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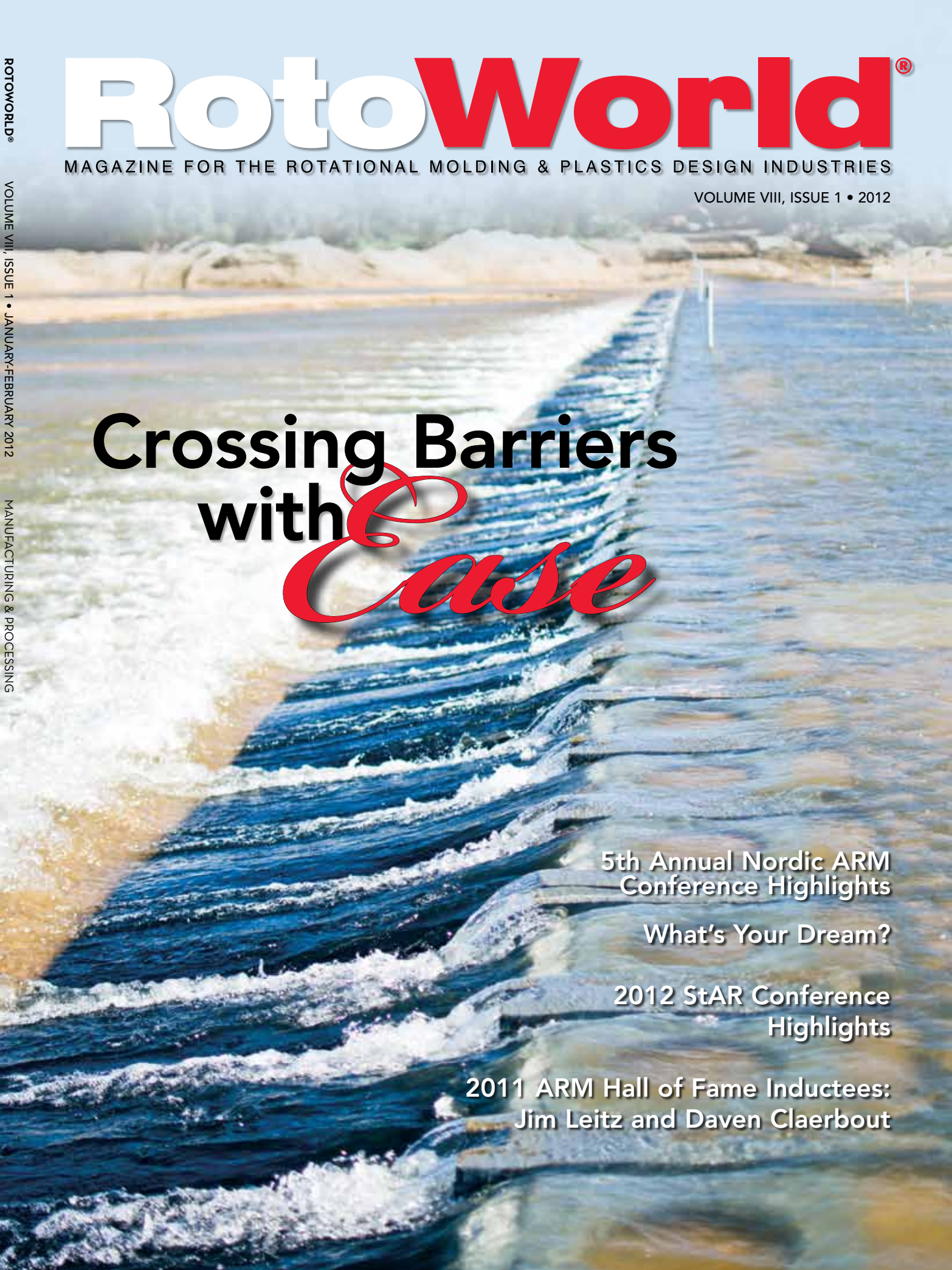

Crossing Barriers with *Ease*

5th Annual Nordic ARM Conference Highlights

What's Your Dream?

2012 StAR Conference Highlights

2011 ARM Hall of Fame Inductees: Jim Leitz and Daven Claerbout

LEISA DONLAN, ARMA CEO

Crossing Barriers with *Ease*

Gough Plastic's Track Pad & Poly Gabion System Continues A History of Caring about People and the Planet with a Passion.

Australia's coastline is sand based and covers almost 60,000kms in addition to a vast sandy dessert in its centre and huge sandy tracts of land in its outback areas. With a relatively small population of 22 million, communities can be isolated by hundreds of kilometres of unsealed roads. These roads are vital to ensure services get through, yet existing road structures experience anything from severe damage right up to total failure in these challenging environments. Most failures currently occur due to the inability to secure them to the riverbed or sandy bases and failure of the structures means that roads can be impassable for months.

