



# Plasticity at High Temperature: for Forming Applications in the Automotive Industry - TUTEMP

*Directorate-General for Research and Innovation*

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During the hot metal gas forming (HMGF) process, a steel tubular part is heated up. Since the yield stress of the component decreases with the increase in temperature, the part can be formed into a complex shape using low-pressure gas and therefore reducing the need for high tonnage presses. The ferritic stainless steel EN-1.4512 showed optimal formability capabilities. It was possible to obtain a 55 % radial expansion even with no axial feeding at a pressure of 15 bars. This steel's application in the automotive industry is devoted to tubular components in exhaust systems. The boron alloyed steel 22MnB5 was also chosen as a target material, due to its special industrial interest regarding car weight reduction (after being heated, formed and quenched at specific cooling rates, Rm values around 1500 MPa can be obtained). The formability rates within the HMGF process were lower than for the EN-1.4512 steel, around 28 % radial expansion with no axial feeding. A further development or a new material concept which could join material formability and high mechanical performance after the process would be recommendable for a future study.

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