

Polishing Processing to Internal Surface of Non-magnetic Pipe by Magnetic Abrasive Finishing

Y. Chen^{1, a}, X. Wang^{1, b} and C. J. Zhang²

¹ Department of Mechanical Engineering,
University of Science and Technology Liaoning, 114051, China

² Anshan Iron and Steel Group Company Heavy Machine CO., LTD, 114031, China

^a cy1234cy@yahoo.com.cn, ^b dayanren001@hotmail.com

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Abstract. It is very difficult matter that polishes the internal surface of the pipe, especially to the thin pipe with the traditional surface technology. Because a usual tool cannot into the inner surface of the thin pipe and automation do not achieved easily. This paper brings up a new method that utilize the characteristic of the magnetic force line may penetrate the non-magnetic material, may using the magnetic abrasive finishing (MAF) method complete to the inner surface of the thin pipe precise polishing. The magnetic abrasive finishing does not need special equipment to complete the complex shape internal surface polishing. Moreover, we already obtained the famous processing effect through the experiment. Meanwhile this paper analyses some factors of influences efficiency, and propose some solution method.

Introduction

Recently, high precision pipe is highly increasing need in some area like medical equipment and astronautics industry. Since a high-purity gas or liquid is required to transport, that increase the requirement of internal surface roughness of pipe. However, because of the limitation of using environment, most pipes are the long and shape is very complex, their caliber is very small too. As a result, the ordinary tool is very difficult to solve this problem; even use the manual work still is very difficult to process. This paper brings up a new method to polishing the thin pipe's internal surface by magnetic abrasive finishing. This method is flexible, self-adaptive, and self-sharpen, which displays the superiority that compare with traditional way.

Polishing to the Thin Pipe

Fig. 1 shows a schematic diagram of magnetic abrasive finishing. The magnetic pole fixes the outside of the workpiece. Put the magnetic abrasive particles to the inside of non-magnetic pipe. For the non-magnetic pipe, the workpiece cannot magnetize in the magnetic field. The magnetic force line can penetrate non-magnetic workpiece just like X-ray [1, 2]. As a result, because the effect of the magnetic force, the magnetic abrasive particles form a Magnetic Brush, which press and enclose on the surface of workpiece along the magnetic force line in magnetic field. When the workpiece rotated, the Magnetic Brush rotated too. But under the influence of magnetic force, the Magnetic Brush shows turn, separate, and recombine phenomenon, which leads a relative motion with the workpiece surface, that complete the precision polishing to the internal surface of non-magnetic pipe. Even if the surface of workpiece is concave-convex, or free curved surface, all these locations can be polishing by "Magnetic Brush" [1, 3].