HFI-welded tubes vs. cold drawn tubes for automotive applications

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The choice of utilising either roll formed welded or seamless cold drawn tubes for automotive (and other) applications is partly based upon the required tolerances for outside and inside diameter and wall thickness.

With increasing process capabilities for both steel strip and HFI-welded tube manufacturing, the required diameter and gauge tolerances are coming within range without the need for a cold draw process. Not only does this open the opportunity for cost saving, as cold drawing and subsequent heat treatment as process steps are no longer required, it also enables the application of a much wider range of steel grades such as AHSS and UHSS, the use of which can be tailored to the specific requirements. Potential substitution will not only depend on available tolerances and mechanical properties, requirements on hardness, specifically that of the weld seam of HFI-welded tubes, are relevant as well. For some applications post-weld treatment has been introduced for this reason.

Another issue might be fatigue load. Typical cold drawn tube applications for automotive include propulsion shafts and drive shafts that are known to be sensitive to variable loads. Steel chemistry is playing a crucial role in this, especially the Mn/Si-ratio when related to the HFI seam weld.

A comparison will be made between HFI-welded tubes versus cold drawn tubes for several applications, taking into account dimensional tolerances as well as mechanical and chemical requirements. The effect of the Mn/Si-ratio will be subject to more detailed analyses for some alternative steel grades.

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