.

"We have been impressed with how Dr. Wood has linked the findings of the projects together and demonstrated how the new knowledge can be beneficial," says Jekl. "I'm confident that the ultimate goal of the research will be possible to achieve by the end of this project."

Meridian has had a long-standing relationship with the University of Western Ontario prior to its involvement with AUTO21. The evolution of the AUTO21 project has been a positive experience for Meridian. "This has been an excellent partnership," says Jekl. "We would definitely be willing to do another project through the program."

Meridian LIGHTWEIGHT TECHNOLOGIES INC.

RENEWING AUTO21'S

research portfolio

AUTO21's third generation of project funding was launched on April 1, 2008 with a $20 million two-year investment. Together with its private and public-sector partners, AUTO21 provided funding to 54 projects.

The funding was announced by the Honourable Jim Prentice, Minister of Industry, at the AUTO21 national conference in London, Ontario in June 2008. Through the federal Networks of Centres of Excellence program, the Government of Canada provided about $10 million of the total investment. Approximately 240 private and public sector organizations, including automakers, parts suppliers and materials companies are contributing the remainder of the funding.

"Canadian consumers are looking for new, cutting-edge vehicles that are advanced, efficient and green," said Minister Prentice. "Right here in Canada, our researchers are stepping up to deliver, and our government is proud to be investing in these projects."

AUTO21 projects receive strong industry support and guidance, in exchange for intellectual property and commercialization rights and access to the brightest academic automotive researchers in Canada. To ensure maximum flexibility, there is no set ratio for industry support. Some projects may receive more funding from their industry partner than from AUTO21, while the situation may be reversed for others.

The projects range from child seat safety, to elderly driver education programs, to advanced factory automation, to hybrid powertrains and lightweight materials research. The projects were selected from a call for proposals held in late 2007 that resulted in more than 60 letters of intent and requests for funding submitted. A rigorous international peer review system ranked the projects, with final approval provided by the AUTO21 board of directors.

In addition to the technology and knowledge generated, the projects are providing training opportunities to more than 500 student researchers.

The Honourable Jim Prentice announced the $20 million funding at the AUTO21 2008 conference.