Tackling Corrosion Through Material Selection and Precision Engineering

From offshore platforms and refineries to LNG terminals, steel components must withstand demanding conditions while delivering reliable service over decades. Swiss specialist Montanstahl combines expertise in stainless steels and high-performance alloys with a range of manufacturing technologies to produce standard and bespoke profiles for the energy sector. In this Q&A, Oil and Gas Innovation explores how the company approaches corrosion resistance, manufacturing precision and customer collaboration, and how its capabilities support both established oil and gas operations and emerging hydrogen projects.

OGI: Could you start by explaining Montanstahl's credentials and experience in terms of your products and services for the oil and gas sector? Could you tell our readers the breadth of your experience, how long the company has been active, and its reach?

Montanstahl: Montanstahl is a family-owned Swiss company founded in 1983 in Stabio, and today it ranks among the worldwide market leaders in special steel profiles. What began as a single rolling mill has grown into an international group: Montanstahl AG in Switzerland, Montanstahl GmbH in Schwerte, Germany, the hot extrusion plant taken over from the former Hoesch Schwerter Extruded Profiles in 2021, Siderval S.p.A. in Talamona, Italy, a hot extrusion specialist founded in 1972 that joined the group in 2023, Stainless Structurals in Conroe, Texas, established in 2005, and, since June 2026, Extralloys LLC in Tunica, Mississippi, our first hot extrusion hub in the Americas.

Montanstahl's Headquarters.



Across these plants we master a shared technology portfolio comprising hot rolling, hot extrusion, laser fusion, cold rolling and cold drawing, and we process everything from carbon steel through austenitic, duplex and super duplex stainless steels to titanium and nickel alloys, with each plant contributing its own specialty: in Stabio we produce profiles in Inconel Alloy 600 and Monel Alloy 400, Schwerte hot extrudes Inconel Alloy 625 and Alloy 690, Siderval covers Alloy 625 and Monel Alloy 400, and Extralloys extends the range in the Americas with grades including Inconel and Monel. For the oil and gas industry specifically, we supply both standardised stainless steel structural, now an essential planning component in the design of new offshore platforms, and fully custom profiles for regasification plants, oil reactors, refineries and petrochemical installations, in the high-performance grades this industry increasingly demands. This is backed by third-party certification: our production processes are certified to ISO 9001:2015, and our product approvals include NORSOK M-650 for the offshore market, EN 1090 factory production control and welding certification, PED, and workshop approvals from DNV and Lloyd's Register.

