

NOVELIS

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IN NOVELIS #5: Multi-alloy aluminium * Innovation
Material tests * Lightweight construction at AUDI
WRW's composite pipes * Bright ideas for the future

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NOVELIS UPDATE: Valve head workshop * Third Compound Tube Conference * New brochures * Intertraffic 2010

INNOVATION *in the pipeline*

Although only founded in 2005, WRW has already established itself as a leading producer of overlap-welded multi-layer pipes, a type of composite pipe. WRW's success stems from certain members of its workforce who are pioneers in pipe-making – with a track record going back more than 25 years.

If WRW's wealth of experience is not enough to win over customers, its products certainly are: "Composite pipes combine the benefits of both plastic and metal pipes," explains Edmund Pilarski, co-founder and managing director at WRW. "They're resistant to diffusion, easy to bend, stable under high pressure and lime-resistant."

COMPOSITE MATERIALS – NOT JUST A PIPE DREAM

Because of their outstanding properties, more and more composite pipes are now replacing conventional utility piping. They have all kinds of applications: as supply pipes for panel radiators and under-floor heating, or to supply hot and cold water, gas or even compressed air.

Recently, composite pipes made in Ahlen have found an innovative new application as spiral geothermal probes.

How does this work? By circulating liquids through the pipe, geothermal engineers can draw heat energy from the earth for use in heating systems. To do this, engi-



neers normally have to drill down 100 metres or more into the earth. With the new method, which only works with composite pipes, they only need to drill down 20 to 35 metres, reducing drilling costs. "The aluminium layer also stops carbon dioxide in the earth diffusing into the pipe", continues Pilarski. This prevents ice from forming and cuts maintenance costs.

Take two layers of plastic, insert a layer of aluminium between, and what do you have? Answer: a multi-layer pipe. Seems simple – but take a closer look and you’ll soon realise these are actually high-tech products. Making multi-layer pipes is a fine art that takes in-depth expertise and years of experience. How best to make these pipes lighter and stronger is demonstrated by Westfälische Rohrwerke (WRW), a pipe manufacturer from Ahlen, 30 miles north-east of Dortmund in north-west Germany.



Composite pipes also have plenty to offer above ground. Because they’re inelastic and don’t spring back or change length when hot, they can be laid in all sorts of enclosed spaces. Also, there is no need to weld connector fittings onto the pipes, reducing the risk of fire. Instead, the pipes can be connected quickly and safely using screw or crimp-type connectors. And when used as coils, connectors are often not needed at all. This saves time and money when laying pipes – and reduces the risk of leaks.

HIGH-TECH IS HIGH ON THE AGENDA

Whether coiled or straight, manufacturing composite pipes is an art in itself. First, a continuous thin strip of metal is used to form the

aluminium pipe in one go. This is then welded into place. Immediately afterwards, the plastic layer on the inside and outside is extruded onto the aluminium as compactly as possible.

For ultimate quality, every stage of the production process is neatly dovetailed, including several rounds of checks. “For example,” says Pilarski, “we pressurise the pipe to 10 bar.” This tests the pipe’s most important property – it mustn’t leak! And it has to stay that way for 30 to 50 years, or maybe even longer. Imagine what would happen if an underfloor heating pipe sprang a leak!

WRW places emphasis on product excellence, but also cares about productivity.

COMPOSITE PIPES

For example, depending on the pipe diameter, the factory in Ahlen can produce between 1500 and 2000 meters of piping per hour – enough to go round an athletics track four or five times.

QUALITY WITHOUT COMPROMISE

As such high demands are placed on WRW's innovative composite pipes, the specification and properties of the pipe's metal core are crucial. "We see aluminium as the ideal material," says Pilarski. "It's light, flexible, impervious to chemicals and doesn't react with the plastic."

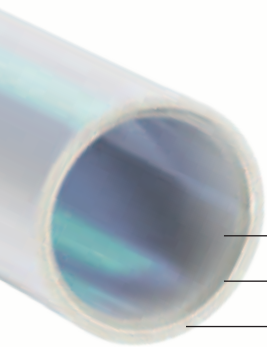
Composite pipes have to go through a variety of complex production processes, so it's important to get everything just right. This applies to the quality of the aluminium and the chemical and mechanical properties of the alloy. There are also strict tolerances to adhere to, all to a defined timing schedule. Even though the aluminium surface is not visible, its surface properties are pivotal to the quality of the composite pipe.

