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Novel medium-carbon quench and press hardening steel for extreme wear applications

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More durable materials are constantly required to increase the efficiency and lifespan of different applications with main focus being on the reduction of emissions. Steels are the most used engineering materials due to the excellent combination of mechanical properties, usability, and low cost. In addition, there are many applications where steels are the only viable material choice, such as in harsh the conditions of mining and material handling and agricultural sector, where wear is the most dominant damage mechanism. Different wear-resistant steels are often utilized in the applications utilized in such conditions, where heavy abrasion inflicts rapid wear of materials. The demand for stronger steels with better wear-resistance is increasing along with the adoption of more powerful machinery. SSAB has developed a new wear-resistant steel M53 for facing the most extreme wear environments. The SSAB M53 is a microalloyed steel grade for quench and press hardening to be used in a wide variety of applications in different segments. The steel was especially engineered for polymer and oil quenching with the fine-grain microstructure designed to prevent the formation of hardening cracks. Heat treatments can be utilized to achieve the desired balance of hardness and toughness. Maximum hardness of 60 HRC can be achieved with rapid polymer quenching followed by low-temperature tempering for improved elongation and toughness properties. The chemical composition comprises microalloying and small additions of chromium and molybdenum to ensure hardenability. The M53 provides an economical and environmentally friendly alternative to more expensive carburized and triple layered steel materials. Here, the mechanical properties and microstructure of the developed M53 steel will be discussed.

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