Everything on the cards

Every second new car contains a vehicle component from Brose. The portfolio also includes seat components and structures, for which the successful family company sources hot-rolled microalloyed steels from thyssenkrupp Steel. In a joint development project and with the support of the supply chain expertise of thyssenkrupp Materials Processing Europe, the partners have now developed various grades of the scalur® product family and have presented the results in **material cards**.

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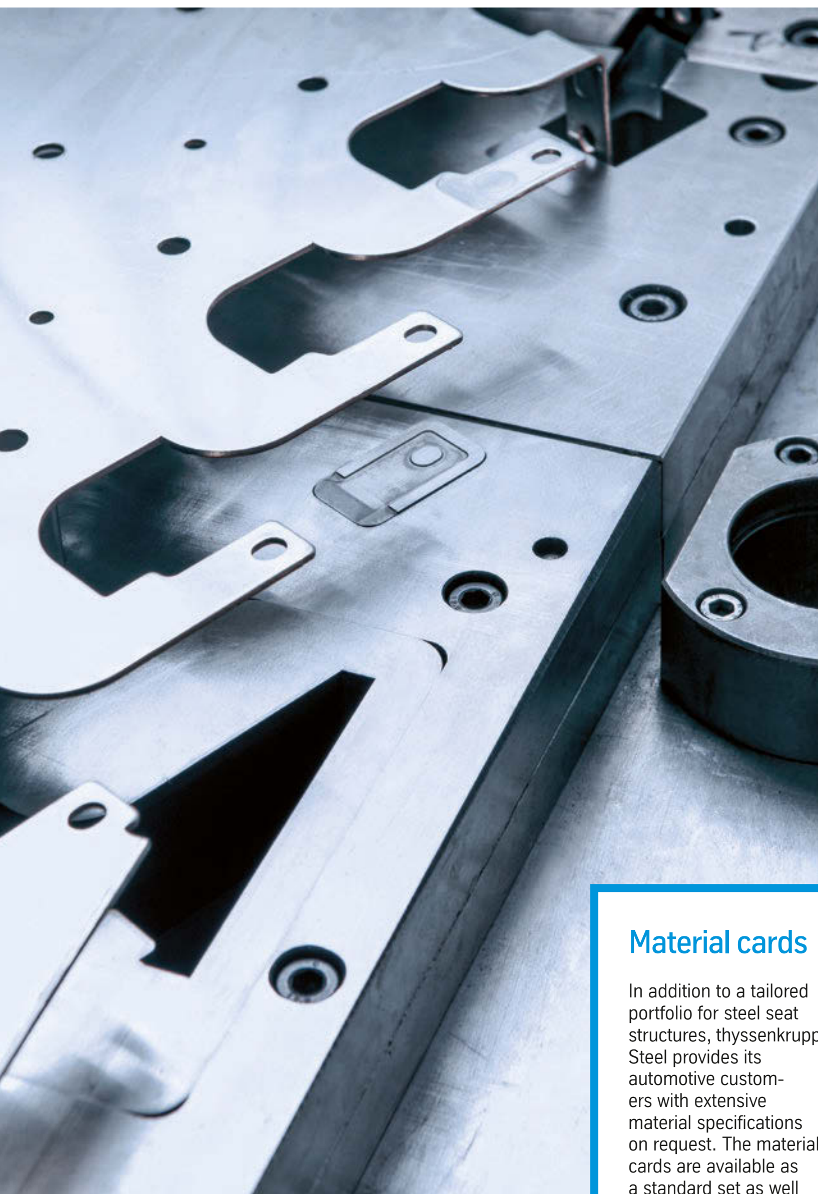

Material cards

In addition to a tailored portfolio for steel seat structures, thyssenkrupp Steel provides its automotive customers with extensive material specifications on request. The material cards are available as a standard set as well as a complex material card with implemented fracture model.

The pickled scalur® hot-rolled strip falls below the usual thickness tolerances. This allows users to reduce the order thickness and lower the material weight, especially when using higher-strength steel grades. At the same time, the steel has excellent forming properties and a quality comparable to that of cold-rolled strip. “scalur® opens up the possibility of using hot-rolled strip where cold-rolled strip was previously used, without sacrificing comfort or safety,” says Gerald Erdmann from Brose’s Materials Technology department.“Another decisive factor in our choice was that the material met our specific material requirements.”

Brose engineer Gerald Erdmann benefits from the new material cards during component development.

Simulating an emergency situation

But how does the material behave in the event of a crash? And what about the forming procedure? Reliable characterization of the material properties in advance of the application is central to Brose. In cooperation with the Application Technology department of thyssenkrupp Steel and the Mannheim site of the Group’s own service centers of thyssenkrupp Materials Processing Europe, a set of material parameters was developed for this purpose.

Enrico Thiele, Brose Key Account Manager at thyssenkrupp Materials Processing Europe, together with Achim Peuster, Technical Manager at thyssenkrupp Steel, ensured that the specific requirements of the automotive supplier were met, in close coordination with the customer. This was based on various experimental investigations to determine the characteristic values and subsequentsimulations for validation. “Among other things, our real-life tests used high-tech testing machines that deliver reliable results even for high strengths,” says Achim Peuster. In the next step, the experts selected the appropriate mathematical models to simulate the material properties in various programs.

Up to now, thyssenkrupp Steel has prepared the material characteristic values of hot-rolled steels mainly as a standard data set for simple simulations. “Together with Brose, we have now developed complex material cards of selected scalur® grades from S315MC to S700MC for numerical simulation for the first time,” explains Achim Peuster. Included, for example, are the mechanical-technological characteristic values from tensile and fracture specimens, supplemented by extensive plasticity and failure descriptions. Advantage for Brose: With the help of the higher-quality complex data, the seat manufacturer can tell at an early stage of development whether the geometry of a component will withstand the load requirements.

Conserve valuable resources

The joint development work took six months. Both sides are satisfied with the result. “The material cards represent the properties of scalur® and allow us to take them into account in the simulation of forming processes and load cases in advance of production,” says Dominik Biniszewski, project engineer for simulation at Brose. Because every virtual simulation in the run-up to production not only saves valuable resources, but also a lot of time. For the just-in-time processes of the automotive industry, this and the assured material supply via the service centers of thyssenkrupp Materials Processing Europe are a decisive advantage.

Web

More info on steel seat structures can be found here:
www.thyssenkrupp-steel.com/lightweight-steel-seat-structures

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Photos: thyssenkrupp Steel Europe photography, Brose

What the experts say

“With our complex material cards, we support our customers in using the optimum material right from the development of the component.”

Hartwig Rösen, thyssenkrupp Steel, expert in simulation methods

“The material cards allow us to consider the properties of scalur® in the simulation of forming processes and load cases – in other words, in advance of production.”

Dominik Biniszewski, Brose Fahrzeugteile SE & Co.KG,
Project Engineer Simulation

“Despite pandemic-related challenges, the project shows that cooperation between a wide range of specialist departments in a spirit of partnership can work very well – and that is the aim of our Materials as a Service strategy.”

Enrico Thiele, thyssenkrupp Materials Processing Europe,
Key Account Manager

“The success of the project confirms how important and beneficial it is for all parties involved to work together in a spirit of partnership.”

Achim Peuster, thyssenkrupp Steel, Technical Customer Support