Manufacturing solutions for the

Aerospace Industry

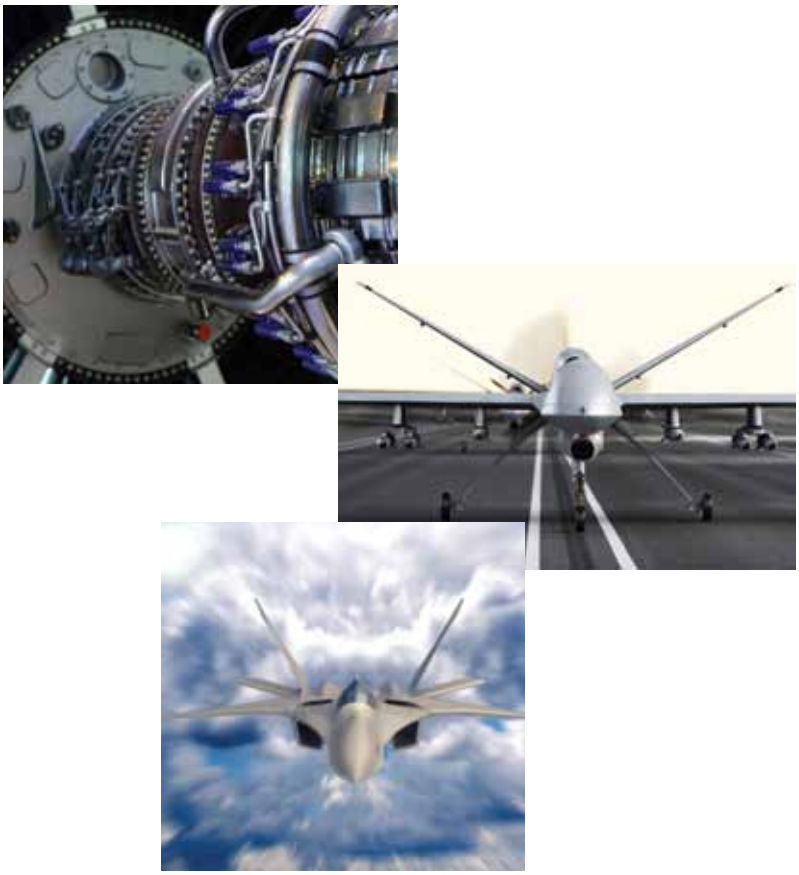
M.A. FORD
High Performance Cutting Tools

*Where **high performance** is the **standard**®*

Integrated Manufacturing Solutions

www.maford.com

For almost 100 years, M.A. Ford has been at the cutting edge of tooling design and manufacturing and has developed an enviable global reputation for performance and precision in advanced solid carbide tooling, serving over 60 countries worldwide. Our innovative cutting geometries, materials and coating technologies are providing effective manufacturing solutions to an expanding and increasingly diverse range of industries. This includes the Aerospace industry, whose demands for ever improving efficiencies in manufacturing processes and the development of new aerospace materials drives the continued advancement in cutting tools.



*M.A. Ford® where **high performance** is the **standard**®*

WORKPIECE MATERIAL

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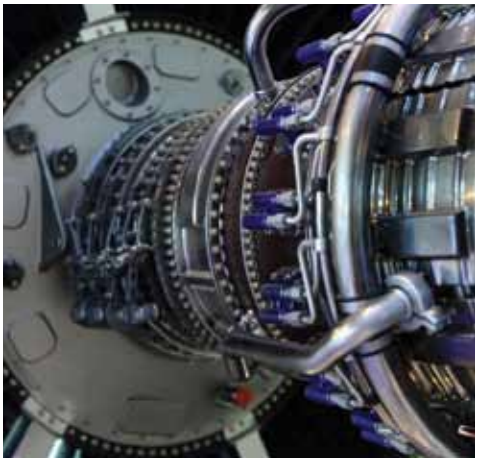


Aluminum **presents it own unique manufacturing challenges, especially in specifications and tolerances for aerospace manufacturing. M.A Ford® meets those requirements by offering a wide range of drill types and sizes, as well as a full range of high performance end mills, reamers and countersinks.**

