

AXD4000 - NEW SCREW-IN-TYPE

To complement the AXD range of milling cutters, a series of screw-in types are now available in sizes from $\varnothing 25$ - $\varnothing 40$. The addition of a screw-in type brings extra versatility and efficiencies by allowing easy tool changes in situ. Additionally, the small diameters lend themselves to machining in smaller pockets and restricted areas in complex components.

Metal removal rate is one of the key factors in determining efficiency when machining typical aerospace components such as wing ribs. Achieving the required efficiency requires a combination of several elements; a powerful machine tool, rigid component clamping, a good coolant supply and a cutting tool capable of removing large volumes of material without overloading the spindle.

The multi-functional AXD4000 series from Mitsubishi Materials has several features to combat the problems usually encountered when machining at the high parameters demanded by today's production environment, such as outstanding metal removal rates.

Combining features such as a rigid tool body, ultra secure insert clamping and carbide inserts with a newly designed geometry, ensures that low cutting resistance and large depths cut of are viable.

The existing range of cutters from $\varnothing 32$ - $\varnothing 125$ including shank and arbour types; and a highly rigid monoblock style with an HSK63-A interface is readily available. Extra secure clamping of inserts on the tool body is critical and is now made possible by using two clamp screws for each insert together with Mitsubishi's AFI (Anti-Fly Mechanism) to further enhance clamping and positional security. Tests have shown that after cutting, tools using the double clamp and AFI mechanism have minimal insert displacement of only $6\mu\text{m}$, when compared to conventionally clamped inserts that moved up to $17\mu\text{m}$.

However, without details such as the correct insert grade



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and geometry, even the most rigid of set ups wouldn't be capable of machining effectively. The inserts for AXD are designed with a helical flank and incorporate a large rake angle that provides the critical element of low cutting resistance. Additionally, a convex cutting edge ensures smooth chip flow, an essential feature during high speed cutting. Working in tandem with the advanced geometry, one of the two carbide grades of the insert, TF15, a non-coated micro-grain cemented carbide with a polished rake face to prevent chip welding also offers both high wear and fracture resistance. The alternative grade, LC15TF, with a special DLC coating offers even higher chip welding resistance and can be used in both wet and dry applications.

Another essential factor that needs consideration prior to high speed milling is the balance of the tool. Without balancing, the high revolutions would generate primary and secondary vibrations which would result in poor surface finishes and a significantly reduced tool life. The tools are balanced to G6.3 at 10000min^{-1} according to ISO1940.

The goal of ultra high productivity, tool reliability and previously unachievable metal removal rates is now a possibility, but only if all the correct parameters are in place.

