



Ships are built, maintained and repaired at the Damen Shipyards Group site at Hardinxveld in the Netherlands.

Images: Stauff

Special requirements in the marine industry

Hydraulic components in shipbuilding

The safety of the hydraulic line system plays a key role in shipbuilding. Leaks and unintentional machine downtimes can cause significant economic losses as well as environmental damage with far-reaching consequences. The Damen Shipyards Group has been using Stauff products for many years and, some years ago, even replaced its welded joints with the Stauff Form EVO forming system.

In The Damen Shipyards Group occupies an important position in international shipbuilding: 11,000 employees, an annual turnover of around €2.5 billion, 35 shipyards in 20 countries and over 6,000 ships built in just under a century are impressive figures for its success. Founded in 1927 by Jan and Marius Damen in Hardinxveld-Giesendam (Netherlands), the shipyard's product range spans work boats and tugs, including the well-known "Shoalbuster" and "MultiCat" series, to ferries, naval vessels and mega yachts. The company's headquarters is in the Dutch town of Gorinchem. Maintenance, repair and the new construction of ships up to 90 metres in length takes place

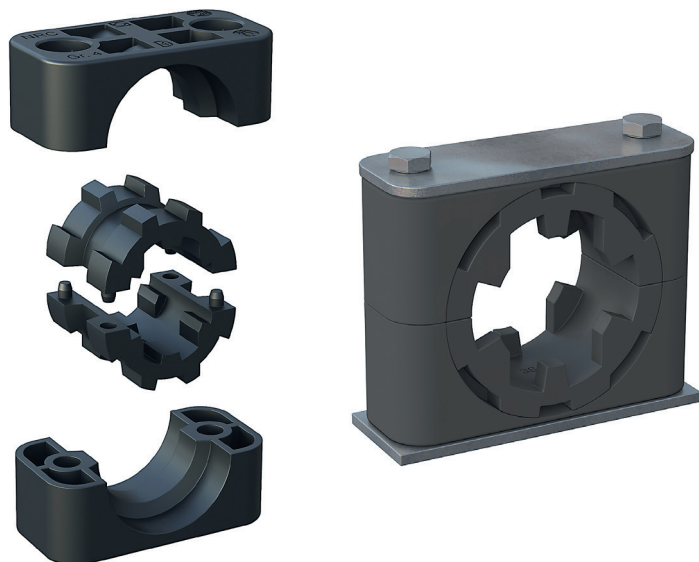
at the company's site in Hardinxveld. This site also supplies other sites with hydraulic line systems.

From welded to detachable tube connectors

Marcel De Bruin, Piping Manager at Damen, has traditionally been an advocate of welded tube connectors. This method offers almost never-ending durability, but requires experienced skilled personnel, takes a lot of time, and is less flexible when it comes to repairs or conversions. He was sceptical of detachable connectors. However, the desire for greater flexibility and increased speed of work led to a rethink in 2018.

Marcel de Bruin turned to the Dutch Stauff-Line system partner JB Hydraulics in his search for an equally reliable connector system. For many years, JB had been supplying the Damen Hardinxveld site with various Stauff hydraulic components (tube clamps, connectors, measuring equipment), which suggested the choice of the Stauff-Form EVO forming system.

Forming systems are characterised by their excellent tear-out strength and durability under extreme conditions, such as strong pressure surges and vibrations, a crucial benefit in particularly safety-critical sectors, such as shipbuilding. In the Stauff Form EVO forming system, a compact machine forms the tube end such that – when fitting “metal to metal” with a conventional fitting body and a union nut – it produces a positive-fit, sealed connection. The only possible leakage path is additionally protected by the special Stauff Viton sealing ring. Approval by the DNV and other independent classification organisations qualifies the system for use in the maritime industry.



NRC clamps are available for tube diameters of between 6 and 89 mm.

