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INVESTIGATION ON DENSIFICATION BEHAVIOUR AND MECHANICAL PROPERTIES OF SINTERED HOT FORGED AISI 8720 PM STEELS

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ABSTRACT

Present experimental work has been evaluated the densification behaviour and mechanical properties of sintered hot forged AISI 8720 PM Steels by elemental powder through Powder Metallurgy techniques. Three aspect ratios were selected namely 0.55, 0.92 and 1.28 were prepared from Fe-0.20% C-0.28%Si-0.80%Mn-0.50%Cr-0.25%Mo-0.55%Ni powder blends using suitable die, punch and bottom insert on 1.0 MN capacity U.T.M in the pressure range of 480 ± 10 M Pa, 520 ±10 M Pa and 540 ± 10 M Pa respectively. The green Compacts were sintered at 1120 $\pm 10^0$ C for a period of 120 minutes under the protective ceramic coating. Sintered compacts were axially hot upset forged to different height strains with hydraulic screw press. The forged steels were heat treated in five different methods. The investigation on densification behaviour and Mechanical properties were studied with the calculated parameters. The sintered forged AISI 8720 steels show the existence of third and second order polynomial densification w.r.t height strain, bulging ratio, diameter strain, relative density and poisson's ratio. The lower aspect ratio 0.55 densified better than other aspect ratio performs. Sintered forged homogenised heat treatment samples shows better mechanical properties then sintered forged heat treated samples. Microstructure of the forged steels exhibited the presence of alloy carbides in ferrite matrix with the traces of martensite needles and bainite, pearlite grains. Fractography reveals mixed mode of fracture.

KEYWORDS: Hot Forging, Densification, Diameter Strain, Height Strain, Poisson's Ratio