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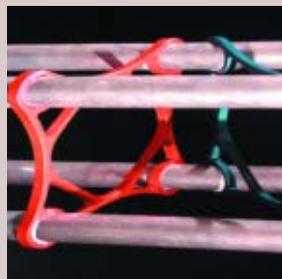
# Horizons

News and information for the extrusion customers of Hydro Aluminum

Summer 2005

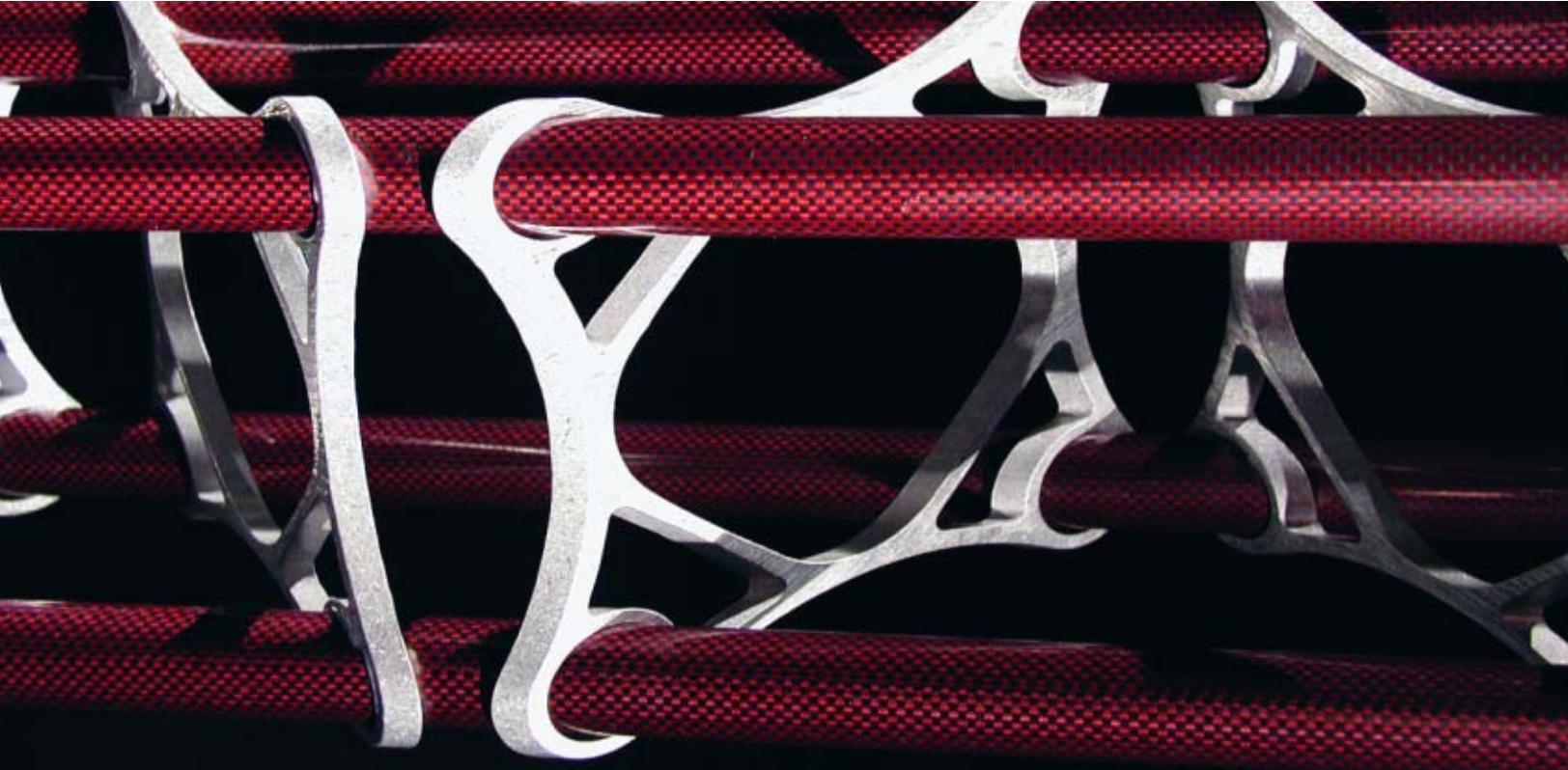
## Ford GT

Struttin' its Stuff p.4



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# Ride the Wave

A new direction for truss design

Total Structures has introduced one of the most innovative ideas in truss design called *new wave*. It is a revolutionary idea for building temporary structures used in trade show exhibits and staging for concerts, corporate events, film and TV. And to help make it happen, they chose Hydro Aluminum's Phoenix operation as their partner.

