

TATA STEEL



Case study

KUHN gyrotedders

Project name: Bespoke specification for high grade, formable steel reduces rejection rates to almost zero

Project: Arms for gyrotedders

Client: KUHN Group

Product: Hybox® TT high-strength cold formed hollow sections





KUHN

Collaboration optimises results

In premium quality machinery and equipment, off-the-shelf steel is rarely the best solution for the OEM or the end user. Optimising the steel itself and the technical services to support customers requires a dedicated and focused approach. It is vital to understand exactly what is needed for customers' products to succeed in the market.

Manufacturing processes in agricultural equipment vary greatly, and terrain, crop types and operating conditions dictate exactly what steel is required for optimum performance. Working collaboratively with KUHN, a world leader in hay-making machinery, Tata Steel co-developed a bespoke specification for high-strength, cold formed hollow sections Hybox[®] TT (Tight Tolerances), to improve quality, yield and efficiency.

A combination of detailed insight, technical expertise and creative thinking, based on an existing long-term partnership, enabled Tata Steel to unlock significant benefits for this customer.

Producing a better tedder

Tedders are mounted or trailed machines used in the cultivation of fields to spread the crop. As such, they need to be able to work on hilly and uneven terrains, cover a wide area and be transported on public roads.

KUHN gyrotedders, manufactured at its headquarters in Saverne (France), are world famous for their quality of work, performance, reliability and longevity. Its machines use high-strength steel hollow sections – or 'tubes' – supplied by Tata Steel to minimise the weight of the arms without compromising performance. The arms themselves are hinged so they can be easily folded to meet the width limitations on public roads and quickly unfolded again to work in the fields. The hinges are located at each end of the tube and are critical to the overall performance and longevity of the gyrotedder. Not only do they allow the arms to be folded, they also hold the transmission axles and the DIGIDRIVE[®] finger couplings that drive the rotors that spread the crop. These rotors increase the efficiency and effectiveness of the tedding process.

Meeting the gyrotedder challenge

The hinges on the gyrotedder arms are cast to very precise dimensions and robot-welded onto the rectangular tube ends, with a hole to position the transmission axles. It is vital that the tubes are consistent and accurate in size and shape to avoid resetting the welding robots each time a new arm is to be manufactured.

The dimensional and concavity/convexity tolerances, in particular, are very small. If the tube is too large or too convex, it does not fit into the space on the hinge. If it is too small or too concave, robot welding must be supplemented by a manual process, which incurs extra cost. Tolerances on tube straightness are also very tight. If the section is not straight enough, the transmission axle will be put under unacceptable tension between each set of hinges.

Within KUHN's gyrotedder range, tube wall thicknesses vary from small to large working widths. However, the same hinges are used in all the machines, so the tubes need to conform to the same specifications regardless of wall thickness.

Health and safety is key

An additional consideration for KUHN is the health and safety of its employees. It is therefore vital that the ends of the tubes are free of burrs and sharp edges to avoid cuts during handling. The final challenge is cosmetic. Dents, scratches and rolling marks must be avoided so there is no need for heavy shot blasting or other finishing work before painting. In addition, the surface finish must be perfect, with a weld line that is extremely smooth and almost invisible. This is also a critical aspect of communicating KUHN's premium brand positioning.

Defining the optimum solution

Historically, KUHN had written its own tube specifications. However, it had become

increasingly apparent that these needed adjusting and refining because tolerances were not well defined. As a result, KUHN sometimes received steel tubes that were too concave, too convex or sized outside acceptable tolerances. As a consequence, they either were rejected or needed re-working before use.

KUHN turned to Tata Steel to help resolve the problem using Hybox TT: highly formable and weldable hollow sections with a minimum strength of 355_MPa. Working closely together, the two partners co-developed a new steel specification, unique to this application. This was possible because Hybox TT complies fully with European Standard EN 10219 for cold formed structural hollow sections. In fact, Tata Steel's manufacturing specification is twice as stringent as the requirements of the standard EN 10219.

Furthermore, Tata Steel's specialist sector team modified the settings of its tubes mill so the steel now consistently meets KUHN's narrower dimensional tolerances and has reduced concavity/convexity values.



This specification corresponds perfectly to the design of the gyrotedders and particularly the welding process of the hinges to the tubes. As well as a consistent ready-to-paint surface finish, the ends of the tubes are supplied clean, safe and free of burrs. They alleviate the need to sort the tubes and eliminate manual reworking or welding. Furthermore, they enable the smooth, continuous, automated welding process that is required for serial production. The tube rejection rate is now almost zero, while output yield and overall production efficiency have improved significantly.

Keeping KUHN at the forefront of agricultural innovation

These results mean that KUHN has introduced Hybox TT into more machines, making its assembly plants more efficient and optimising gyrotedder quality and performance. In turn, KUHN can uphold its brand promises to customers.

Now an almost €1 billion turnover business producing about 65,000 machines every year. KUHN seeks to retain its position as the global leader in hay-making equipment. This means continually innovating and improving its machines with the help of key partners like Tata Steel.



“Through its partnership approach and ability to understand the challenges we faced, the Tata Steel team has helped us enhance the consistency and quality of our gyrotedders, optimise the flow of the automated welding process – and strengthen our brand image to our customers. We look forward to further collaboration with Tata Steel in the future.”

Pascal Weiss, Purchaser Steel Products, KUHN, Saverne, France

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