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POWDER METALLURGY MATERIALS IN THE AUTOMOTIVE INDUSTRY

N. Beköz Üllen
Istanbul University, Department of Metallurgical and Materials Engineering, Istanbul, Turkey.
nbekoz@istanbul.edu.tr

ABSTRACT

Roughly 70% of the structural parts made by powder metallurgy (PM) have been used by the automotive industry, and despite of the drop in consumption due to the recent global economic crisis [1]. The use of in automotive vehicles such as cars, buses, trucks, vans, and so on can be broadly classified into transmissions, engines, chases and other component [2]. PM is an established green manufacturing technology for the production of net-shape components. The ability to use PM to mass produce reliable precision parts consistently at a cheap rate is very attractive to the automotive industry [3]. Recently, Aluminum foams produced by PM are an interesting alternative for vehicles weight saving with the advantage to be a stiff and also a high impact energy absorption material, as well as being preferred in the areas where it is desired to increase the stability in automobiles. Powder injection moulding (PIM), metal injection moulding (MIM) applications in the automotive industry are increasing day by day due to increasing demand in the sector [1]. MIM can play an interesting role in the automotive industry due to the net-shape capability for complex shape parts which can reduce machining costs to low levels. Larger and more precise parts are being developed and short production runs can be cost effective. Today, parts manufactured by PM methods are used in transmission, engine, chassis and other components of family cars, buses, trucks, light commercial vehicles and many other transport vehicles. All major components of both semi-automatic and automatic transmissions: hubs, clutch plates, clutch plate bearings, synchromesh parts and many other components have recently been manufactured by PM methods [4].
Automotive industry is the main driving force for the PM global development. The automotive industry is one of the key sector of the economy noted for its global value chain and is a major customers of the PM. Automobile manufacturers are facing the challenge of procuring components with light weight, superior performance and enhanced durability and reliability in order to produce comfortable, safe vehicles at low cost [5]. PM is an energy saving, green technology offering improved performance and greater design flexibility compared with traditional manufacturing methods such as casting, extrusion, forging and machining. As a general conclusion, automakers focus on; weight reduction efforts in vehicles, the discovery of new materials that will provide fuel efficiency and the reduction of emission values. In order to provide worldwide emission standards, focusing on new technologies and enhancing fuel efficiency is emerged as a new trend among automobile manufacturers. These requirements have been successfully implemented by PM methods in recent years. In the coming years, it is thought that PM will provide contributions to many areas in automotive sector [6-7].In this study, the theoretical knowledge about the processing principles of PM methods and the developments of these methods, PM part produced in the automotive sector are given. Throughout this study; emerging trends and prospects for innovative PM technology in the automotive industry, and key factors in the increase in use of PM parts in automotive applications and the challenges related to this increase are examined.

Keywords: *Powder Metallurgy, Automotive Industry, Ferrous and Non-ferrous.*

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