

# [Within engine piston with the primary forming processes](https://assignbuster.com/within-engine-piston-with-the-primary-forming-processes/)

Within this assignment I have been tasked to research intotwo components of a single consumer product and the primary forming processesused to manufacture the two parts. For this I have chosen my product to be acar with the two parts being the engine cylinder head and the engine piston withthe primary forming processes being sand casting and forging respectively. Iwill do further research into the specific characteristics, advantages anddisadvantages of each forming process and why they are the chosen method forthe given part over alternatives. 1.

0 Enginecylinder head 1. 1     Overview An engine cylinder head is commonly located at the top ofthe engine block where It closes off the top of the cylinder forming thecombustion chamber where the fuel is burned. The main function of the cylinderhead is to help the head gasket to seal the cylinders so that they can buildenough compression for engine operation to work efficiently. Also, the cylinderhead contains lots of channels and passageways which are used to stop theengine from overheating as they enable engine coolant to pass through, allowair and fuel to the cylinder and let exhaust fumes escape.

(stein, n. d.)1. 2     MaterialCylinder heads in automobiles are subjected to thermalstrains, aggressive wear conditions, and high fatigue stresses which is why itis key that the engineer selects the correct material for the job. The mainrequirements of the material that are needed to be suitable for use in anengine cylinder head are:·        Strength/weight ratio- The applied alloyshave to offer sufficient strength and hardness at room temperature for machiningand assembly as well as maintaining properties at elevated temperatures of upto 250°C whilst also being as light as possible ·        Thermal conductivity-  The alloy will have to have high thermalconductivity to allow the heat from combustion to escape into the coolant quickly·        Surface quality- Smooth finishingsurfaces are required because of the constant gas flow for combustion as ifthere were any rough patches or notches over time you will get cracks in thepart·        Fatigue strength-  Having a high fatigue strength if key asengine cylinder heads are exposed to high-cycle fatigue (HCF) from combustioncycles and to low-cycle fatigue (LCF) from thermal expansion and contractionduring start-up and stop of the engine (Aluminium Automotive Manual, 2011)Grey cast-iron alloys were the popular choice in material incylinder heads for many years due to its cheapness compared to other metals likealuminium, castablility, machinability, high corrosion resistance, rigidity, and hardness, as well as its low thermal expansion.

However cast-iron has the disadvantagesof high weight and low thermal conductivity when compared to alternatives. Thisthen lead to the extensive use of aluminium alloys which left cast iron onlybeing used in applications where the internal stresses are much higher. This isbecause aluminium alloys are much lighter and more conductive than cast-iron. This makes aluminium alloys more suitable for use in cylinder heads because itwill help to keep the weight of the engine down increasing performance of thevehicle and it will allow the heat from combustion to escape into the coolantquicker which is the main purpose of the part. (Galal, 2016)