

FASTER, BETTER, STRONGER END MILLS



The cutting tool industry has been trying for years to replace solid carbide end mills with indexable end mills. There have been many attempts, few, if any have been successful. One factor is the number of cutting teeth per unit of diameter is higher on solid carbide than with indexable end mills. Smaller diameter tools require higher RPMs. Higher RPMs increase the centrifugal force on the insert. Conventional indexable end mills rely only on the insert screw to secure the insert and prevent the centrifugal force from ejecting the insert from the pocket. Conventional indexable end mills have flat seated inserts that provide nothing to prevent the centrifugal force from trying to eject the insert other than the screw. To accommodate the screw the insert needs to be large enough, limiting the number of teeth per unit of diameter.

Tungaloy's TungForce-Rec line of end mills has successfully overcome this obstacle by designing the insert with a "V" bottom that fits into a mating "V" bottom pocket on the tool.



This design removes much of the centrifugal forces from the screw, putting the forces into the rigid pocket and allowing much higher RPMs. The “V” bottom design also allows for a larger screw of manageable size.

The “V” bottom insert allows inserts to overlap at the center of the tool, allowing for more inserts even in small diameter tools. The “V” bottom design leaves additional material at the center of the tool body making the body much stronger. Conventional flat-seated inserts would not be capable of crossing over the centerline of the tool body, thereby leaving very little material at the center of the tool even with only one insert.



Together these features equate to higher metal removal rates with the TungForce Rec as compared to solid carbide end mills.

A common objection to indexable versus solid carbide has been the surface finish and wall accuracy achieved with solid carbide. TungForce Rec’s superior pocket design and large screw increase the stability of the insert. The ground insert provides increased accuracy, freer cutting forces and improved repeatability. Collectively, these features improve wall accuracy and surface finish to rival those attained with solid carbide.

The stable design and ground insert permits accurate repeatability when indexing an insert., significantly reducing downtime, when compared to Solid Carbide. The TungForce Rec can be indexed without removing the tool from the holder in seconds. Solid carbide end mills need to be taken out of the holder, replaced with a new end mill, set with a tool presetter, put back into the machine, touched off and offsets would then need to be entered.

Solid carbide end mills can be expensive; therefore, many users regrind their end mills. This may appear to be a practical option. Since most re-grind operations have at least a 2 week turn-around time the end user would need to have at least a three-week supply in the pipeline at all times. Needlessly tying up cash in inventory would only create expensive, avoidable cost. Reground tools have reduced diameters which will require more set up time to determine the offsets. Having numerous diameter end mills in a shop increases the probability of an error by loading the wrong size end mill into the machine. TungForce Rec’s excellent repeatability insures each tool to be the same size. Historically, regrinds offer only about 75% of the original performance of a new solid carbide end mill. Unlike a reground end mills, the TungForce Rec offers the same advanced performance after every index. TungForce Rec does not require needless inventory carrying costs since the TungForce Rec tool is indexable the inventory levels are simply what is required.

TungForce Rec is capable of ramp angles often 3 times greater than solid carbide, making TungForce Rec a great choice for slotting and pocketing.

Solid carbide tools have carbide shanks, allowing for long reaches with little deflection. However, the TungForce Rec is available with a modular head that can use a carbide shank, thereby matching the reach capabilities of solid carbide at a fraction of the price.

The TungForce Rec is an obvious choice for any production or tool room end milling application. Many of today’s CNC lathes have “live tooling”; however, these live tools are limited on the size of milling tool, making TungForce Rec a logical option.

Of course, a major advantage of the TungForce Rec cutter is that all these benefits are available at an operating cost generally less than the cost to regrind a solid carbide end mill.

The extensive application range and versatility of the TungForce Rec line includes: shoulder milling, slotting, ramping, helical interpolation, hole enlargement, plunging and traversing. The diameter range is from 8mm diameter up to 32mm diameter. Inserts are available to machine: Steels, Stainless steels, Iron, Aluminum, Titanium, Inconels, and Hardened steels. Collectively, all of these benefits make the TungForce Rec family of small end mills an indispensable addition to any machining facility.