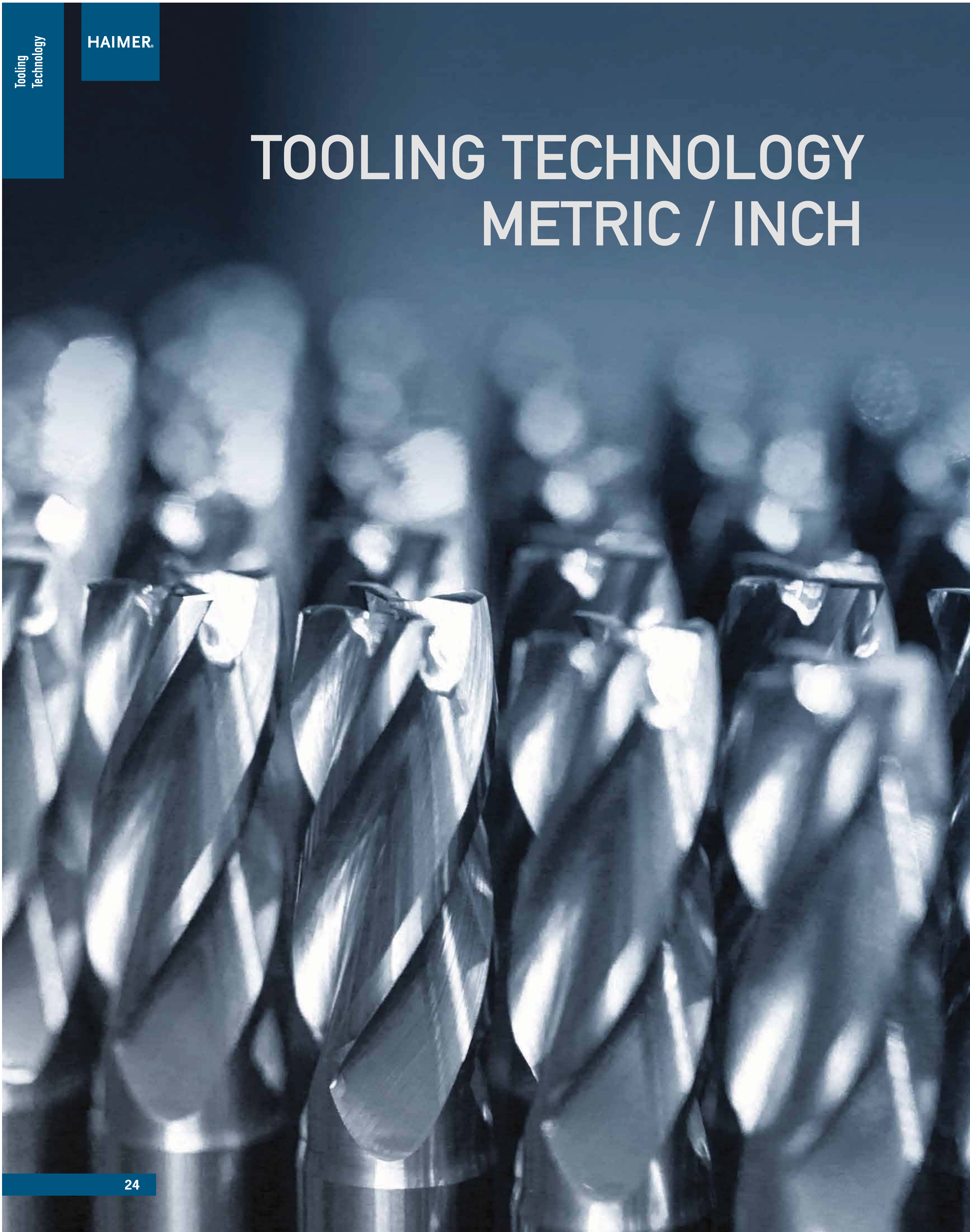
MASTER CATALOG

HAIMER®

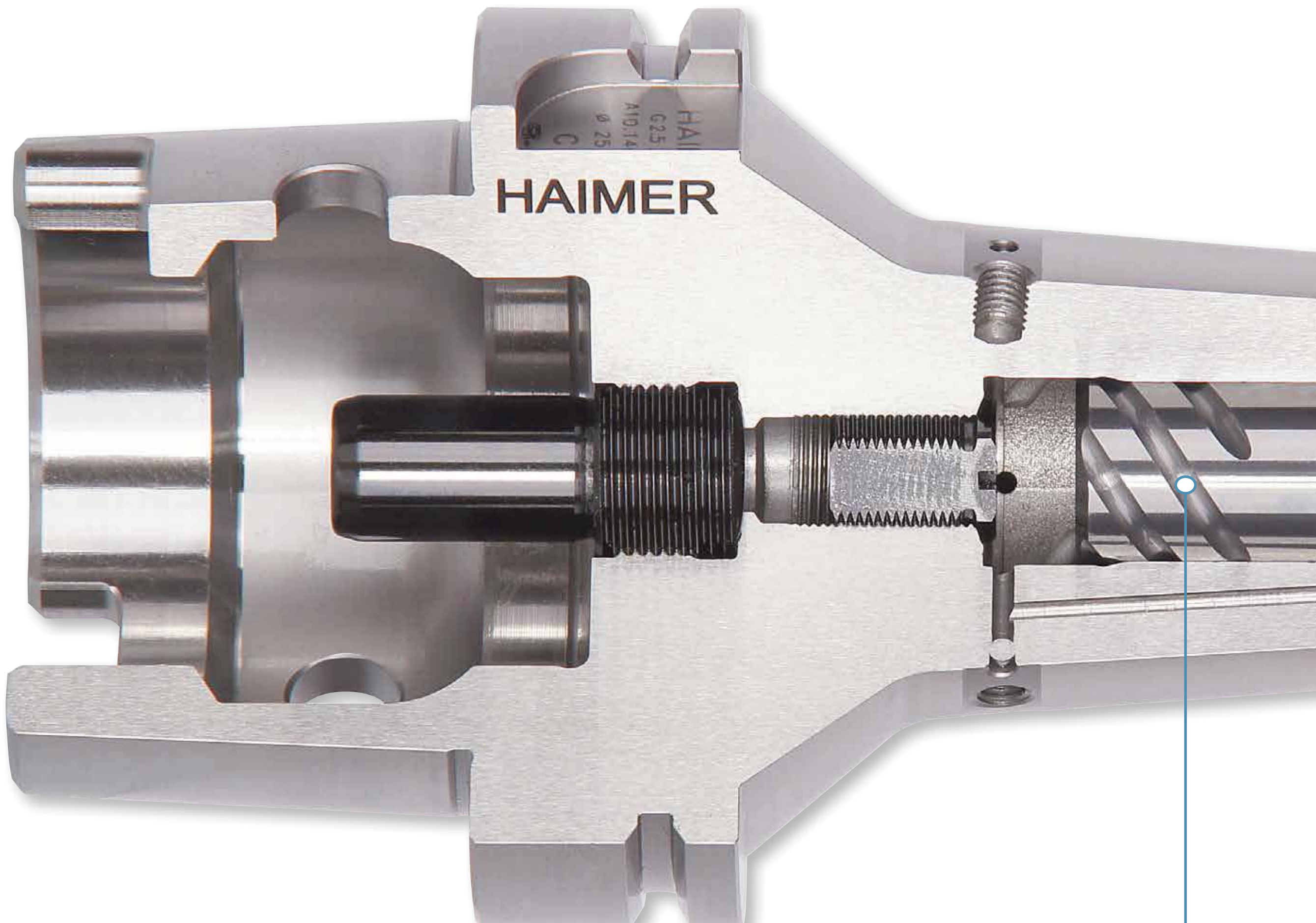
HAIMER

TOOLING TECHNOLOGY METRIC / INCH



HAIMER MILL Power Series

Solid Carbide End Mills – Unique Advantages



HAIMER Quality – 100% guarantee:

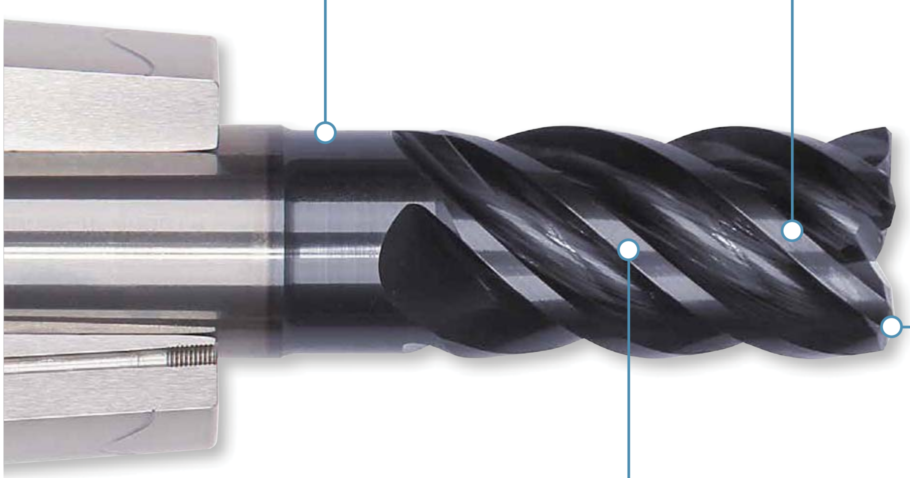
→ Consistent cutting tool performance
→ Maximized process reliability

Safe-Lock shank:

→ Maximum pull-out protection
→ Best run-out accuracy
→ Maximum cutting volume
→ Even in tool holders without Safe-Lock consistent clamping forces and torques
→ h5 shank tolerance

Recessed Neck:
→ Greater reach capability (ap)
→ Expanded application range

Fine-balanced to < 1gmm
→ Smooth vibration-free rotation
→ Spindle Bearing Protection



Max. 5 µm run-out accuracy
→ Optimized repeatability
→ Better machining quality
→ Reduced chatter
→ Increased tool life thanks to equal tool wear

High precision rounding of cutting edges
→ Less prone to chipping
→ Wide application range

Polished Surfaces:
→ Optimized chip removal
→ Increased tool life

Shock-resistant packaging
→ Top quality in each delivery

Tooling Technology

HAIMER

HAIMER MILL Power Series

For maximum cutting performance and tool life

FORMULAS – MILLING BASICS

Common North American cutting tool formulas

INCH

Description	Formula
Cutting Speed (RPM)	$RPM = \frac{SFM \cdot 3.82}{Dia.}$
Surface feed per minute	$SFM = RPM \cdot 0.262 \cdot Dia.$
Feed (IPM)	$IPM = RPM \cdot IPR$
Feed per tooth	$IPT = \frac{IPM / RPM}{\text{No. of flutes}}$
Material removal rate	$MRR = IPM \cdot WOC \cdot DOC$

Legend

RPM = Revolutions per minute
Dia. = Tool diameter [inch]
SFM = Surface feed per minute [inch/min]
IPM = Feed per minute [inch/min]
IPR = Feed per revolution [inch/r]
IPT = Feed per tooth [inch/Z]
MRR = Material removal rate [inch^3/min]
WOC = Width of cut
DOC = Depth of cut

Cutting speed, Feed and Milling

METRIC

Description	Formula
RPM	$n = \frac{v_c \cdot 1000}{D \cdot \pi}$
Cutting speed	$v_c = \frac{D \cdot \pi \cdot n}{1000}$
Feed per tooth	$f_z = \frac{f_n}{z}$ $\quad f_z = \frac{v_f}{z \cdot n}$
Feed per rotation	$f_n = f_z \cdot z$ $\quad f_n = \frac{v_f}{n}$
Feed rate	$v_f = f_z \cdot z \cdot n$
Material removal rate	$Q = \frac{a_p \cdot a_e \cdot v_f}{1000}$
Drive power	$P_a = \frac{a_p \cdot a_e \cdot v_f \cdot k_c}{60 \cdot 10^6 \cdot \eta_{mt}}$
Cutting time	$T_c = \frac{l}{V_f} = \min$
Average chip thickness	$h_m = f_z \cdot \sqrt{\frac{a_e}{D}}$

Legend

a_e = Radial cutting width [mm]
a_p = Axial cutting depth [mm]
D = Diameter [mm]
f_n = Feed per rotation [mm/r]
f_z = Feed per tooth [mm/Z]
h_m = Average chip thickness [mm]
k_c = Specific cutting force [N/mm^2]
l = Length of cut [mm]
n = Revolutions per minute [rpm]
P_a = Drive power [kW]
Q = Material removal rate [cm^3/min]
T_c = Cutting time [min]
v_c = Cutting speed [m/min]
v_f = Feed rate [mm/min]
z = Number of teeth
π = 3.14...
η_{mt} = Efficiency rate