Of course these issues aren't only an Australian problem. Any area of the world that requires vehicular access in sandy or loose soil has the same challenges and many countries around the world have remote river crossings where the cost involved in building traditional

Photographs courtesy of Fractal Division Photographics

concrete style structures is just not cost effective. One company has been working to find a better solution with global potential and to replace traditional materials with a rotationally moulded polyethylene system.

Australian rotational moulder Gough Plastics is based in stunning Northern Queensland, home to the world famous Great Barrier Reef. The company is a Research, Design and Manufacturing specialist, which focus on new products from conception through to installation. Built on a strong base, which gives both flexibility in operation and security of existence, it is this family unit, which will continue to steer the company into future growth and expansion.

Gough Plastics began working with their partner Base IGI, a local consulting firm, who works closely with Australia's remote regional local government to try and find a better solution to the constant maintenance required in local sandy river crossings. Base IGI's goal was to help the authorities provide the most cost effective delivery of services to the people of those communities. IGI wanted to put forward a better solution rather than doing the same thing again, which basically would have meant the crossing would have failed again at some time in the future. The new system had to be designed for heavy vehicle and machinery traffic over delicate or unstable terrains.

Installation of the head wall on Mitchell River crossing in North Queensland.

Simon Gough, the company's Director in charge of Sales & Product Development says, "GP is well known for their unique way of thinking outside the square. The initial meeting was the usual case of a white board and a whole heap of ideas being thrown around. We went away from that meeting and quickly sat down with the product development team to hatch a plan. We had to design a system that would be able to be delivered in kit form, but be able to be assembled into a one-piece structure when completed. The engineers were very excited by what we had come up with and the project very quickly progressed to 3D models, engineering calculations done, the relative consultants involved and the project costed."

The new system would also deliver substantial cost savings due to the ability to utilize the local construction materials and very rapid speed of installation compared to traditional structures were key factors in convincing the clients that the system would do the job and be installed in a cost effective and timely

Checking levels on the crossing prior to installation of the system.

Local helicopter pilots checking the progress of the new crossing.

manner. The North Queensland region of Australia basically has two seasons, the wet and the dry. All works need to be carried out in the dry because once the wet sets in the gravel and black soil roads in these areas are closed for months at a time and the only access is by air.

Gough Plastics have an inclusive culture when it comes to product development. Many people were involved and together the team brought the project to fruition. The time frame from initial meetings to producing the first products from the mould was under 6 weeks.

A phenomenal effort by all: Gough Plastic's own internal sales and product development team worked closely with two external engineering firms during the development to meet the government requirements for funding and construction approval.

Building a sand island to form the crossing.

Water flowing over the completed crossing.

The rotational moulding process brought out some challenges. Simon Gough responds, "As a world first product we had to think very much outside the square, we knew we were going to use our track pad system as the road surface and we knew how it performed as we have been using it for quite a few years in national parks as a road system for remote and difficult track areas. We had never used it before in a situation where it was going to be submerged, flooded and subjected to so many forces from water and river bed change. The key component to the whole system is the Poly Gabion or PolyG. Gabion Walls date back to Roman times and they work. What we had to do was design, engineer and construct a product that would enable us to tie the whole structure into one piece unlike any rock gabion design. The secret to the whole

design is no matter what nature threw at it; it would hang together and not be broken up. It should be remembered that we were designing a system to replace a concrete structure weighing hundreds of tons that had been washed up to 3 kilometres downstream by the wet season monsoon flooding."

The required time frame was extremely tight for such a technically challenging project. The company not only had to meet the engineering challenges, but they had to make sure the product was freight friendly and could be handled on site with ease.

The system has application in low-level sand through to rock bed snowmelt streams and rivers that experience dramatic variations in stream flows. The extreme variations in flow usually result in serious bridge or crossing damage. The crossing is designed not to impede the flow of the river at all and be there when the water level drops to a safe crossing height. The river crossing system itself consists of two major pieces. The PolyG part of the system is a four-piece mould constructed of fabricated steel and manufactured in house. To mould the part, the company used a combination of standard Polyethylene tank grade material from local producer Qenos.

To put the system together the company had to design and engineer the galvanised steel connector plates and injection moulded pins. The grid system is formed using the PE track pads and a range of PE CNC machined connector plates, pins and screws or nylon bolts. Hydraulic pressure testing of the parts for a load of up to 10 tonne was performed and sectional cuts confirmed good wall thickness was achieved. PolyG can be filled with several materials including sand, soil or concrete, depending on the requirements of the installation.

