Cincinnati Tool Steel Company
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Powdered Metal Tool Steels

Cincinnati Tool Steel Company's producing mill's powdered metal tool steel process starts with nitrogen atomizing molten metal to produce prealloyed metal powder. The resultant powder is blended, filled into mild steel canisters, hot isostatically pressed to 100% density, then hot worked to produce mill forms for further processing into finished products.

Many of the benefits realized by employing this process are a direct result of the refined microstructure (smaller, more uniformly distributed carbide particles and a finer grain size) and the lack of segregation in the powder metallurgy product.

Key Benefits

The benefits of powder metallurgy processed steels over cast/wrought steels include:

- Reduced manufacturing costs to the tool producer
- Improved machinability in the annealed condition
- Improved grindability in the hardened and tempered condition with no reduction in the abrasion resistance of the finished tool
- Increased toughness of the finished tool
- Greater uniformity of performance from tool to tool
- Less out-of round distortion after heat treating
- Higher alloy content powdered metal tool steels can be made possessing higher wear resistance and improved cutting performance

Improved machinability and grindability result in reduced wear and increased manufacturing productivity. Grinding operations also produce a smoother cutting edge on the finished tool.

The machinability of Cincinnati Tool Steel's powdered metal tool steels may be further enhanced through the use of controlled sulfur additions.

Increased toughness translates to a greater resistance to tool breakage, which is particularly relevant in intermittent cutting operations. Increased toughness also permits a tool to be heat treated to a higher hardness for a desired toughness level, resulting in either longer tool life or higher cutting speeds.

Less out-of-round distortion after heat treating increases the predictability for scheduling tool changes, resulting in less downtime for unscheduled retooling and more efficient usage of tool in multi-spindle machines, where failure of a single cutter usually requires changing all of the cutters, including those that are still good.

This greater uniformity of size change also permits a more predictable as heat treated envelope, which in turn permits the tool manufacturer to machine annealed tool blanks closer to finished size, thereby eliminating the amount of final grinding required after heat treatment.