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# Rocket engine and metal 3D molded nozzles

Removal of residual fines in internal fine cooling

# pipes

（Bluestar R&D Co., Ltd. has developed and delivered ultrasonic casting sand removal equipment for aluminum casting parts. The company has also standardized and marketed ultrasonic deburring equipment for removing burrs generated after machining of aluminum die-cast products such as engine heads, engine blocks, and transmissions. These have been standardized and marketed domestically and internationally as the vacuum pre-processing type ultrasonic deburring system and the ultrasonic casting sand remover MARS series.

In recent years, requests for removal of residual fine powder in internal cooling microtubes, heat exchangers, and cross flow paths for metal 3D have been increasing, so the MARS series was improved and released as the PERION-AM series dedicated to internal metal powder removal for metal 3D.

The shape of AM's internal tubules varies widely, but some of them are less than 1mm in diameter, and there are many secrets regarding the exact flow paths and internal tubules that we are not able to understand. In some cases, the AI design around aircraft engines has become so complex that human designers are unable to understand the distribution of the inner and inner tubing. In any case, the product will not become a product unless the metal powder left inside is removed. Air blowers and high-pressure water are not sufficient to remove them. Therefore, we have combined the ultrasonic freezing sand removal and ultrasonic deburring technologies that we have cultivated over many years to remove residual metal powder in the inner fine tubing.

It is necessary to efficiently transmit ultrasonic waves through the metal 3D to generate ultrasonic cavities (microvacuum nuclei) inside the microtubules. Therefore, the irradiation method, such as the irradiation angle, involves some trial and error.

When the nozzle of the combustion section of a rocket engine is made smaller and lighter by metal 3D manufacturing, the cooling tube through which the refrigerant

passes inside is naturally a complex structure. Therefore, the removal of residual metal fines is an essential condition.

We also specialize in ultrasonic removal of residual fine particles in metal 3D molded rocket engine nozzles/internal fine cooling tubes, the result of our accumulated technology and experience since the F1 era.

Experiments are accepted at any time, so please inquire separately. by shibano