To realise the final design, the company worked together with internal and external designers and engineers using 3D modelling to integrate with the CNC machinery at the mould shop. The mould and shot weight together for the PolyG comes in at around 1000kgs and the company notes the arms on their Rheinhardt carousel machines have been built to handle the loads. The design for the PolyG was made as simply as possible however it required hinging panels in the mould due to undercuts that create strengthening ribs, so it was necessary to use a four piece mould. Each product weighed 220kgs so, in line with Gough Plastics worker safety guidelines, the design had to allow working from the ground and special inserts were used to lift out the product from the mould with the unload and reload time in sync with the machine operation so no cycle time was lost.

> “We were designing a system to replace a concrete structure weighing hundreds of tons that had been washed up to 3 kilometres downstream by the wet season monsoon flooding.”

Gough's Trackpad is a modern polyethylene version of Marsden Matting, a standardized, perforated steel matting material originally developed by the United States at the Waterways Experiment Station shortly before World War II, primarily for the rapid construction of temporary runways and landing strips. Marsden matting consisted of steel strips with holes punched through it in rows and a formation of U-shaped channels between the holes. Hooks were formed along one long edge and slots along the other long edge so that they could be connected to each other. The short edges were straight cut with no holes or hooks. To achieve lengthwise interlocking, the mats were laid in a staggered pattern.

The Gough Plastics PE track pad is manufactured in a complicated 8-piece cast aluminium mould in two halves and six inserts that form pockets. The track pad is made using polyethylene micropellets, which have the necessary flow properties to work with the complicated geometry of the mould.

Andrew Gough, the company's Director in charge of Production states, “We were very lucky with this project that Henry and his team at Base IGI are locals we were able to use local expertise which enabled us to expedite the whole process. To expand the market and bring the product to the rest of the market in Australia will take quite a bit of doing but Rome wasn't built in a day and we are enthusiastic about the benefits of the system to remote communities everywhere.”

The development process has brought more knowledge and experience to the company with the systems being well received by authorities. CEO Ian Gough states, “There was a phenomenal amount of work that went into getting the project off the ground and the end users are grateful that they can now get to town, buy their groceries and get their children to school. Our partners are excited that we now have a solution to a continuing challenge and the system has been well received in general.”

The PolyG river-crossing concept has been used on two major projects with success and each project has allowed the company to assess the design and engineering of the system. There were minor changes made from project 1 to 2 and the results of these changes should appear once the river goes down and the developers can see the crossing again. One of them, the Dunbar – Koolatah Crossing on the Mitchell River is 400m long dual-carriage way. The Mitchell River has one of the largest catchments in Australia.

The company has been operating from its Townsville base since 1989 and has successfully completed projects in Brazil, Germany, South Africa, Papua New-

The crossing during installation of its total 400 metre length.

Guinea and throughout Australia. They take great pride in their achievements in all fields, especially those that have a bearing on Health and Environmental matters. And the company has a long history of helping the planet, particularly in the local Sugar Industry during the Second World War when grandfather Herbert Gough spent much of his time helping the Italian migrant farmers in the Lannercost area of the Herbert River Valley, Queensland, to remain viable during the times of internment. During his time as a farmer Peter Gough was responsible for developing a cane planting system, which was to become the accepted norm in the Sugar Industry worldwide before his move into plastics and specifically rotational moulding.

It has been this sort of resourcefulness and willingness to succeed and overcome challenges, that has seen a family company grow into a dedicated team of professionals striving for excellence under the banner of Gough Plastics. Most recently in their long history, they have successfully made the move from a small family based company into a well governed and truly corporate style business that is able to balance the family dynamics with good business through professional planning. The third generation version of the company includes three brothers who all take responsibility for various aspects of the business with Ian Gough as CEO and running the show, Andrew Gough focussing on Production & Product Development and Simon Gough working in Sales & Product Development. The three brothers acknowledge that this sort of ground breaking new product development is only possible with an amazing team on staff and they credit the success of the new river crossing system to their team's refusal to acknowledge something is impossible.

In an economy that continues to struggle into recovery and an industry that is suffering along with the rest of the global manufacturing sector, its innovative companies such as Gough Plastics that work with limited but sophisticated resources in highly specialised sectors that prove rotational moulding still has a world of possibilities.

The river crossing system has worldwide potential and not only for Gough Plastics. The company would be interested in talking to anyone who feels there may be some local potential for this global first in rotational moulding. If you would like more information simply go to www.goughplastics.com.au or email Simon Gough sg@gough.com.au.