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Microstructural adjustment of carburized steel components towards reducing the quenching-induced distortion

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ABSTRACT

It is crucial to control and minimize the geometrical distortions resulted from the application of carburizing and quenching processes. This is particularly of the utmost importance for high quality steel products such as power transmission components which require high performance and dimensional precision in the range of micrometers. Carburized steel components are quenched from hardening temperature to room temperature to acquire a very hard martensitic layer (case). During the quenching process, due to the phase transformation-induced volumetric expansion in case and the interior region (core), unwanted dimensional changes may occur. In the present work, the effects of a modified hardening temperature and different soaking times on the core microstructure, the final dimensional stability and the mechanical properties are systematically investigated. Navy C-ring specimens are employed to quantify and correlate the effect of the developed microstructural constituents, magnitude of