DRILLS

Cyclone Series CDACR

- Enhanced double margin design
- Lower thrust point geometry
- Excellent choice for drilling cross holes
- 2 flute, solid carbide, coolant fed, 5X drill, 140°-142° point angle, 30° helix, manufactured to DIN6537L

Offering #31 (.1200") – 1/2" and 3 – 12.5mm

Click here for full details

Twister® AL Series 229

- An option to the CDACR
- Parabolic flute increases chip evacuation
- Point design allows for easy re-grinding
- 3 flute, solid carbide, 5X drill, 144° point angle ≤12mm 150° point angle >12mm, 30° helix
- Metric sizes ≥3mm to DIN6537L

Offering 3/64" – 3/4" and 2 – 16mm

Click here for full details

Twister® GP 300 Series Micro Drills

- Economical micro drilling option
- 2 flute, solid carbide, straight shank, 5X+ drill length, 118° point angle, 35° helix

Offering #80 (.0135") – 1/4" and 0.50 – 3.15mm

Click here for full details

Aluminum

DRILLS

Twister® GP 302 Series Micro Drills

- Economical drilling option
- Micro drills available in up to 3 different flute lengths
- 2 flute, solid carbide, 130° point angle, 35° helix

Offering #102 (.0039") to 1/8" and 0.10 – 3.15mm with a 1/8" (3.175mm) common shank

Click here for full details

END MILLS

TuffCut® AL Series 134/134N/134S

- A high 45° helix for rapid stock removal
- 3 flute, solid carbide with Chipbreaker design, in standard and stub flute lengths and neck relief options, center cutting

Offering 1/4" – 1" and 6 – 25mm

Click here for full details

TuffCut® AL Series135/135N/135B/135BN

- Geometry allows it to be run at extremely high chip loads
- Designed for roughing cuts
- 2 flute, solid carbide, stub and standard lengths, square end, corner radius, neck relief and ball end styles
- 30° helix, ball end 37° helix, center cutting

Offering 1/8" – 1" and 2 – 25mm

Click here for full details

END MILLS

TuffCut® AL Series 136

- Designed for finishing cuts
- Provides excellent part finishes
- Wiper flat end geometry and face grind protection
- 2 flute, solid carbide, 45° high helix, center cutting

Offering 1/8" – 1" and 3 – 20mm

Click here for full details

TuffCut® X-AL Series138/138R/138N/138NR 138CE/138B/138BN

- Part of the newest generation of end mills developed for extreme productivity
- Wiper flat end geometry and face grind protection
- Available uncoated, Fordlube coated or CERAedge® coated
- 3 flute, solid carbide, offers square end, corner radius, ball nose and neck relief options with stub, standard and long lengths, center cutting

Offering 1/8" – 1-1/4" and 2 – 20mm

Click here for full details

TuffCut® XR-AL Series 334

- Enhanced flute design for improved chip control and reduced cutting forces
- Chipbreaker provides better part finish than a traditional knuckle rougher and aids in chip management
- Variable helix strengthens the tool corner reducing the chance of a chipped corner
- Manufactured from premium grade ultrafine carbide material and Gem+ coated for extended tool life
- 3 flute, solid carbide, standard and long lengths, 45° helix with neck options, center cutting

Offering 1/4" – 1"

Click here for full details

Aluminum

REAMERS

TrueSize® Carbide Range Reamer Straight Flute Series 270

- Right hand cutting
- 45° lead cutting angle
- Metric sizes to DIN1420 H7

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Carbide Range Reamer Left Hand Spiral Series 270L

Made to order from .0434" – .3860" and 1.10 – 9.80mm

Click here for full details

TrueSize® Carbide Range Reamer Precision Tolerance OD Series 270P

- Right hand cutting, straight flute
- 45° lead cutting angle
- Diameter Tolerance +.0001/+.0000" and +.0025/+.0000mm