The surface of the aluminium needs to be just right in order to bond flawlessly and permanently

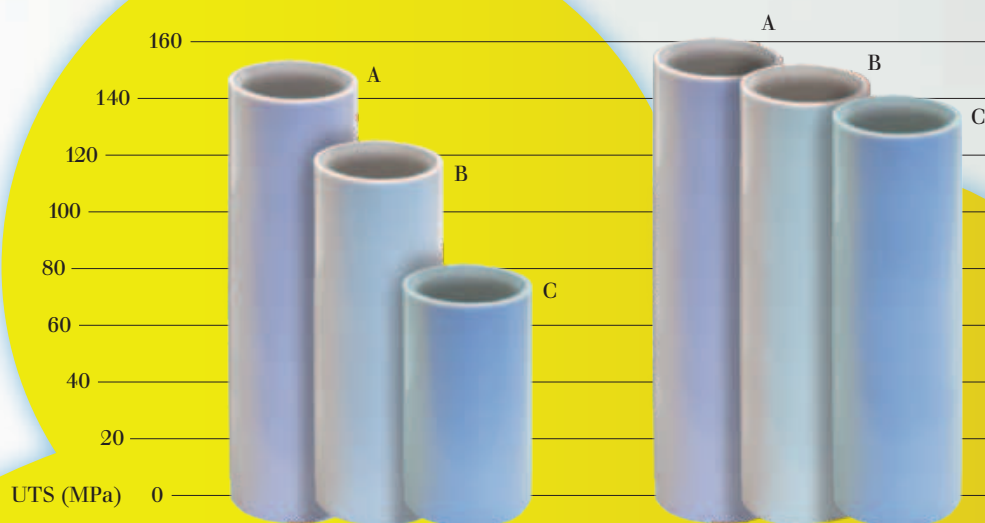
with the inner and outer plastic layers on the production line. "This was why our search for the right supplier was so difficult," reflects Pilarski, describing the early days of the composite pipe.

WRW found a partner able to deliver the quality the company needed: Novelis. Novelis also has the facilities it takes to address key criteria such as absolutely clean metal surfaces and pipe thickness tolerances thinner than a sheet of paper.





Inner pipe
Aluminium pipe
Outer pipe



Mechanical strengths of EN-AW3003 (left) and Novelis Fusion™ BS410 (right) A = UTS at 20°, B = UTS at 95°, C = Creep (breaks after 1 hour at 95°)

CLOSE PARTNERSHIPS PAY DIVIDENDS

Pilarski and his colleagues have been working closely with the metal rolling experts at Novelis ever since. Recently, WRW decided to investigate ‘the new aluminium’ – Novelis Fusion™ – to see if it was also suited to composite pipes.

Just like composite pipes, which combine the benefits of metal and plastic, Novelis Fusion™ offers a variety of useful aluminium properties in a single alloy – effectively sidestepping many of the compromises previously associated with alloys. So WRW took the logical step of checking, testing and ultimately using the new aluminium in its products.

WRW engineers had been trying to improve the rigidity of their pipes for some time by using thicker metal. But this had its limits, as expanding the pipe diameter is not an option and reducing the plastic thickness is also problematic. At the same time, WRW had been using the same tried-and-tested alloy for years and was reluctant to change. Testing the deformation and welding properties and corrosion resistance of a new alloy would have been too big a task.

With Novelis Fusion™, it was possible to keep using the old alloy for the outer layers of the metal strip, while using an alloy with higher rigidity for the core. “Right from the very first test, things looked highly encouraging,” remembers Pilarski, an authority in composite piping. “Novelis Fusion™ allowed us to improve rigidity significantly, with a layer of metal only a fraction thicker.” Previously, it would have been necessary to almost double the thickness of the aluminium layer.

SERIALLY PRODUCED PRODUCT ENHANCEMENTS

Before serial production of the new pipe began in 2008, WRW had to prove the product’s longevity to meet the DIN EN 9080 standard. This meant leaving the material in a hot-water pressure chamber under standardised conditions for a minimum of 8760 hours – a whole year!

The result: Novelis Fusion™ has enhanced the performance of multi-layer composite piping several times over. “The type of Novelis Fusion™ we use is more durable than other alloys, and can be produced in thinner layers,” says Edmund Pilarski. “We can now make composite pipes for applications that weren’t previously possible with aluminium.”

WRW currently produces 30 million metres of piping a year, mainly for use in heat production, and anticipates market expansion over the next 10 years. Production is likely to shift focus with the launch of many new products for fields such as cooling applications. Who knows what other applications WRW’s Novelis Fusion™ composite pipe will find in the future?



To find out more, visit:
www.wrw-ahlen.de
www.the-new-aluminium.com