XPF steels: stretching strength & Formability for Increased Performance and Mass savings in Automotive Chassis Applications (RFA2198)

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The automotive industry is continuously in pursuit of cost-effective options to further improve chassis performance and to engineer innovative light-weight chassis systems for reduced vehicle weight. Steel manufacturers have responded to this with the development of hot-rolled AHSS that has started to displace conventional HSLA for cold-formed chassis components. However, to enable automotive engineers to further innovate for improved chassis performance and reduced vehicle weight, Tata Steel has launched its development of XPF, a new range of hot-rolled high-strength steels that stretches the boundaries for formability and substrate fatigue beyond that of AHSS.

Tata Steel's high-strength XPF product range is characterised by an unsurpassed balance of cold-stretch and stretch-flange formability, which is derived from a nano-precipitation strengthened single-phase ferritic microstructure based on a well-balanced low-carbon micro-alloy and hot-strip mill process design. The benefits of XPF provide automotive engineers the freedom to exploit its formability for improved manufacturing robustness, to use its strength for improved in-service performance or – ultimately – to exploit the combination of strength and formability for design optimisation in component geometry for mass savings without loss in key performance metrics such as stiffness and collapse strength.

This paper highlights Tata Steel's recent commercial development of XPF800 and – building on that – introduces the latest R&D development of XPF1000. Apart from presenting the metallurgy in terms of alloy and process and linking this to microstructure and performance, including hole-expansion capacity, the application properties of XPF800 and XPF1000, including that of zinc coated variants via heat-to-coat galvanising, will be reviewed and benchmarked against AHSS grades commonly found in automotive chassis applications. Finally, this paper will review chassis component grades and geometry optimisation to demonstrate how the benefits of XPF can be deployed at lowest total cost of ownership to achieve improved in-service performance or mass-savings without compromising in-service performance and manufacturing robustness.