

A method for manufacturing a steel product, comprising the steps of: providing a heated steel starting product at a temperature comprised between 380 °C and 700 °C, having a metastable fully austenitic structure, with a composition comprising, in percent by weight: $0.15 \% \leq C \leq 0.40 \%$, $1.5 \% \leq Mn \leq 4.0 \%$, $0.5 \% \leq Si \leq 2.5 \%$, $0.005 \% \leq Al \leq 1.5 \%$, with $0.8 \% \leq Si+Al \leq 2.5 \%$, $S \leq 0.05 \%$, $P \leq 0.1 \%$, at least one element chosen among Cr and Mo, such that: $0 \% \leq Cr \leq 4.0 \%$, $0 \% \leq Mo \leq 0.5 \%$, and $2.7 \% \leq Mn + Cr + 3 Mo \leq 5.7 \%$, and optionally one or several elements chosen among: $Nb \leq 0.1 \%$, $Ti \leq 0.1 \%$, $Ni \leq 3.0 \%$, $0.0005 \% \leq B < 0.005 \%$, $0.0005 \% \leq Ca \leq 0.005 \%$, the balance of the composition consisting of iron and unavoidable impurities resulting from the smelting; subjecting said starting product to a hot forming step at a temperature comprised between 700 °C and 380 °C, with a cumulated strain ϵ_b between 0.1 and 0.7, in at least one location of said heated steel starting product, to obtain a fully austenitic hot-formed steel product; then quenching the hot-formed steel product by cooling it down, at a cooling rate VR_2 superior to the critical martensitic cooling rate, to a quenching temperature QT lower than Ms in order to obtain a structure containing between 40 % and 90 % of martensite, the rest of the structure being austenite; then maintaining at, or reheating the product up to a holding temperature PT between QT and 470 °C and holding it at said temperature IT for a duration Pt between 5s and 600s.