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Series 272

- Designed for high-precision hole finishes, or tighter diameter control
- Precision ground between centers to assure maximum concentricity
- Recommended for general purpose reaming
- Straight flute, right hand cutting, 45° lead chamfer, solid carbide in over 900 standard sizes
- Metric sizes to DIN1420 H7

Offering .0130" – 5/8" and 0.35 – 16mm

Click here for full details

COUNTERSINKS

HSS Series 92

- Designed for countersinking, chamfering and deburring
- Bright surface reduces any chip build-up on the cutting edge
- A clean, chatterless finish is achieved
- 3 spiral flutes with included angles 60°, 82°, 90°, 100° and 120° as standard options

Offering 1/4" to 2" and a 5 piece set of popular sizes is available

Click here for full details

HSS Micro-Stop Series 83

- The integral pilot can be specified to any diameter within a specified range
- 2 flute, with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Micro-Stop Series 84

- Pilot hole for an interchangeable inserted steel pilot
- 2 flute, with included angles 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

COUNTERSINKS

HSS Micro-Stop Series 86

- The integral pilot that can be specified to any diameter within a specified range
- 3 flute with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Micro-Stop Series 87

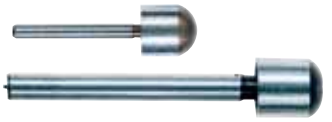
- Pilot hole for an interchangeable inserted steel pilot
- 3 flute with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Pilots Series 850 and 851

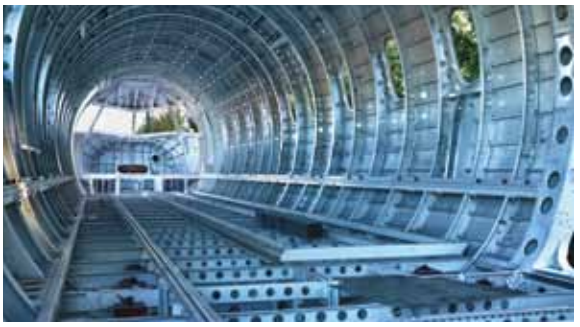
- Two HSS countersink pilot series to use with the micro-stop countersink Series 84 and 87
- Series 850 has a .086" shank
- Series 851 has a .093" shank



The pilot head diameter range is from 3/32" – 3/8"

Click here for full details

Composite Graphite is extremely abrasive.



Carbon Fiber Reinforced Plastics (CFRP) and similar composite materials can be a challenge to machine. M.A. Ford® has developed the optimal combination of tool material, geometries and coating to meet this challenge.

DRILLS

Twister® GP Series 207

- No delamination
- Eliminate fuzz or “fray” at exit
- Brad and spur point
- 2 flute, stub length, solid carbide, 35° helix

Offering #42 (.0935") –1/2" and 2.4 – 12.0mm

Click here for full details

Twister® HP Series 207CE

- No delamination
- Eliminate fuzz or “fray” at exit
- Brad and spur point
- 2 flute, stub length, solid carbide, 35° helix, CERAedge® coated

Offering 3/32" – 1/2" and 3.2 – 8.0mm

Click here for full details

Composite Graphite

ROUTERS

Diamond Coated Series 239

- Cut more linear inches
- Faster cycle times
- High routing rate
- Delivers great edge quality
- No delamination or flaking
- GemX diamond coated or uncoated
- 4 end grind options, solid carbide with upcut design
- Licensed for Boeing U.S. Patent 7,090,442

Bur End End Mill Safe End Fishtail

Offering 1/8" – 1/2" and 3.0 – 12.0mm

Click here for full details

Diamond Grind Series 230

- Down cut, safe end
- Ultra fine micrograin carbide
- Routers are available with color coded depth setting rings upon request

Safe End

Offering 1/32" – 3/8" and 0.8 – 8.0mm

Click here for full details

Diamond Grind Series 231

- Down cut, end mill point
- Ultra fine micrograin carbide
- Routers are available with color coded depth setting rings upon request

End Mill Point

Offering 1/32" – 3/8" and 0.8 – 8.0mm

Click here for full details

GemX Coating

A CVD diamond coating for composites and aluminum that offers the maximum hardness and wear resistance of any of the M.A. Ford® coatings.