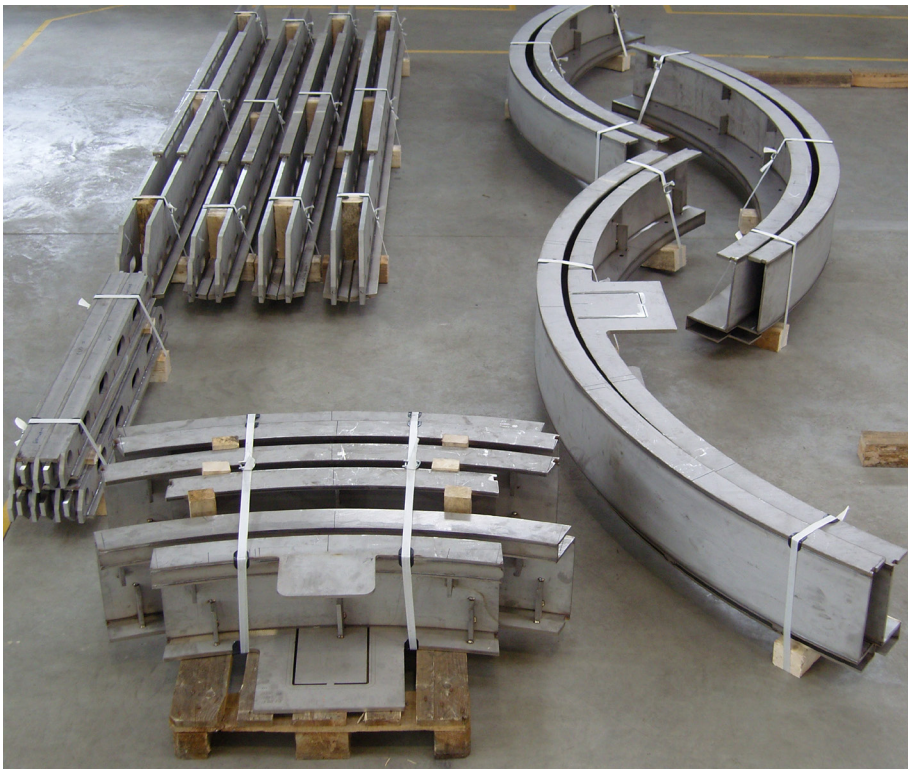


OGI: Corrosion remains one of the biggest challenges for upstream, midstream and downstream facilities. What advantages do stainless steel profiles offer over conventional materials in harsh operating environments?

Montanstahl: The obvious advantage is that austenitic, duplex and super duplex stainless steels resist the chlorides and process chemicals that attack carbon steel, without depending on coating systems that need constant inspection and renewal. But two less obvious advantages matter just as much. First, mechanics: duplex grades combine corrosion resistance with significantly higher strength than carbon steel, so a thinner, lighter section can carry the same load, a decisive argument when every kilogram has to be lifted onto a platform. Second, geometry: corrosion offshore often starts in crevices where salt-laden water concentrates. A hot rolled angle has generous root radii that leave a gap against the pipe shoe or the surrounding steelwork; a laser welded profile with sharp, defined edges sits flush and eliminates that crevice. Take pipe supports as an example, individually inexpensive, but there are thousands of them on a platform, and the grade and geometry chosen for each one determine how much inspection and replacement work the operator inherits over the life of the asset. That is why lean duplex grades such as 1.4362 have become the reference for structural work on offshore platforms, a market we supply with NORSOK M-650 qualified production. And where even super duplex reaches its limits, sour service, or the hydrofluoric acid environments of refinery alkylation units, nickel alloys take over: Inconel Alloy 625 and Monel Alloy 400 are part of our regular production range across the group.

OGI: Every energy project presents unique engineering challenges. How closely does Montanstahl work with customers to develop bespoke profile solutions, and what does that collaboration typically involve?

Montanstahl: Very closely, and from the earliest possible stage. Our approach has always been that during the design phase of a new profile all available manufacturing technologies



must be considered, hot rolling, hot extrusion, laser fusion, cold drawing or a combination, so the customer gets the most cost-effective route to the required geometry, tolerance and grade, never a solution forced into one process. In practice, collaboration typically involves reviewing the drawings with the customer's engineers, proposing modifications that reduce machining or eliminate complex assemblies of standard products, and validating the section before series production; our extrusion facilities can even produce single-bar prototypes. Because our hot rolling relies on electric induction heating, we can run small batches economically, which suits the low-volume, project-driven nature of energy work. The collaboration extends to delivery details as well: on a offshore project we specified flange lengths at exactly 295 mm to eliminate material waste, cut flanges at the ends to simplify site assembly, and laser engraved every section with a unique identification code so each piece could be located within the assembly sequence.

OGI: As operators increasingly focus on reducing lifecycle costs, how can custom-engineered steel profiles improve reliability, minimise maintenance and extend asset life?

Montanstahl: Lifecycle cost is decided at the specification stage, not at the purchase order. A custom-engineered profile contributes in three ways. Material: choosing a duplex or austenitic grade matched to the actual corrosive environment removes the recurring cost of coating, inspecting and replacing carbon steel components. Geometry: sharp-edged, laser fused sections eliminate the crevices where localised corrosion begins, which directly reduces the inspection burden over decades of service; and because higher-strength grades allow thinner sections, structures are lighter to install and impose less dead load. Precision: components for offshore installations are prefabricated onshore and installed against piping that is already routed, a section that drifts dimensionally means rework offshore at a cost far above the value of the part. Our laser welding holds tolerances of 0.5 mm with perfectly straight faces, so parts fit first time. The result is a component that may cost more per kilogram than commodity steel but costs far less per year of reliable service.

OGI: The LNG sector continues to expand worldwide. What opportunities do you see for specialised stainless steel components in LNG terminals, liquefaction plants and storage facilities?

