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Cranes without compromise by using ultra high-strength steels - case Fassi

The fierce competition in the lifting- and transportation industry forces companies in the business to develop better products, if they wish to remain in the competition. Making use of ultra high-strength steels to lighten lifting arms and booms has become an important competitive factor, especially in Central Europe.

Ruukki is a forerunner in the production and development of thin ultra high-strength steels. The company has a strong position in the production of components for the end-product manufacturers of lifting and transportation industries. One focus area of Ruukki's product development work has been the use of ultra high-strength steels in welded structures.



- Only with high-strength steels are we able to develop lighter, longer, stronger and safer cranes. These are our main goals, which enable us to say: "cranes without compromise", explains Rossano Ceresoli, R&D Manager at O.ME.FA. S.p.A, which is part of Fassi group.

Fassi Gru S.p.A is one of the biggest manufacturers of loader cranes. Use of advanced materials from leading steel manufacturers guarantees the quality of Fassi products.

Lightness brings competitiveness

- From my point of view, the most significant problem in crane manufacturing is the deflection of crane's structure. In the past, the cranes were heavy and short. Today, thanks to high strength steels, the lifting booms are lighter and longer and we should have the elastic deflection totally under control, Ceresoli explains.

The new ultra high-strength steel grades enable smaller total weight and higher strength of the hoist. This materializes in the crane as higher efficiency, higher payload, longer reach and safer lifting. The lighter crane decreases also the fuel consumption of the vehicle. All these together mean competitiveness in a fierce market.

- From the steel used in cranes, we require high strength, high toughness, good welding and bending properties, high homogeneity in physical, chemical and mechanical properties and low thickness variation, Ceresoli lists.

The properties mentioned by him are the same that Ruukki is targeting and improving in its own development work of ultra high-strength steels.



Fassi's loader crane directed to the German market. The steel used is Ruukki's Optim 900 QC ultra high-strength steel.

Through the whole chain

When using ultra high-strength steels, one must consider the whole production process of the end product from beginning to the end, since the challenges of the production differ from those present with standard steels. When using high-strength steels in the production of loader cranes, one must especially take into account the material's sensitivity to fatigue, the form of the structure and the welding parameters.

Ultra high-strength steels can be successfully welded with traditional methods, if the recommendations of the material supplier are taken into account. For example, depending on the requirements of the welded joint, it may be necessary to determine the welding parameters again. The placing of welded joints must be carefully considered. With the processing of high-strength grades, this is even more important than with standard steel.

With ultra high-strength steels we speak about strength classes where it starts to be challenging to make the welded joint as strong as the steel material that is being welded. The welding must be planned and instructed so, that each welder, who treats the high-strength steel, masters the new work habits required by the new material.

- Today alloying elements are under control and the new steel production processes reduce the CEV level significantly. As a consequence, weldability is better with standard parameters also, Ceresoli explains.

In addition to welding, bending of ultra high-strength steels is more challenging than bending of standard steels. Higher forces than before are also required in bending and mechanical cutting. This means that special know-how and robust machinery are required from the production workshop. If needed, Ruukki can deliver ready-bent components, if the

customer's workshop has no equipment that is robust enough.

- We want to use all the potential of high-strength steel and our approach in engineering phase is very meticulous. Therefore, we study all properties for each steel grade from every supplier in our internal technology laboratory. We verify mechanical, chemical and physical properties, standard and specific applied welding processes, welding parameters, bending ratio, fatigue welding joint classification. Steel from Ruukki has very good properties, emphasizes Ceresoli.

Cooperation ensures right direction of development work

Being nowadays a steel based solution provider, Ruukki has emphasized that the development work of steel is based on true customer needs.

- We need information on steel's evolution. We need a partner to share information about new ideas, new market requirements, new environment conditions as well as new regulations. In addition we need Ruukki's experience in steel applications. Ruukki is a good supplier for us and a reliable partner in design and production; yes, from Ruukki we have received what we need, Ceresoli says.

The Application Support-function at Ruukki serves clients in demanding product applications and gathers information for the product development to continuously improve product properties. Thorough understanding of customer applications ensures right direction of development work.

- We support our customers' material choice, beginning from the application design phase. We think over with the customer how Ruukki, with its products, could assist the customer in reaching its targets, explains Jari Plosila, Application Manager at Ruukki Metals division.

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