M.A. Ford® Coating	M.A. Ford® Tool Number Designation	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
GemX	GX	10,000	600° C / 1100° F	0.10

Available upon request

Diamond Grind Series 231B

- Down cut, bur point
- Ultra fine micrograin carbide
- Routers are available with color coded depth setting rings upon request

Bur End Point

Offering 1/32" – 3/8" and 0.8 – 8.0mm

Click here for full details

Diamond Grind Series 231D

- Down cut, drill point
- Ultra fine micrograin carbide
- Routers are available with color coded depth setting rings upon request

Drill Point

Offering 1/32" – 3/8" and 0.8 – 8.0mm

Click here for full details

Diamond Grind Series 231F

- Down cut, fishtail point
- Ultra fine micrograin carbide
- Routers are available with color coded depth setting rings upon request

Fishtail Point

Offering 1/32" – 3/8" and 0.8 – 8.0mm

Click here for full details

Composite Graphite

Ceramic Coating with Extreme Properties

- Hardness that makes it the 3rd hardest material when compared to industrial diamonds
- Toughness that is comparable to Titanium
- Lubricity that approaches Teflon
- Extreme heat tolerance
- Non-reactive to Titanium

CERAedge®

Coating Properties

M.A. Ford® Coating	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient	Coating Thickness	Color
CERAedge®	3400	1100° C / 2012° F	.25	2-3 Microns	Light Gray

ROUTERS

CERAedge® Coated Diamond Grind Series 230CE

- Down cut, safe end
- Ultra fine micrograin carbide

Safe End

Offering 1/8" – 1/4" and 3.0 – 6.0mm

Click here for full details

CERAedge® Coated Diamond Grind Series 231CE

- Down cut, end mill point
- Ultra fine micrograin carbide

End Mill Point

Offering 1/8" – 1/4" and 3.0 – 6.0mm

Click here for full details

CERAedge® Coated Diamond Grind Series 231BCE

- Down cut, bur point
- Ultra fine micrograin carbide

Bur End Point

Offering 1/8" – 1/4" and 3.0 – 6.0mm

Click here for full details

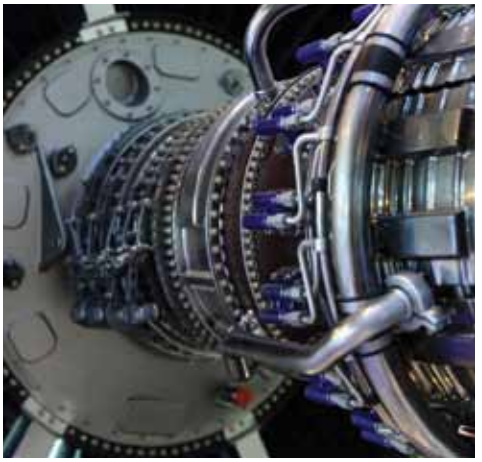
CERAedge® Coated Diamond Grind Series 231DCE

- Down cut, drill point
- Ultra fine micrograin carbide

Drill Point

Offering 1/8" – 1/4" and 3.0 – 6.0mm

Click here for full details



Nickel and Nickel Alloys are often used for their corrosion and heat resistance properties and strength. Jet turbine engines and their components need to tolerate high temperatures. These same properties can make Nickel and Nickel Alloys difficult to machine.

DRILLS

Twister® MD Series 2MDCL Micro Drill

- Coolant fed, 2 flute, solid carbide
- 10X drilling length
- Slow - 15° helix, 140° point angle
- ALtima® tip coated
- Designed for high performance drilling in a broad range of materials

Offering 2.0 – 2.95mm

Click here for full details

Twister® Micro-Tuff® Series 305 Micro Drill

- 2 flute, solid carbide
- Uncoated or ALtima® Micro coated
- 3-10X drilling lengths
- Slow - 12° helix, 135° point angle
- 1/8" shank x 1-1/2" OAL or 3.0mm shank x 38mm OAL