Montanstahl: LNG is a natural fit for our capabilities because cryogenic service rules out carbon steel from the outset: at process temperatures reaching down to −180 °C, standard carbon steel becomes brittle and loses the fracture toughness required for structural integrity, while austenitic stainless grades such as 304L retain their toughness. Every liquefaction train, regasification terminal and storage facility therefore needs stainless structural frameworks for its process equipment: skids, supports, platforms and these structures rarely match standard mill geometry. We manufactured several complete stainless steel skids for an offshore regasification plant built on a vessel in Norway: laser fused HEA beams in sizes 140, 180 and 300 and square hollow sections in 150 and 300, cut to custom lengths, with stiffening plates and laser-cut lifting lugs supplied as part of the package. As LNG capacity continues to be added worldwide, onshore terminals, FSRUs, bunkering infrastructure, we see growing demand for exactly this kind of assembly-ready, custom-length stainless supply.

OGI: Hydrogen is becoming an increasingly important part of the global energy mix. How is Montanstahl positioning itself to support hydrogen production, storage and transportation projects?

Montanstahl: Hydrogen builds directly on competences we already exercise every day. On the cryogenic side, liquid hydrogen at −253 °C pushes the same material logic as LNG even further: austenitic stainless steels remain the structural materials of choice, and our experience supplying assembly-ready 304L and 316L frameworks for cryogenic plants transfers directly to liquefaction and storage projects. On the materials side, hydrogen service raises questions of embrittlement and compatibility that favour precisely the grades our group processes, stable austenitics, and nickel alloys such as Inconel Alloy 625 and Monel Alloy 400, which we hot extrude in Europe at Schwerte and Siderval and, through Extralloys, in the United States as well. And on the production side, electrolysers, compression stations and refuelling infrastructure are being built by engineering companies that need small series of custom sections in exotic grades with short lead times, exactly the niche our flexible, small-batch technologies were built for. We are following hydrogen project development in Europe and North America closely and are already in dialogue with equipment manufacturers entering this market.

OGI: Many oil and gas operators are balancing performance requirements with sustainability targets. How can material selection contribute to both operational efficiency and lower environmental impact?

Montanstahl: Material selection is one of the few decisions that improves performance and footprint at the same time. A stainless or duplex component lasts the life of the asset without coatings, solvent-based maintenance or periodic replacement, and at end of life the material is fully recyclable and retains real value, stainless steel production is itself largely based on recycled scrap. Higher-strength duplex grades allow thinner, lighter sections, which means less material produced, transported and lifted per function delivered. Our manufacturing choices reinforce this: Montanstahl has heated its hot rolling line by electric induction since 1983, a cleaner solution than the gas furnaces traditional at the time, and our near-net-shape technologies such as laser fusion and hot extrusion produce sections to the exact geometry and length required, minimising machining scrap; on customer request we routinely optimise dimensions specifically to eliminate material waste. Finally, steel profiles qualifying as Swiss-origin goods are exempt from the EU's Carbon Border Adjustment Mechanism (CBAM), offering a procurement advantage for customers importing into the EU as the mechanism enters its definitive phase. These commitments are certified and documented: our German hot extrusion plant operates certified ISO 14001:2015 environmental and ISO 50001:2018 energy management systems, we publish Environmental Product Declarations for our profiles, and our sustainability report is publicly available on our website.



OGI: Manufacturing precision is becoming increasingly important as projects become more complex. How have advances in your production technologies improved quality, tolerances and lead times?

Montanstahl: Laser fusion, which we industrialised in the early 2000s, changed what a welded

