

Introduction

Benefits of a spindle chiller

Maintaining accuracy and spindle longevity are the primary reasons to consider adding a spindle chiller to your machining center.

Details

Why high temperatures compromise the spindle and affect accuracy

Because conventional spindles are typically designed with a fixed bearing preload (no springs), there isn't any compensation for the thermal expansion that occurs from heat generation. Higher temperatures cause the bearing raceways to expand and tighten. This causes the bearing system to increase its preload beyond the original setting, which leads to increased axial and radial loading on the bearing system. In addition to compromising the lifespan of the spindle bearing system, this thermal expansion affects accuracy.

Conclusion

Why a spindle chiller might be a worthwhile investment

A spindle chiller is a worthwhile investment that extends spindle life, protects accuracy, increases the machine's capacity, and reduces maintenance costs. Refer to the chart below for basic guidelines.

	DUTY CYCLE			
	Light 25%	Medium 60%	Heavy 100%	Continuous Spindle Operation
SPINDLE SPEED	Percentage of load from maximum axial and radial*			Very Few Tool Changes
6K / 50T	Not necessary	Not necessary	Recommended	Required
8K / 50T	Not necessary	Recommended	Required	Required
8K / 40T	Not necessary	Not necessary	Required	Required
10K / 40T	Not necessary	Recommended	Required	Required
12K / 40T	Required	Required	Required	Required
15K / 40T	Required	Required	Required	Required

* Percentage (%) based on the maximum relative capacity load of the spindle bearings. The life of the bearings will decrease with the amount of heat generated. Larger radial and axial loads and faster speeds will generate more heat.

Light 25% High speed machining with a shallow depth of cut (less than .050"); also any finish passes.

Medium 60% Medium duty: General machining with moderate cut depths and average surface speeds, including .050"-.150" depth of cut in non-harden materials.

Heavy 100% Heavy Duty: Hogging of large amounts of material using deeper depth of cut (above .150"); also general machining of hardened materials could be considered heavy duty.