Governed Air Turbine Spindles® vs. Coolant Driven Spindles

For a quick view see summary grid on page 3

Review the Pro's and Con's:

1. **Estimated Speed Range vs. Specified Constant Speeds**
   Coolant driven spindles operate at an *estimated speed range* described as: "approximate rpm values - depend on pressure, flow rate and used coolant type". The maximum approximate speed available is 50,000 rpm.

   Air Turbine Spindles® rotate within 10% of a specified *fixed constant speed* of 25,000 to 90,000 rpm determined by port architecture.

2. **Slowing by Several 1,000 rpm vs. Governor Controlled High Speed**
   Coolant driven spindle specifications state: *"The spindle rotates at its rated speed when idle. When the cutting tool enters the work piece, it is expected that the rotation speed might slow down by several thousand rpm."*

   Air Turbine Spindles® are governor controlled. This means that airflow increases if the rotational speed slows and is maintained at high speed under load when you start cutting - even on angles and hard materials.

3. **No Power Rating vs. 1.4 hp (1 kW)**
   Coolant Driven spindles specifications state *No Power Rating* and state small tools shouldn't be used. Coolant spindles have low power.

   Air Turbine Spindles® deliver up to 1.4 hp (1 kW) on demand to maintain high speed on the toolpath so you can mill 10,000mm/min in HSC 60+ steel with 1/4" / 6mm tools. High Speed without a governor to maintain high power soon drops to a lower speed and actual productivity is limited.

4. **Filtration and Reduction of Coolant vs. 90 psi (6.2 bar) Air Supply**
   Coolant driven spindles require filtration and coolant pressure reduction system.

   Air Turbine Spindles® are powered by 90 psi / 6.2 bar compressed air and no coolant or reduction is required. A free filter regulator is included in standard equipment.

5. **Chip Loaded Coolant vs. Compressed Air**
   Coolant contains various substances, including chips, which can cause clogging or corrosion in a coolant driven spindle, or solidify and bacteria grow if static, requiring repairs. Coolant can also leak into your CNC's spindle causing an expensive repair and downtime.

   Air Turbine Spindles® have only compressed air in circulation. These direct drives operate with just 2 moving parts: a powerful proprietary turbine and 2 ceramic grease packed precision bearings. *Air Turbine Spindles®* life often exceeds 4,000 hours depending on application.

6. **Automatic Loading - Coolant only vs. Flexible Options for Air Supply**
   Coolant driven spindles require a pressure reduced filtered supply of coolant and load automatically from the magazine.

   Air Turbine Spindles® load automatically and connect to compressed air available at every CNC.

   Select through spindle air from the machine air blast or our patented Auto-Changer Assembly making set up easy. Manual connection by NPT also available.

7. **Unknown T.I.R. vs. 2µ Accuracy**
   Coolant driven spindles state no T.I.R statistic.

   Air Turbine Spindles® certify 2µ precision.

8. **Energy Efficiency - 20 - 40 bar vs. 6.2 bar (90 psi)**
   Coolant Driven Spindles use 20 – 40 bar coolant pressure reduced from much higher pressures. This system is not energy efficient.

   Air Turbine Spindles® governor controlled airflow induces only the exact the amount of air flow needed to drive the tool, resulting in economical use of compressed air. The result is energy efficiency. *Air Turbine Spindles®* use only 6.2 bar / 90 psi air pressure, not high pressures used with coolant.

9. **Availability of Compressed Air in Every Machine Shop**
   Coolant Driven Spindles require coolant. Not every CNC user has or needs coolant in his machine or wants coolant in his process. With some materials coolant undesirable.

   Air Turbine Spindles® use 90 psi / 6.2 bar available at every machine, clean air cannot contaminate work material and it costs very little.

10. **Observation of Speed Falloff vs. Constant Governed High Speed**
    Coolant Driven Spindles offer an accessory Digital Tachometer.

    Air Turbine Spindles® do not need not this option. A simple tachometer will show the rotational speed remains close to rated speed up to 80%+ of maximum power.

    View *Air Turbine Spindles®* at www.airturbinetools.com

air turbine spindles®

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Technical Comparison Summary Grid

	Coolant Driven Spindles	Air Turbine Spindles®
Fixed High Speed	No	Yes
Maximum Speed	50,000 rpm Free Speed which drops	90,000 rpm Constant Governed Speed
Speed + Power Maintained by Governor	No	Yes
Maximum Power	Unspecified	1.4 hp (1 kW)
Coolant Filtration / Reduction	Yes	No
Contamination / Clogging Risk	Yes	No
Automatic Loading from CNC magazine	Yes	Yes
Collet held T.I.R Accuracy	Unspecified	2µ
Pressure / Energy Used	20 - 40 bar	6.2 bar (90 psi)
Governor Controlled Energy Efficiency	No	Yes
Coolant required	Yes	No
Contamination risk to work / main spindle	Yes	No
50mm and 100mm Extended Spindles	No	Yes