APPLICATION NOTES

FOERSTER

Cast swash plate inspection of automobile air-conditioner compressor

Every automobile is equipped with an air conditioner, and there is a compressor between the heat exchanger of the indoor unit and the heat exchanger of the outdoor unit. The power of the compressor is transmitted from the power shaft of the reciprocating engine by a belt. However, in the special environment of an automobile, the compressor must be able to operate reliably against large vibrations at all times, it must be able to be housed in the limited space of the engine compartment, it must be able to control the amount of compression without depending on the engine speed, and it must be lightweight from the viewpoint of fuel efficiency. The swash plate type compressor, which solves these problems, is widely used in automobiles.

In the swash plate compressor structure, the swash plate, a disk-shaped plate, rotates, and the multiple pistons, which are in constant contact with the swash plate, move up and down to compress the vaporized refrigerant and return it to liquid form. The swash plate is cast from cast iron, and casting flaws and cracks may occur during the manufacturing process. If the outer surface of the swash plate is damaged by casting flaws, the piston will not operate smoothly and the air conditioner will not run properly. Casting flaws are an unavoidable problem for cast products, and they cannot be easily reduced to zero even if the mold is improved or the manufacturing process is reviewed. Casting is the best way to mass produce products at low cost. However, once a defective product is incorporated into a finished product, the cost of collection and replacement is enormous. Therefore, it is necessary to inspect the parts before installation, but visual inspection using magnetic powder flaw detection requires labor costs, and there is a risk of oversight by the human eye. In addition, there is the cost of consumables such as magnetic powder solution and waste liquid disposal. And some defects cannot be identified by image inspection using a camera.

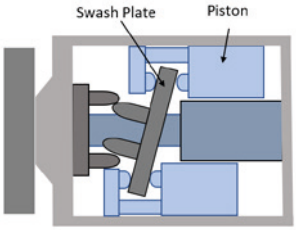

Fig.1: Schematic view of a swash plate type compressor

This is where eddy current testing comes in handy. Eddy current testing does not involve contact with the material to be inspected and is not contaminated by the magnetic powder solution of magnetic powder testing. Defects are processed as electrical signals according to their depth and size. This allows for quantitative evaluation, automation, streamlining, and cost reduction.

Fig. 2: STATOGRAPH CM / CM + and different probes

The best performance for this test is achieved by using FOERSTER's STATOGRAPH CM / CM+ and special probes.