Offering #102 (.0039") – 1/8" and 0.1 – 3.0mm

Click here for full details

Twister® MXD Series MXDSR Micro Drill

- 2 flute, solid carbide, web thinned point, post coat polishing, diameters .8mm and above have honed cutting edges
- ALtima® coated
- 5X drilling lengths, 135°-140° point angle, 30° helix

Offering 0.5 – 2.95mm

Click here for full details

Nickel and Nickel Alloys

DRILLS

Twister XD® Series 2XDSS

- 2 flute, solid carbide
- ALtima® coated
- 3X drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 3/4"
and 2.5 – 20.0mm

Click here for full details

Twister XD® Series 2XDSR

- 2 flute, solid carbide
- ALtima® coated
- 5X drilling lengths, 140°-142° point angle, 30° helix

Offering 1/64" – 5/8"
and 0.5 – 16.0mm

Click here for full details

Twister XD® Series 2XDCS

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 3X drilling lengths, 140°-142° point angle, 30° helix
- Metric sizes > 5mm to DIN6537K

Offering #31 (.1200") – 5/8"
and 3.0 – 16.0mm

Click here for full details

Twister XD® Series 2XDCR

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 5X drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 3/4"
and 3.0 – 20.0mm

Click here for full details

Twister XD® Series 2XDCL

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 7X+ drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 1/2"
and 3.0 – 12.0mm

Click here for full details

Twister XD® Series 2XDCE

- 2 flute, coolant fed, solid carbide
- ALtima® tip coated
- Works exceptionally well in all deep hole drilling applications
- 2XD drilling geometry provides productivity increases and reduced cycle time by eliminating the need for a peck drilling cycle
- 12X+ drilling length varies by diameter, 140°-142° point angle, 30° helix

Offering 1/4" – 1/2"
and 5.0 – 12.0mm

Click here for full details

Nickel and Nickel Alloys

END MILLS

TuffCut® XR7 Series 180/180CB/180N

- ALtima® Blaze coating for increased performance
- 7 flutes, 38° helix, solid carbide, non-center cutting
- Available in stub, standard, XL and XXL cutting lengths with square end, corner radius, chipbreaker and neck relief options

Offering 1/4" – 1" and 6.0 – 20.0mm

Click here for full details

TuffCut® XR Series 177/177W

- Designed for EXTREME productivity
- Unique flute geometry reduces harmonics at increased feeds and speeds - 4 flute, 35°/38° variable helix, solid carbide, center cutting
- Standard offering includes Weldon shank flat option, square end or corner radius and stub or standard lengths
- ALtima® coated

Offering 1/16" – 1" and 1.5 – 25.0mm

Click here for full details

TuffCut® XR Series 177S

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds, center cutting
- Necked with square end and corner radius options, standard length, solid carbide and optional shank flat
- ALtima® coated

Offering 3.0 – 20.0mm

Click here for full details

TuffCut® XR Series 177L

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds, center cutting
- Necked with corner radius, solid carbide
- Long reach
- ALtima® coated

Offering 6.0 – 20.0mm

Click here for full details

TuffCut® XR Series 178/178W

- 5 flute, 38° helix designed for EXTREME productivity
- Gain 20% or more in productivity over 4 flute styles
- Smooth cutting action to eliminate vibration
- Standard offering with Weldon shank flat option, square end or corner radius, solid carbide, center cutting

Offering 1/8" – 1" and 3.0 – 25.0mm

Click here for full details

TuffCut® XR Series 178N

- 5 flute, 38° helix, standard and long lengths, center cutting
- Necked with corner radius, solid carbide
- ALtima® coated

Offering 1/4" – 1"

Click here for full details

Nickel and Nickel Alloys

END MILLS

TuffCut® XR Series 179

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds
- Ball nose, stub and standard lengths, solid carbide, center cutting
- ALtima® coated

Offering 1/16" – 1" and 1.5 – 16mm

Click here for full details

TuffCut® XR Series 179L

- 4 flute, ball nose, 35°/38° variable helix that reduces harmonics at increased feeds and speeds
- Necked, solid carbide, center cutting
- Long reach
- ALtima® coated