structural section can be. The process is autogenous: no filler material is added, the laser simply fuses the parent material with itself, so flange and web become one and the finished profile behaves like a monolithic section, with no foreign metal in the joint whose chemistry could differ from the base material. And because the laser concentrates heat in a narrow seam, distortion is minimal, edges stay sharp and, critically for duplex grades, the phase balance of the microstructure is preserved, so the corrosion behaviour of the parent material carries through the joint. Its latest evolution laser welding, delivers sharp-edged profiles with flat, straight faces held to tolerances of 0.5 mm. Alongside it, 3D laser fusion and hybrid laser welding extend the geometry range, hot extrusion at Siderval, Montanstahl GmbH and Extralloys produces complex seamless solid and hollow sections, up to a 17-inch inscribed circle and 90-foot lengths in the United States, and cold drawing refines tolerances and surface condition further. Digitalisation supports the precision: laser engraving of identification codes lets fabricators track every piece through an assembly sequence. On lead times, the combination of flexible small-batch processes and production on two continents means customers no longer wait for overseas sourcing of special sections. Quality assurance keeps pace with the technology: welding operations are certified to DIN EN ISO 3834-2 and supervised by our internal International Welding Engineer, every product ships with an EN 10204 certificate (2.2 or 3.1) as standard, and customers can order third-party witnessed 3.2 certification issued by an accredited inspection institute, a routine requirement in oil and gas that our quality department handles alongside external inspectors from the nuclear, naval and aeronautical sectors as well.

OGI: Supply chain resilience has become a major concern across the energy industry. What steps has Montanstahl taken to ensure reliable deliveries and consistent product availability for customers worldwide?

Montanstahl: Our answer to supply chain risk has been structural: we duplicated our key technologies on both sides of the Atlantic. In Europe we produce in Switzerland, Germany and Italy; in the United States, Stainless Structurals in Conroe, Texas has manufactured laser fused sections domestically since 2012, and with Extralloys in Tunica, Mississippi the group now operates a hot extrusion hub in the Americas as well. Together they form one of the most complete specialty profile manufacturing platforms on the continent, covering both laser-welded and hot-extruded solutions with full domestic production, shorter lead times and Buy American compliance, high-performance profiles that previously required overseas sourcing are now made locally. This regional redundancy means a disruption in one region does not stop supply to customers in another. On top of manufacturing, we maintain stock programmes of standard stainless structurals with distribution covering more than 60 countries, supported by an online client area giving customers direct visibility of available material. For selected orders we also offer a call-off service: the material is produced against a blanket order and then released in scheduled deliveries as the project requires, so customers secure capacity and price without carrying the full inventory themselves. And as a family-owned group we plan for continuity over decades, not quarters, which is ultimately what long-life energy assets require from their suppliers.

OGI: Could you share a recent project where Montanstahl's engineering expertise or custom profile capabilities solved a particularly challenging problem for an energy-sector customer?

Montanstahl: A project that brings all of this together is the offshore regasification plant built on a vessel in Norway, for which we manufactured several complete stainless steel skids housing all the LNG process equipment. The challenge was threefold: cryogenic operating conditions down to −180 °C ruled out carbon steel, the vessel-mounted installation had to withstand both the process environment and the mechanical loads of a marine setting, and the skid envelope 9 metres long, 2 metres wide and nearly 5 metres high, dictated section lengths and flange geometry that fell outside standard mill supply. Our solution was a complete package in stainless steel 304L: laser fused HEA beams in sizes 140, 180 and 300 and square hollow sections in 150 and 300, cut to custom lengths of 3.4 and 4.5 metres, with flange lengths specified at 295 mm to eliminate material waste and flanges cut at the ends to simplify on-site assembly. Every section was laser engraved with a unique identification code so each piece could be located within the assembly sequence, and stiffening plates and laser-cut lifting lugs were supplied loose as part of the order. The customer received not a batch of steel but an assembly-ready kit, which is exactly what offshore schedules demand. On a smaller scale but with the same logic, we supplied low impact laser welded lean duplex 1.4362 angle profiles as pipe supports for an offshore installation, sharp-edged and held to 0.5 mm tolerances so that thousands of prefabricated supports fitted first time against piping already routed.

Montanstahl's approach highlights how material selection, profile geometry and manufacturing precision can influence an energy asset's performance throughout its operating life. By working with customers from the design stage and supplying components tailored to installation requirements, the company aims to reduce rework, simplify maintenance and support long-term reliability. With production capabilities across Europe and the United States, Montanstahl is positioning itself to meet demand for specialised steel solutions across offshore, LNG and hydrogen infrastructure.

Contact Information:

Montanstahl AG
W: www.montanstahl.com
E: info@montanstahl.com
T: +41 91 641 68 00