The insert contour of the NRC clamp reduces the contact area between the clamp body and the tube

Shipbuilding was there from the very beginning

In this 1960s, Stauff began as the inventor of plastic clamps to fasten hydraulic tubes, and has continuously expanded its product portfolio since then. Soon shipyards counted among the company’s convinced customers and, in 1968, the Stauff clamp received its first approval by Germanischer Lloyd. Today the company is known internationally as a full-liner for all hydraulic line system components, and supplies the manufacturers of mobile and stationary systems in the international hydraulic market. All products are developed and produced in-house: the Stauff Connect tube connection range, tube clamps and measuring equipment, SAE and ISO standard-compliant flange connectors, and two-way and multi-way valves to shut off fluid media flows. The marine industry also benefits from the company’s investment in research and development. A crucial service for internationally operating companies is the support and supply of its own production sites, as well as end customers, through 45 Stauff sites in 18 countries, combined with an international network of partners. Research, development and production continue to be located at Stauff’s headquarters in the Sauerland region of Germany.



Damen uses various products from the Stauff connector and fastening range.



Damen work boats are known throughout the world for their excellent durability.

Success factor: collaboration with OEMs, service for end customers

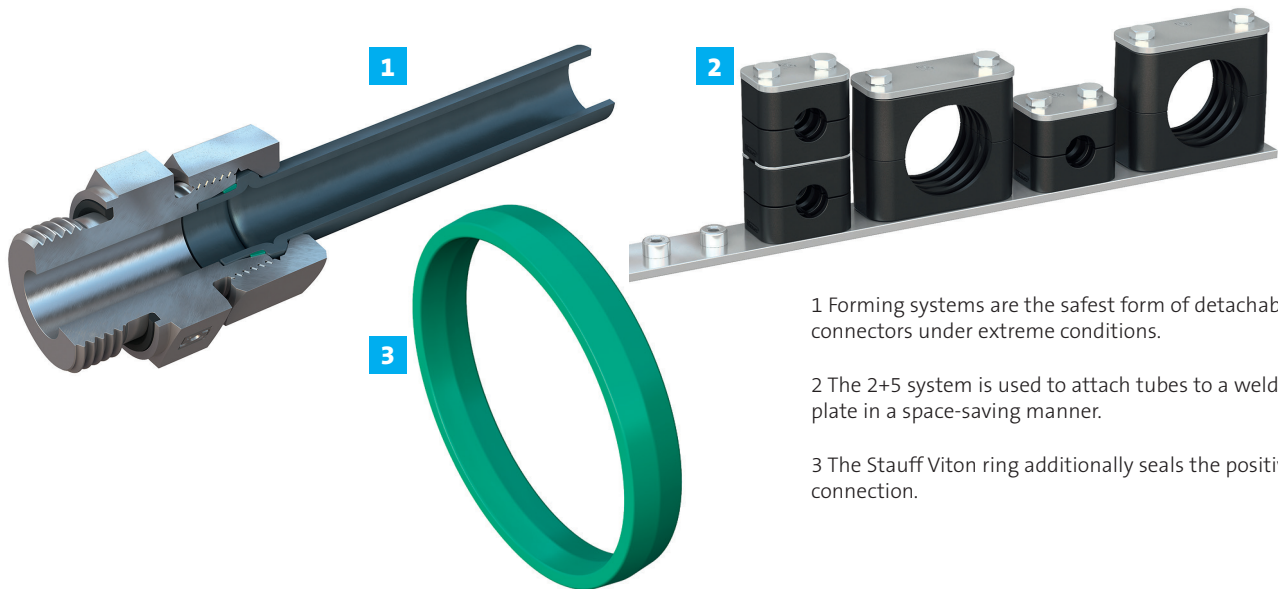
One of the key success factors for OEMs is direct collaboration with the development specialists at Stauff. This enables hydraulic circuits and line systems to be taken into account at the design stage and, if need be, special clamps developed, which, in turn, advance hydraulics throughout the marine industry. Sensitive criteria include the available installation space, weight of components, vibration resistance, shock resistance, acoustics, contact with water, and special fire protection materials or certification requirements.

Requirement: vibration reduction

Stauff NRC clamps were developed to minimise noise emissions plus vibrations, which place special stress on the fasteners and tube connectors. NRC clamps (Noise Reduction Clamps) are designed for tubes with outside



Marcel de Bruin (right) receives advice in Hardinxveld from the Dutch Stauff-Line system partner JB Hydraulics.



