Press information

Metal forming using water revolutionizes component manufacturing in the automotive industry

Henkel Technologies offers matched Fluid-System for hydroforming

Hydroforming – using the power of water to form metals – is a new and revolutionary technology which is gaining importance in automotive manufacturing. Hollow components are formed by filling them with water and subjecting the water to intense pressure. The so-called "medium additive", essentially an anti-corrosive compound with friction-reducing properties which is added to the water, plays an important role in the hydroforming process. In addition, lubricants are also needed for the external surfaces of hydroformed metal components. Henkel Technologies supplies a perfectly matched fluid-system ensuring optimum results.

Düsseldorf – Hydroforming is based on the physical property of water to retain its volume unchanged under pressure. The role of water is that of an active medium similar to that of air which is blown into a balloon. The hydroforming process begins where pipes or other hollow bodies are placed in a special machine and filled with water, which is then subjected to high pressure. The high pressure inside the pipe or the hollow body causes it to expand to the maximum extent allowed by the die. When the process was first introduced, it was suitable to form only soft metals such as lead and copper. With increasing sophistication of plants and processes it is now possible to generate and control the enormous forces and pressures that

are necessary to form steel and aluminum. Modern hydroforming plants can generate high pressures of several thousand bars within the worked components.

Ideal for modern lightweight design

Innovative plant technologies have made hydroforming particularly attractive for the automotive industry. Using hydroforming to produce hollow automotive components has several decisive advantages: the components have higher rigidity and strength at low weights. The production process telescopes several steps into one, doing away with welding for joining operations for instance. As a result, hydroforming is very useful in designing vehicles that are lighter and yet meet higher standards of crash safety and rigidity of the chassis. Hydroforming is a very efficient technology to produce components with complex geometries such as exhaust systems and engine frames for cars as well as utility vehicles. In exhaust systems for example, hydroforming helps to cut down on the overall number of individual parts, reducing in the process material weight, development times, production overheads and hence manufacturing costs, compared to conventional techniques. At the same time, hydroformed components last significantly longer which also translates into added value for customers.

Additive a key component

For the automotive industry, hydroforming initially entails substantial investments in new plants and machinery. The choice of the additive is therefore very important to achieve optimum results in mass production and to keep the manufacturing process stable as long as possible. The additive combines with water to form a solution which prevents corrosion of the component and the die as well as the hydraulic assemblies of the hydroforming plant.

Approved by world market leader

High-performance lubrication, bacterial stability and corrosion protection are the exacting requirements for an additive which MULTAN 98-10, developed by Henkel Technologies, meets to optimum effect. The product is

fully synthetic, boron-free and offers a long shelf life. Proof of product quality comes in the form of approval by Schuler, a world leader in hydroforming plants, following ten months of trials on the shop floor and numerous tests. The experts at Schuler were particularly impressed by the favorable lubrication and metal forming properties of the product as well as its stability under pressure and compatibility with other components such as pressure seals and cables.

High purity and stability

Inferior additives can cause serious damage to hydroforming plants which cost several million euro. In order to preclude such damage, Schuler makes it mandatory for its customers to use only approved additives. Schuler's approval of MULTAN 98-10 vouches for high purity and long term stability even after sustained use – prerequisites for smooth working in the challenging context of automotive mass-production.

A matched pair

In addition to an efficient additive for the internal high-pressure medium, external lubrication is another key aspect in hydroforming. This is why Henkel Technologies offers a perfectly matched fluid system for users of hydroforming applications. Product development of the external lubricant is closely accompanied by friction tests at the Technical University of Darmstadt and the Institute for Metal Forming Technology in Stuttgart. Additive and lubricant are applied in separate contexts. For the hydroforming plant to function correctly, lubricant and additive must not be mutually miscible under any circumstances. Positive results from shop floor tests in the USA and Europe confirm that the fluid system is designed perfectly. Henkel Technologies also develops customized solutions for hydroforming applications in co-operation with the automotive and automotive parts industries with a single objective – achieving the highest standards in production.