Vapormatt

White paper

Edge honing round shank tools by wet blasting to help prevent damage to cutting edges and improve tool performance

This whitepaper delves into the innovative approach of edge honing round shank tools by wet blasting, with a focus on preventing damage to cutting edges when the tool is in use. Round shank tools play a crucial role in numerous industries. Preventing damage and producing the correct cutting-edge profile for the application in question, is critical for optimal performance and prolonged tool life. This paper discusses the challenges associated with cutting edge damage, introduces wet blasting as an effective honing method, and provides practical insights into implementing wet blasting for edge honing.

Introduction

Round shank tools are widely employed in machining and metalworking applications, with their cutting edges facing challenges such as wear, abrasion, and thermal stress. This paper explores wet blasting as a novel technique for edge honing to address these challenges, and in turn enhancing the longevity and efficiency of round shank tools.

Cutting-edge damage

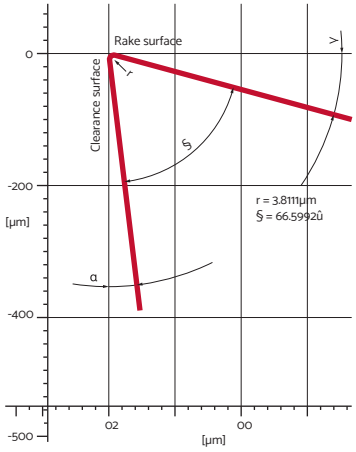
Cutting edge damage is a common issue for round shank tools, stemming from factors like overly sharp edges, abrasive wear, thermal stress, and mechanical loads.

Key challenges include:

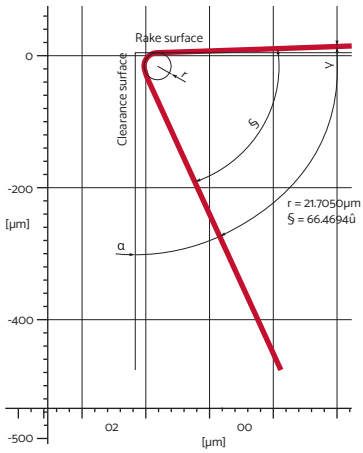
- **Overly sharp edges:** The highly sharpened cutting edges produced during the manufacturing process, are significantly more prone to damage like chipping and curling. A pencil is a good analogy here; a highly sharpened pencil tip is significantly more prone to breaking than a slightly rounded tip.
- **Abrasive wear:** Interaction with workpiece materials and contaminants can lead to abrasive wear on cutting edges.
- **Thermal stress:** High-speed machining and prolonged use can cause thermal stress, impacting the hardness and durability of cutting edges.
- **Mechanical loads:** Heavy loads and interrupted cuts can impose mechanical stresses, resulting in chipping or deformation of cutting edges.

Wet blasting for accurate and consistent edge honing

Wet blasting is a finishing technology that involves blasting a slurry, containing water and an abrasive media, at a particular component or tool. In this application it can hone a cutting edge to a specific micrometer tolerance and to a specific profile.



The cutting edge of a tool prior to edge honing



The cutting edge of a tool after edge honing by wet blasting

Creating an edge hone helps prevent chipping, curling, micro-cracking or premature wear of the cutting edge and significantly reduces issues associated with thermal stress because the cutting edge of a honed tool operates at a much lower temperature. Edge honing also helps the tool cope with heavier mechanical loads, particularly from new.

The ability to offer a controlled edge hone to within +/-5 microns (up to 100 microns) tolerance of specification makes wet blasting the preferred solution for many round shank tool manufacturers.

Mainly relevant to tools like end mills, wet blasting is also cable of producing an edge hone to a specific K-factor. This can make a big difference in cutting performance and durability. The process can apply a waterfall or trumpet profile to cutting edges, or anything in between.

The wet blasting process

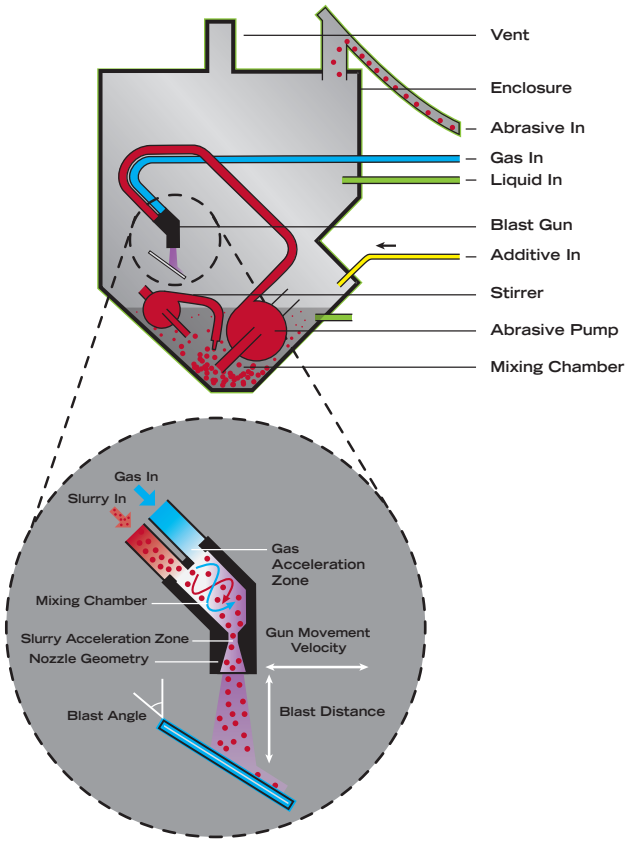
Implementing wet blasting for edge honing involves the following key steps:

Tool preparation: Clean and inspect the tool before wet blasting to ensure optimal results. Wet blasting can be used to thoroughly clean the tool, removing all contaminants, oils and grease, in effect combining the cleaning and edge honing processes into one operation.

Blasting machine selection: Choose suitable wet blasting equipment based on the tools' specifications, size, and material. Other factors to take into consideration include the similarity of the tools to be honed and the quantity of tools to be processed in a given timeframe. Vapormatt can advise on the best wet blasting machine for your requirements.

Slurry composition: Develop an effective slurry composition considering the abrasive media, water, and additives for the wet blasting process. Again, Vapormatt can advise on the best wet blast slurry composition for your needs.

Process optimisation: Fine-tune wet blasting parameters such as pressure, nozzle distance, and slurry flow rate for optimal results. Our automatic machines allow you to program in the most suitable parameters and it is worth noting that wet blasting is more controllable than other type of finishing process. This allows manufacturers to achieve the perfect finishing result on their round shank tools.



Cross section of the wet blast gun

Vapormatt Oncilla wet blasting machine for automatic round shank tool finishing

Conclusion

Wet blasting presents an excellent solution for edge honing round shank tools to prevent cutting edge damage. This whitepaper has explored the challenges associated with cutting edge damage, introduced wet blasting as an effective honing method, and provided practical insights into implementing wet blasting for edge honing. By adopting this innovative approach, manufacturers can enhance the performance, longevity, and cost-effectiveness of their round shank tools for various applications.

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