Offering 3.0 – 16.0mm

Click here for full details

TuffCut® XT9 Series 380

- 9 flutes, standard and long lengths, 37° helix, solid carbide, non-center cutting
- Designed for high speed machining of Titanium, Inconel and similar materials
- New ALtima® Xtreme (AX) coating designed for high speed machining and dry machining
- Uneven number of flutes reduces harmonics to provide stable machining zones

Offering 3/8" – 3/4" and 8.0 – 20.0mm

Click here for full details

TuffCut DM® Series 157

- Multi-flute designed for hardened materials Rc 50-65, 45° helix, standard length, solid carbide, center cutting
- Available as a square end and in 7 standard corner radii
- Coated with ALtima® 52 for materials Rc 52 and above

Offering 1/8" – 5/8" and 3.0 – 25.0mm

Click here for full details

Nickel and Nickel Alloys

REAMERS

TrueSize® Carbide Range Reamer Straight Flute Series 270

- Right hand cutting
- 45° lead cutting angle
- Metric sizes to DIN1420 H7

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Carbide Range Reamer Left Hand Spiral Series 270L

Made to order from .0434" – .3860" and 1.10 – 9.80mm

Click here for full details

TrueSize® Carbide Range Reamer Precision Tolerance OD Series 270P

- Right hand cutting, straight flute
- 45° lead cutting angle
- Diameter Tolerance +.0001/+.0000" and +.0025/+.0000mm

Made to order from .0434" – .6350" and 1.10 – 16.13mm

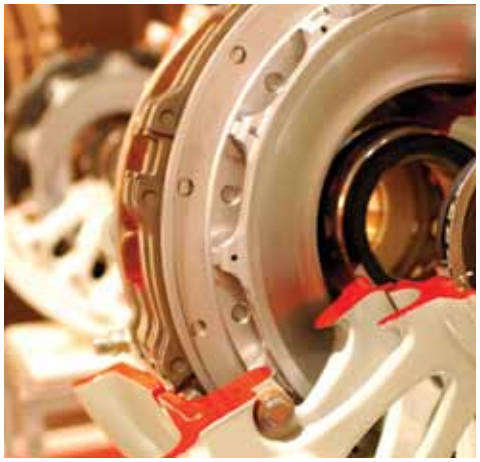
Click here for full details

TrueSize® Series 272

- Designed for high-precision hole finishes, or tighter diameter control
- Precision ground between centers to assure maximum concentricity
- Recommended for general purpose reaming
- Straight flute, right hand cutting, 45° lead chamfer, solid carbide in over 900 standard sizes
- Metric sizes to DIN1420 H7

Offering .0130" – 5/8" and 0.35 – 16mm

Click here for full details



Stainless Steel can be used for almost any part of an aircraft. Examples are structural parts, machined parts, exhaust components, springs and castings. This popular material requires rigid machine setups and cutting tools with tool geometries to meet the challenges this material can provide.

DRILLS

Twister® MD Series 2MDCL Micro Drill

- 2 flute, coolant fed, solid carbide
- 10X drilling length
- Slow - 15° helix, 140° point angle
- ALtima® tip coated
- Designed for high performance drilling in a broad range of materials

Offering 2.0 – 2.95mm

Click here for full details

Twister® Micro-Tuff® Series 305 Micro Drill

- 2 flute, solid carbide
- Uncoated or ALtima® Micro coated
- 3-10X drilling lengths
- Slow - 12° helix, 135° point angle
- 1/8" shank x 1-1/2" OAL or 3.0mm shank x 38mm OAL

Offering #102 (.0039") – 1/8" and 0.1 – 3.0mm

Click here for full details

Twister® MXD Series MXDSR Micro Drill

- 2 flute, solid carbide, web thinned point, post coat polishing, diameters .8mm and above have honed cutting edges
- ALtima® coated
- 5X drilling lengths, 135°-140° point angle, 30° helix

Offering 0.5 – 2.95mm

Click here for full details

Stainless Steel

DRILLS

Twister XD® Series 2XDSS

- 2 flute, solid carbide
- ALtima® coated
- 3X drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 3/4"
and 2.5 – 20.0mm

