

Enable the powder metallurgy process to expand to new markets with more reliable parts and lower manufacturing costs through the inspection of green parts

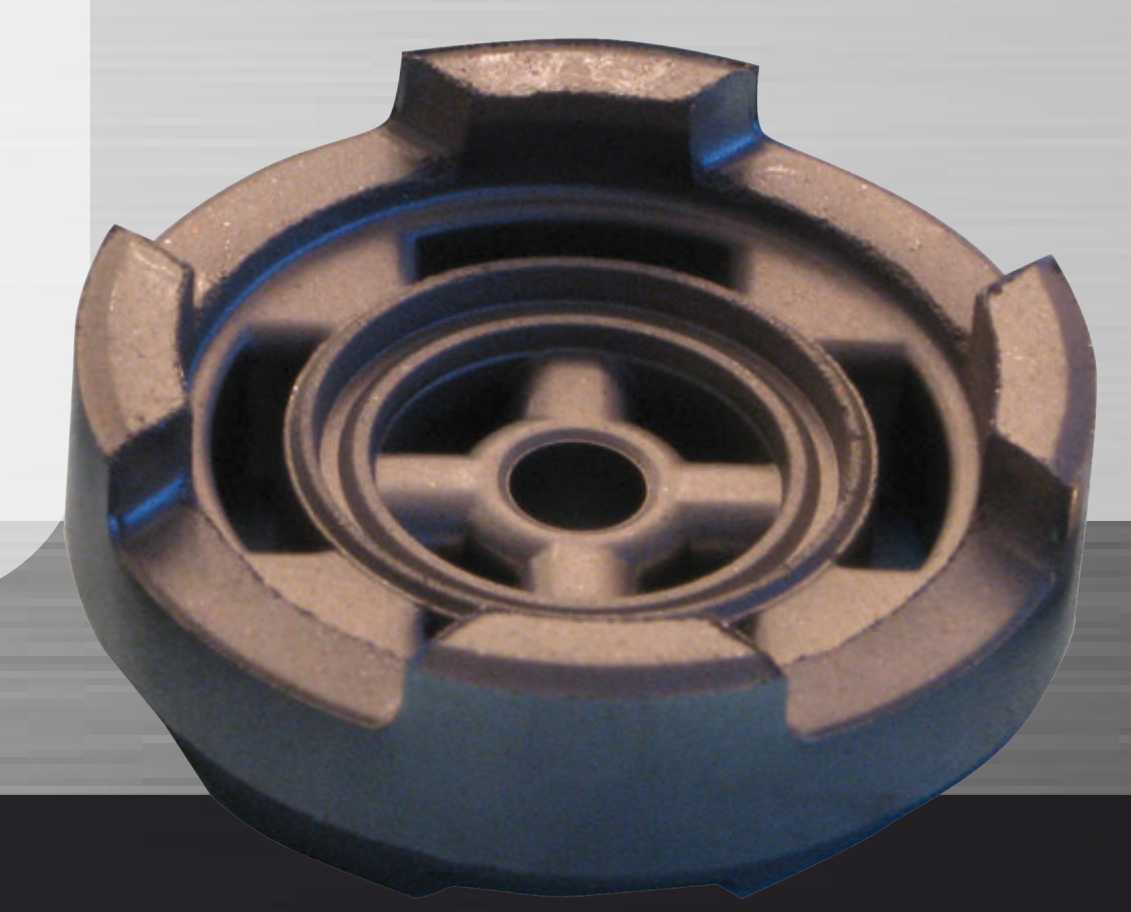
A highly effective non-destructive system to inspect 'green parts' of powder metallurgy manufacturing process resulting in a higher-level quality assurance and savings in material, time as well as energy

The Need

A great variety of industrial products are made from powdered raw materials by die pressing or injection moulding and sintering. Among these are sintered structural parts, die pressed ceramic parts, powder injection moulded metal and ceramic parts, and magnets. The DIRA-GREEN system is a non-destructive inspection tool for parts manufacturing technologies starting from powdered raw materials.

Powder compaction in a die is a very complex process. High pressures are required, particularly in the compaction of compressible powders, and the powder is subjected to high frictional forces. Elements of the tooling are deformed elastically under pressure and bounce back when the pressure is released, thereby exerting forces on the fragile compact. If these exceed the strength of the compact, cracks may form which are often difficult to detect with conventional methods.

In powder injection moulding of very complex part geometries it is the shrink-age of the compact within the mould during cooling and the shrinkage during sintering that may cause hidden cracks. The powder based industries have long been trying to find an efficient and reliable non-destructive method to check green and sintered powder compacts for cracks and other defects.



The Solution

The DIRA-GREEN project will develop an automatic digital radiography inspection system that can be installed on-line with the press on the shop floor. The radiation coming from a micro-focus X-ray tube generates a digital image that is evaluated fully automatic by the integrated image recognition software. Any deviation from the expected image will lead to a reaction of the system that can be utilized to sort out defective parts.

This system will allow the PM industry to install a 100 percent on-line inspection at affordable cost and brings it one step closer to the target of producing zero defect parts. It is perfectly safe under radiological safety regulations.

The Benefits

Detecting defective parts right after compaction before they go through the sintering cycle is cost- and energy-saving. The information obtained from the system about the occurrence, size and location of cracks can be used to improve tool and mould design. The increasing use of non-destructive inspection in the European PM industry will enhance its competitive advantage over other manufacturing technologies and low labour cost countries.



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