## Making waves

As the name suggests, Total Structures intends their *new wave* product to be the next generation in trussing. The concept is surprisingly simple. The *new wave* trussing system is an assembly of intertwining cords in geometrically intriguing configurations. Carbon or aluminum cords are passed through holes in aluminum extruded profiles to form a web superior in strength yet remarkably lightweight. The design provides a unique opportunity to use an epoxy adhesive to bond components, rather than the traditional, and time consuming, welding of assemblies.

"One of the challenges we faced was finding a supplier who could control the dimensions of the aluminum

web," said Peter Johns, Vice President of Total Structures. "A previous provider was unsuccessful. So, we thought we'd put Hydro to the challenge."

Total Structures had prior, positive experience working with Hydro on a Hollywood Bowl project. There, Hydro provided 1" and 2" 6061 aluminum



*Total Structures' award-winning new wave truss system is perfect for lightweight, temporary structures such as trade show displays and booths seen here. Easy to assemble in countless configurations, the new wave is an elegant, high-tech, and cost effective truss solution.*

tubing for catwalks, trusses, lighting battens and acoustic deflection panels. "Hydro provided quality product and service at the Bowl, so we thought they could do it again," explained Johns. "Sure enough, with *new wave*, Hydro came up with the perfect sample on the first try. And they have provided flawless product ever since."

The challenge is to design an extrusion with 9 perfectly shaped holes that allow 1" carbon fiber to pass through smoothly at different angles (see photo above).

"Maintaining the wall thicknesses and concentricity on some of the holes, especially those at the corners, can be tricky," explained Craig Hatlen, Hydro Aluminum Territory Sales Manager, Phoenix Operations. "The walls may fluctuate, give way or wobble during the extrusion and quenching processes. It is critical that we hold the dimensions to print so the 1" tubes will fit snug in the holes and allow the angled webs to rest at the proper angle. Hydro is able to control these dimensions through a combination of billet temperature, press



## How's It Done?



speed, quench and technical know-how." (see "How's It Done?" sidebar)

### On the same wavelength

Of course, quality is paramount to both companies.

"Our products are highly visible and used in a wide variety of public venues - a Luther Vandross stage, a Cats musical promo (see photo above), various companies' trade show booths - so our product must perform without fail," explained Johns. "Thankfully, Hydro's quality has been consistently up there."

Hydro takes many steps to maintain quality during a press run. Sample slices are taken both at the beginning and the end of each press run to match actual dimensions to specified requirements.

Hydro also provides a special 6005-T6 alloy that Total Structures needs for strength and Hydro needs for extrudability. All of the metal comes from Hydro's Phoenix remelt operations where metal purity, quality and specifications are tightly controlled. "In fact, we can modify an alloy to have tighter specifications,

within the allowable range, that give us unique advantages during the extrusion process," said Hatlen.

### The ripple effect

Offering appealing alternatives to the traditional aluminum trusses, the *new wave* versatile design presents aesthetic qualities in cords and structures never seen before. It has been making waves throughout the industry, receiving recognition six times in the past five years, most recently winning First Place in a Professional Category of the 2004 International Aluminum Extrusion Design Competition held by the Extrusion Technology for Aluminum Profiles Foundation.

Bottom line, there simply is no other truss on the market that allows this much flexibility in appearance and function. It certainly will have an impact on the future of truss design. And Hydro is proud to be a part of its history.

For more information go to [www.totalstructures.com](http://www.totalstructures.com).

Hydro's challenge was to design an extrusion for Total Structures with 9 perfectly shaped holes that allow 1" carbon fiber to pass through smoothly at different angles. Hydro developed a process that yields less distortion during extrusion and holds extremely tight tolerances. Billet temperature, press speed and quenching are closely managed so that wall thickness and hole concentricity can be maintained.

Extrusion begins by preheating aluminum billet to temperature in a range from 450°C to 500°C. Under high pressure, up to 6500 tons, the aluminum is passed through a custom die. Press speed is controlled to maintain dimensional integrity, and as the extrusion leaves the press, it is quenched and cut to 1/4" lengths in both straight and angled slices. Hydro also provides ten-foot lengths that are later cut using electrical discharge machining (EDM) to incorporate logos.

After aging in an oven to achieve proper strength, the extrusions receive a final quality check and are ready for machining, deburring and delivery to Total Structures.



# What Legends Are Made Of

## Extrusions help launch Ford GT

When the Ford Motor Company celebrated its 100th anniversary, they chose as their Centennial car the legendary Ford GT, re-designed, re-engineered and re-launched for today's high-tech automotive market.

