

6.4 Case Study No. 4 Door Hinge Assembly

Component name:	Door Hinge Assembly
Forging Process:	Hot impression die
Size, mm (in.):	120 (4.6) x 220 (8.7)
Weight, kg (lb):	0.8 (1.75)
Alloy:	Aluminum 7075
Tensile strength, MPa (psi):	480 (70,000)
Yield strength, MPa (psi):	415 (60,000) minimum
Secondary Operations:	Machined and assembled
Heat treatment:	T-73511
Surface treatment:	Powder coated
Number of parts:	2 forgings
Alternate process:	Casting
Annual Production:	5000

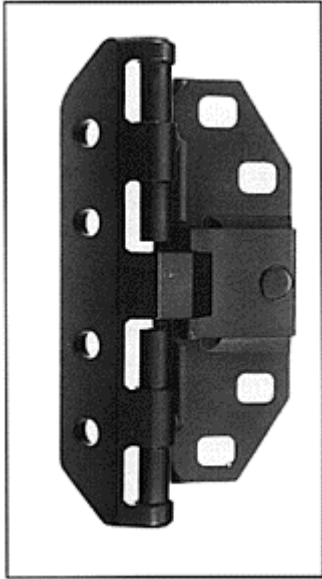


Figure 6-4

The door hinge assembly, shown in Figure 6-4, is currently the only instance of a forged aluminum door hinge for a production North American automobile. It is used on a high performance sport car. Since the hinge is critical to occupant safety, it meets all requirements of Federal Motor Vehicle Safety Standard 206, which applies to door locks and door retention components. The hinge assembly additionally meets the vehicle manufacturer's internal standards for life cycle requirements and door sag. Life cycle requirements were verified by 35,000 cycles of testing over a wide temperature range. The door sag requirements were verified by deflection testing using prototypes machined from forged blocks.

The forged aluminum hinge replaced a cast steel design, reducing vehicle weight by 2 kg (4.5 lb). Purchase price was reduced by 50%. Part of the cost reduction is attributed to the as forged surface quality of the forgings, which receive a powder coat without requiring any surface finishing.

The vehicle producer's design center supplied CAD models by modem to the forging company, who developed the forging and process. The original steel design required only minor design modifications for production as an aluminum forging. Prototype hinges for pre-production test and development were machined from forged blocks.