1 Forming systems are the safest form of detachable tube connectors under extreme conditions.

2 The 2+5 system is used to attach tubes to a welding plate in a space-saving manner.

3 The Stauff Viton ring additionally seals the positive-fit connection.

diameters of between 6 and 89 mm and/or between 1/4 and 3 inches. Their innovative design is based on a polypropylene

clamp body that complies with the Standard Series according to DIN 3015 (Part 1), combined with a specially shaped two-part elastomer insert. The contour of this insert produces a minimal contact area between the tube and clamp body, dampening vibrations much more effectively than previously known solutions. The reversible tongue-and-groove contour of the insert and clamp body offers flexibility and versatility, as it enables the system to be used for a wide range of tube dimensions for each clamp size.

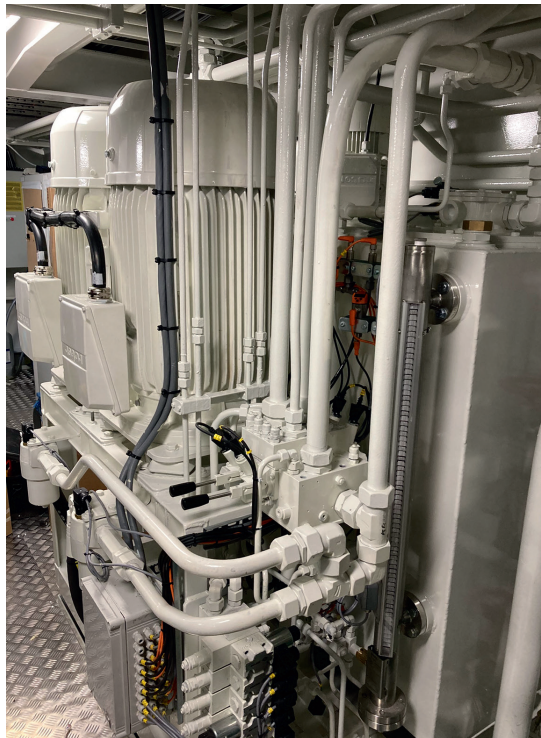
Specific material expertise

Fastening components also had to be continuously developed and differentiated with the increasing complexity of hydraulically operated systems. This also includes the continuous expansion of the range of materials. Stauff

supplies clamps made of flame-retardant plastics, which comply with international guidelines and standards, for safety-relevant areas in shipbuilding. Different Shore hardnesses are also called for in shipbuilding. Softer elastomers absorb vibrations and impacts better, while harder plastics offer greater structural integrity and resistance to mechanical wear. The chemical resistance and thermal properties of the materials are also taken into account. These various criteria must be carefully weighed up against each other when selecting the optimum fastening solution. If required, Stauff is able to develop customised solutions and also produce them in small series.

Saving time with the '2+5 system'

There is often very little installation space available in hydraulic systems in the maritime industry. The connectors are generally worked on site and need to be configured precisely to the installation conditions on site. Stauff's 2+5 system offers a space-saving and flexible solution for fastening pipes with diameters of between 6 and 42 mm for this specific scenario. The system enables size 2 and 5 clamp bodies to be fastened on a single welding plate. The system is complemented by single and multi-clamps with elastomer inserts, which can be flexibly inserted into the clamp halves to securely fix all tube diameters. Stauff offers special safety locking plates for the multi-clamps to ensure their stable installation in 'metal cages'.



Damen Shipyards has switched over to the Stauff Form Evo forming system.

Economic benefits with Stauff Form Evo

Tube preparation workflows have been greatly simplified since the Hardinxveld tube experts switched over from welding to forming. Marcel De Bruin: "Previously we had to prepare, weld, clean, X-ray and possibly rework the tubes, and then zinc-plate or paint them. Personnel outlay, processing times and costs were high. We now simply measure the tube, saw it, and deburr it. It is then bent and formed and can be installed directly." Using the Stauff Form Evo machine in Hardinxveld, eight tubing experts prepare around 8,000 ready-to-install hydraulic tubes each year. This means that the machine is used for some 16,000 connecting operations with 8 to 42 mm diameter tubes – 95% of which are made of carbon steel and 5% stainless steel.

rso ■