Aluminum extrusions from Hydro's Kalamazoo, Michigan facility are key elements of this exciting new vehicle. Aluminum was chosen for its strength, lighter weight and cost effectiveness. Plus it fit the cutting-edge image Ford wanted. Hydro was selected for its engineering abilities and its extensive transportation experience.

### All-aluminum chassis

The new Ford GT features an all-aluminum chassis. From Kalamazoo, Hydro supplies 23 individual extrusion profiles. Extrusions connect four corner castings and one behind-the-passenger compartment to create a welded frame that is lightweight, yet rigid and strong. Rocker panels and bolt-on extrusions add structural support to the engine compartment. Each GT is assembled using advanced robotic welding and friction stir welding.

In addition to chassis components, Hydro supplies aluminum extrusions that are used for the door handle and rear sport bar.

### Adding value

Hydro engineers contributed significant application expertise to the project. Hydro already had proven its worth in Ford projects for Jaguar/Aston-Martin and the THINK zero-emissions electric vehicle.

With the GT, Hydro consulted on part design feasibility and alloy selection. Each specified extrusion was carefully evaluated to determine if it would meet structural and performance objectives. And new extrusion dies were created on the fly to adjust to profile changes.

Two alloys were used: 6061 was used for its strength and heat tolerance (for welding), and 6063 was used for its lighter weight and design appeal. In just 12 months from initial design, Hydro helped Ford produce three prototypes.

### Cars of the future

The 2005 Ford GT went on sale last year. If you are lucky enough to see one on the road, you'll get a feel for the high-tech metal that plays such an important role in this historic vehicle. And a metal that is sure to be seen more and more in cars of the future.

For more information go to [www.fordvehicles.com/fordgt](http://www.fordvehicles.com/fordgt)

# Partnering for the Right Reasons

## Allsteel's success with Hydro

When Hydro Aluminum was chosen as new supplier of fabricated aluminum extrusions for Allsteel's Terrace office system, both companies committed to a long-term partnership that has seen impressive advances in processes and cost controls.

### A model for transitions

Changing suppliers was a major investment for Allsteel. But Hydro's Cassville/Monett, Missouri team brought a wealth of resources – engineering design, tooling expertise, and reliable metal sources. Allsteel was assured they were making the right choice.

Both companies worked tirelessly during a six-month transition. Hydro partnered with Allsteel in design review. Improvements to extrusion shapes were identified, and dies made in record time. Fabrication equipment was transferred or bought new. And thanks to proper project management, everyone adhered to the transition schedule.

Things went so smoothly, that Allsteel now uses Hydro's transfer process as a

model for other transitions.

### Real-time improvements

Hydro and Allsteel are now engaged in several process control programs:

First, Allsteel's Margin Improvement Process: Hydro seeks ways to remove waste in production. Each year a goal is set and both companies try to improve margins together.

Second, Inventory Management Program: Hydro stocks parts and delivers them daily to Allsteel, keeping inventory costs down for both companies.

Third, On-Time Delivery: Allsteel guarantee's on-time delivery of its office systems. Hydro helps Allsteel maintain a 99.8% on-time performance.

Today, Hydro's Missouri operations supply nearly 400 parts to Allsteel including T's, L's, top cap trim, cosmetic trim, and vertical trim. Both companies anticipate a partnership long into the future.

For more information go to [www.allsteeloffice.com](http://www.allsteeloffice.com).

# Guess What?



You're looking at supercharger impellers for an automobile engine. These marvelous works of engineering help boost the power and speed of some of the top cars on the road. Intertwining impellers spin to compress an air/fuel mixture into a combustion chamber for supercharged performance.

And Hydro makes it happen. For these impellers, Hydro's St. Augustine, Florida operation created a unique process to extrude aluminum rods, twisting them as they come through a die. And, as you can imagine, they are made to absolutely precise requirements so that they can turn and intertwine flawlessly and perform under extreme heat conditions. The result is pure genius. A strong, light weight, high performance product.



# Hydro Highlights

## PEOPLE

**Randy Kearns** of Hydro's Ellenville, New York, plant won the Grand Prize at this year's ET Foundation Aluminum Extrusion Design Competition. Kearns developed a vertical windmill with a simplified structure to catch wind from any direction. He competed against nearly 100 other contestants, both Students and Professionals, from around the world.

