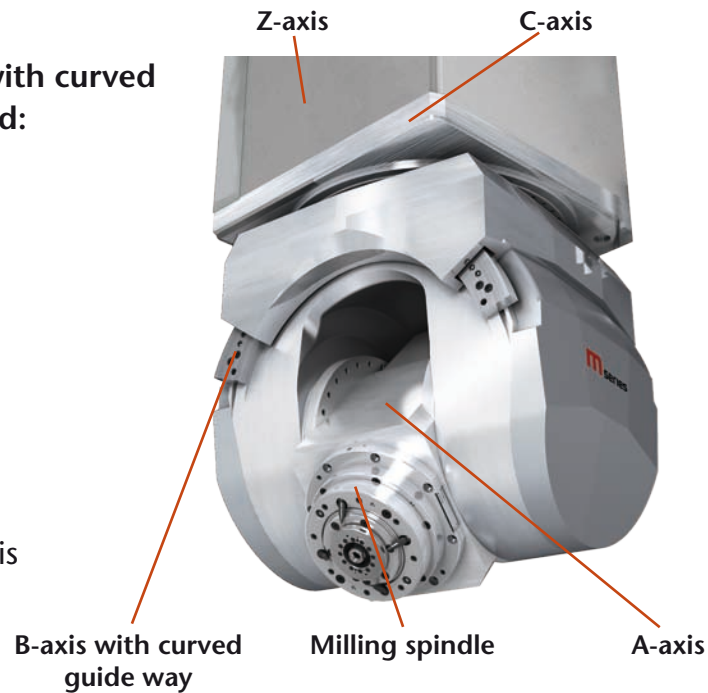


**M3 ABC - the high-end milling head with curved guide way leaves nothing to be desired:**

- Extremely rigid and compact design
- 3 swivelling axes A, B and C
- Very large swivelling ranges
- Direct optical scales in all axes
- Clamping systems in all axes
- Highly dynamic drives
- No need for an infinitely rotating C-axis



Comparison	Parallel kinematics	AC milling head	AB head (Competitors)	ABC head (M-Series)
Compact design	-	✓	-	✓
Large swivelling ranges	-	✓	-	✓
No pole problem	✓	-	✓	✓
5 axis simultaneous machining	✓	(✓)	✓	✓
Extended compensation capabilities	✓	-	✓	✓
Suitable for HSC gantry machines	-	✓	-	✓
Reduced risk of machine damage	-	-	-	✓

Conventional 2-axis milling heads have a C-axis parallel to the Z-axis and an A-axis at a right-angle to C. This results in the so-called pole problem at  $A = 0^\circ$ , where the C-axis and the milling spindle are aligned in parallel. The result is that, at this point, the C-axis cannot swivel the spindle at all. Any movement of the spindle must be done by the A-axis; the only use of the C-axis is to preset the A-axis. Accordingly, even the smallest spindle movements – e.g. a few angular seconds – can cause C-axis movements of up to  $90^\circ$ .

The problem is particularly apparent during simultaneous 5-axis machining, when the vertical spindle is seen to "dance" on the surface of the workpiece with enormous C-axis movements, adversely affecting productivity, surface finish and tool life.

And there is yet another limitation. The latest developments in machine compensation and enhancement of volumetric accuracy are not available on machine tools with conventional 2-axis heads. Therefore a milling head without the pole problem is required.

Such milling heads without the pole problem are already in use, for example in the aircraft industry, but these heads have several limitations as to their swivelling range and compactness.

**The solution is the new and unique M3 ABC, the first milling head which combines all the advantages of the other concepts used up to now!**

You would like to know more about the new 'M-Series'? Then please contact: