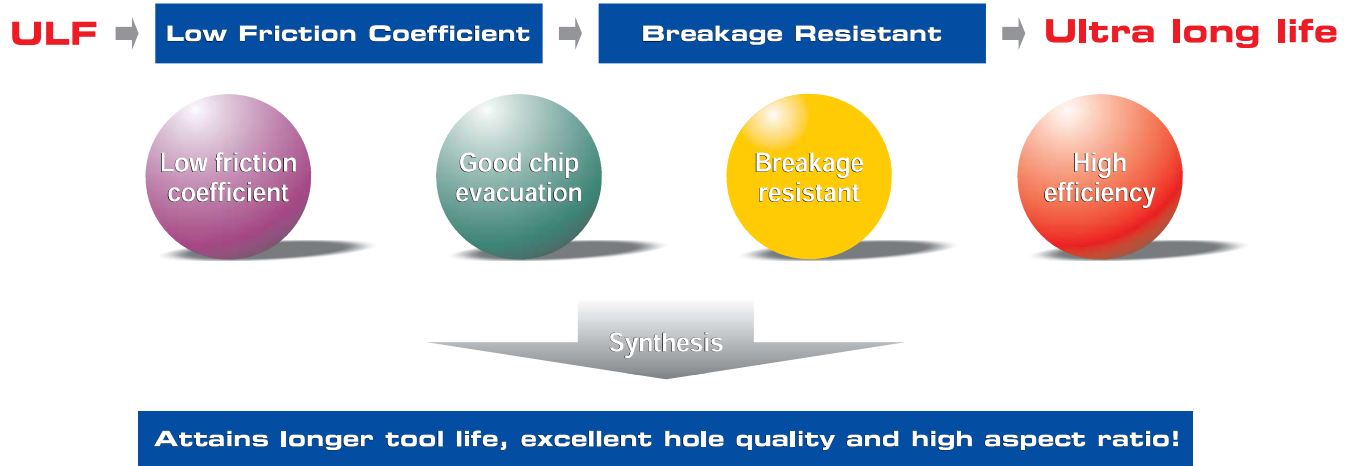


ULF coating/Beschichtung/ revêtement/rivestimento/revestimiento

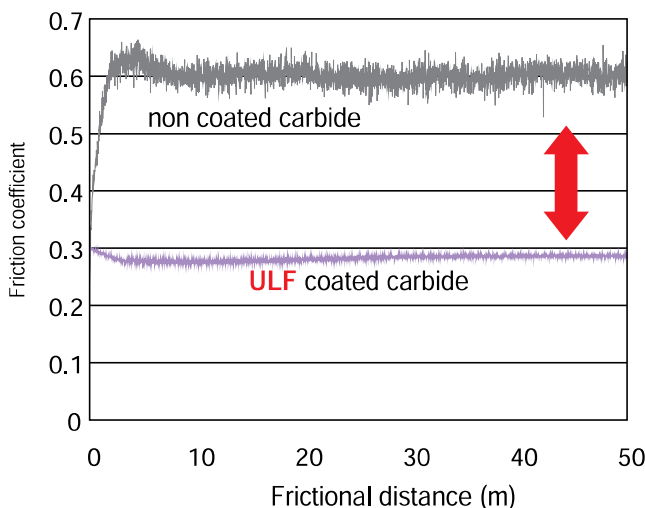
ULF: Union Tool Lubricant Film, Ultra Long-life Film

Union tool's ULF coated drills overturns the conventional wisdom for ultra micro PCB drills



Comparison of friction coefficient between ULF and non coated carbide

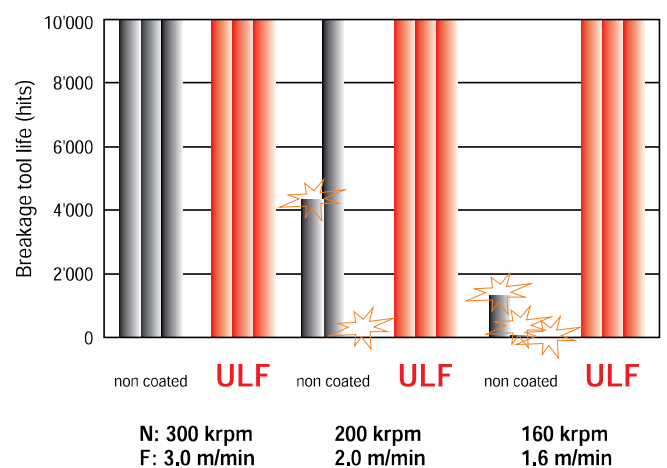
Ball on disk test
Substrate: MCL-E-679FGR t0.8 mm without Cu layer
Used sphere: W-Co S6 mm
Turning radius: 2.5 mm
Velocity: 100 mm/s
Sampling: 5 Hz
Test load: 5 N



**Friction coefficient decreased
on base material surface
Improved surface lubrication**

Comparison of tool breakage life between non coated and ULF coated drill

Drilling conditions
Drill: Ø 0.105 x 1.7 mm
PCB: MCL-E-679FGM t0.11 mm (double sided) x 7 boards
Entry board: LE900
Backup board: t1.5 mm Bake



**Breakage resistance of ultra micro
drills is improved by ULF coating**

ULF coating will take micro drill bit design to the next stage.

We will develop drill bit geometries in accordance with the characteristics of **ULF** to meet further long life and increased stack height requests.