For the past two years, Hydro has sponsored the awards for the Foundation's Design Competition, including the Hydro Sustainable Design Award for the student entry that best reflects environmental and/or societal values. Hydro recently committed to continue the sponsorship for 2006 and 2007. For information on the competition and how you can enter in 2006, visit: [www.etfoundation.org](http://www.etfoundation.org)

Hydro bolsters its transportation offerings by recruiting **Rob Abfall**, General Manager, Sidney, Ohio operations. Abfall will leverage his Automotive and Heavy Equipment experience to enhance Hydro's contract manufacturing solutions.

Another important addition, **Sanna Frew** is the new Vice President of Metal Products operations with bottom line responsibilities for all six North American casthouses. Her extensive experience in managing European remelters gives a valuable global perspective in metal sourcing, quality and safety initiatives.

## PLANTS & CAPABILITIES

Hydro's Cassville, Missouri door unit has introduced its first Terrace Door. The T-5000 was developed with Hydro's European Domal building products unit. Made for high-performance applications – coastal regions, high-rises, etc. – it is a glazed, completely finished, ready-to-install hinged door with multiple design options.



*The T-5000 is perfect for homes, condominiums, hotels and office buildings*

Hydro has invested \$3.5 million for a 50,000 sq. ft. addition to its plant in Sidney, Ohio, dedicated to the production of doors for Class 8 trucks. Sidney will fabricate, assemble and paint extrusions received from Hydro's Kalamazoo, Michigan facility.

A four-phase, \$11 million upgrade to the Hydro Ellenville, New York remelt operation has reached the halfway mark with the completion of improvements to the melter and holding furnace and the installation of a Hycast high-density gas cushion casting unit and scrap charging machine. Further upgrades in homogenization and sawing will be finished by March 2006.

Hydro has launched a program to upgrade its extrusion plants' IT infrastructure. An SAP enterprise system combined with a proprietary shop floor management system will be implemented over the next 18 months. This effort builds on the highly successful SAP integration completed by the North American remelt network last year. The end result will be streamlined processes and enhanced customer response.

## WORLD VIEW

Qatar Petroleum and Hydro will develop one of the world's largest aluminum plants with planned capacity at 570,000 metric tons of primary aluminum in the first phase. Total project costs are at USD 3 billion and Hydro's share at USD 1.5 billion. The facility will include an aluminum metal plant, anode plant, casthouse and dedicated power plant located south of Doha, Qatar. For Hydro, the project is a major strategic investment, improving its relative cost position in primary production and further strengthening its positions in global metal markets.



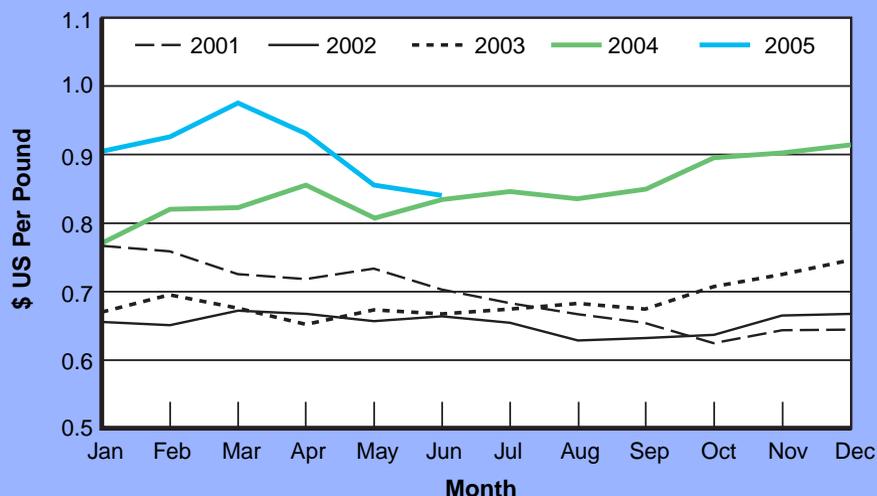
*Agreement signed by Hydro's CEO Eivind Reiten and Qatar's Minister of Energy & Industry, HE Abdullah Bin Hamad Al-Attiyah*

# Supply & Demand

## Current Market Outlook (provided July 11 by David Gast)

- LME 3 month: decreased to \$1816 versus \$1982 in Q1 2005
- Midwest P1020: \$0.8389 versus levels in Nov 2004 of \$0.9002
- 6063 Billet: \$0.9389 versus \$0.99 in Fall 2004

## History of "Metals Week" Transaction Price



## The short take

The LME cash price for aluminum has climbed since 2003, impacted by a weakened US dollar, a stronger Euro, strong market demand and tight aluminum supplies. As a result, LME prices eclipsed \$2000 per metric ton.

Recently, however, price retracements have been dramatic, dropping

down to \$1700 per metric ton. Premiums have moved downward as the Euro has weakened and metal supplies become more abundant.

Transport costs will remain high and continue to impact aluminum prices, especially in the US, a net importer of the metal.

## What goes up...

*by David Gast, Vice President, Sourcing and Trading, Metal Products, Raw Material and Hedging Group*

Beginning in the second quarter of 2003, the LME cash price for high-grade aluminum began to climb steadily upwards. While there were days when prices moved substantially, for example over \$50 per metric ton in either direction, the overall pace has been a methodical advancement to higher price levels. The increases have been supported by at least three factors.

First, the Euro strengthened in relation to the US Dollar. This made the dollar-denominated product more attractive for European market participants as they were able to buy more metal with fewer Euros. Combined with a generally buoyant demand in most markets, prices were pressured higher. Finally, as often seems to be the case, once this price movement gains momentum, the technical market players move into the fray.

Tight supplies were not a contrived event and on a few occasions supported backwardations in the market. Metal was extracted from LME warehouses to supplement the flow of metal to the market. LME inventories have been cut by more than half, or about 680,000 metric tons, over the last 2 years.

Not since early in 1995 have we seen LME prices eclipse \$2,000 per metric ton. Some market observers suggested that prices could top \$2,200 or \$1 per pound! This run up over the past 2 years touched over \$2,000 but never reached the \$2,200 level.

(Continued on next page)

LME price increases were accompanied by increases in regional premiums, like the Midwest premium. In late 2004 and early 2005, the Midwest premium moved to unprecedented levels. The long-term average MW premium had held at about \$0.044 per pound. The Midwest premium seemed range bound between \$0.05 and \$0.02. The historical references, however, have since been shattered. Over the past year, the premium increased to about \$0.075 and seemed poised to cross through \$0.08 per pound. Demand for aluminum and the costs to deliver off-shore production to the USA were major contributors to this new price frontier.

## ...must come down

(or at least we think so)

The past few weeks have seen a price retracement more dramatic than the increases seen over the past few years. The LME prices have dropped back to a level of about \$1,700. Combined factors of lower demand and the weakening of the Euro, have contributed to this downtrend. The market appears ready to trade sideways for some period of time and not make movements in either direction.

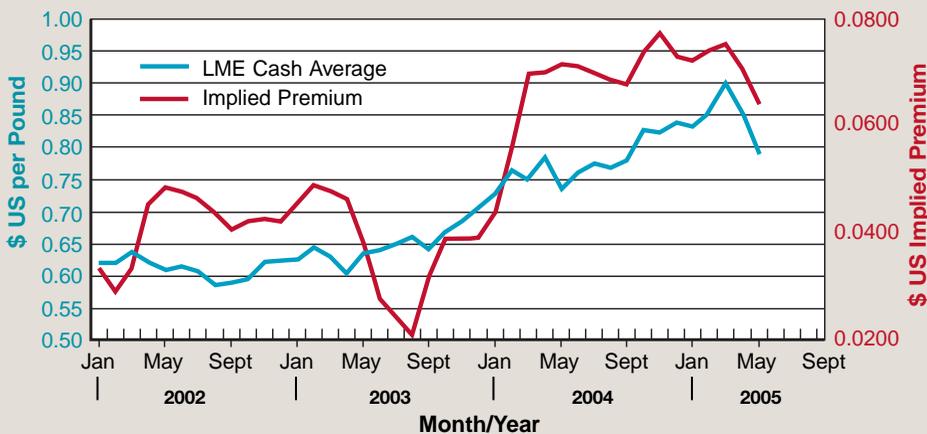
The Midwest premium has likewise moved downward giving back about 25% of the peak premium. Premiums are now about \$0.055 per pound and

represent a new challenge to the market. Metal is more abundant as demand has slackened and new production capacity has come on-line thus premiums have moved downward. The costs to bring replacement metal to market, however, have not changed dramatically. Crude prices over \$50 per barrel support higher transport costs. Also, vessels used to transport the metal around the globe remain in relatively high demand.

### Where do we go from here?

Have we reached new plateaus in prices? Over the long term, probably not. The underlying LME, which makes up most of the price of aluminum, will move yet again. Movements will occur with the dynamics of not only the supply/demand relationship, but also whenever the technical players' computers tell them to move in or out of the market. Hopefully those price movements are not so drastic so as to reduce the heartburn of metal buyers. What we can expect, however, is that as long as transport costs hold high, the Midwest premium may be playing at a new, longer-term level. The old paradigm of needing \$0.045 to bring metal to the USA market, which is a net importer, may have given way to a higher level. Let's watch the market to see how things develop over the coming months.

LME Cash Avg. & Implied Premium Since Jan. 2002



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