Click here for full details

Twister XD® Series 2XDSR

- 2 flute, solid carbide
- ALtima® coated
- 5X drilling lengths, 140°-142° point angle, 30° helix

Offering 1/64" – 5/8"
and 0.5 – 16.0mm

Click here for full details

Twister XD® Series 2XDCS

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 3X drilling lengths, 140°-142° point angle, 30° helix
- Metric sizes > 5mm to DIN6537K

Offering #31 (.1200") – 5/8"
and 3.0 – 16.0mm

Click here for full details

Twister XD® Series 2XDCR

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 5X drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 3/4"
and 3.0 – 20.0mm

Click here for full details

Twister XD® Series 2XDCL

- 2 flute, coolant fed, solid carbide
- ALtima® coated
- 7X+ drilling lengths, 140°-142° point angle, 30° helix

Offering #31 (.1200") – 1/2"
and 3.0 – 12.0mm

Click here for full details

Twister XD® Series 2XDCE

- 2 flute, coolant fed, solid carbide
- ALtima® tip coated
- Works exceptionally well in all deep hole drilling applications
- 2XD drilling geometry provides productivity increases and reduced cycle time by eliminating the need for a peck drilling cycle
- 12X+ drilling length varies by diameter, 140°-142° point angle, 30° helix

Offering 1/4" – 1/2"
and 5.0 – 12.0mm

Click here for full details

Stainless Steel

END MILLS

TuffCut® XR7 Series 180/180CB/180N

- ALtima® Blaze coating for increased performance
- 7 flutes, 38° helix, solid carbide, non-center cutting
- Available in stub, standard, XL and XXL cutting lengths with square end, corner radius, chipbreaker and neck relief options

Offering 1/4" – 1" and 6.0 – 20.0mm

Click here for full details

TuffCut® XR Series 177/177W

- Designed for EXTREME productivity
- Unique flute geometry reduces harmonics at increased feeds and speeds - 4 flute, 35°/38° variable helix, solid carbide, center cutting
- Standard offering includes Weldon shank flat option, square end or corner radius and stub or standard lengths
- ALtima® coated

Offering 1/16" – 1" and 1.5 – 25.0mm

Click here for full details

TuffCut® XR Series 177S

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds, center cutting
- Necked with square end and corner radius options, standard length, solid carbide and optional shank flat
- ALtima® coated

Offering 3.0 – 20.0mm

Click here for full details

TuffCut® XR Series 177L

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds, center cutting
- Necked with corner radius, solid carbide
- Long reach
- ALtima® coated

Offering 6.0 – 20.0mm

Click here for full details

TuffCut® XR Series 178/178W

- 5 flute, 38° helix designed for EXTREME productivity, center cutting
- Gain 20% or more in productivity over 4 flute styles
- Smooth cutting action to eliminate vibration
- Standard offering includes Weldon shank flat option, square end or corner radius, solid carbide

Offering 1/8" – 1" and 3.0 – 25.0mm

Click here for full details

TuffCut® XR Series 178N

- 5 flute, 38° helix, standard and long lengths, center cutting
- Necked with corner radius, solid carbide
- ALtima® coated

Offering 1/4" – 1"

Click here for full details

Stainless Steel

END MILLS

TuffCut® XR Series 179

- 4 flute, 35°/38° variable helix that reduces harmonics at increased feeds and speeds, center cutting
- Ball nose, stub and standard lengths, solid carbide
- ALtima® coated

Offering 1/16" – 1" and 1.5 – 16mm

Click here for full details

TuffCut® XR Series 179L

- 4 flute, ball nose, 35°/38° variable helix that reduces harmonics at increased feeds and speeds
- Necked, solid carbide, center cutting
- Long reach
- ALtima® coated

Offering 3.0 – 16.0mm

Click here for full details

TuffCut® XT Series 277/277W

- 4 flute, 38°/41° variable helix, center cutting
- Standard offering includes Weldon shank flat option, square end or corner radius, stub, standard, long and X-long lengths, solid carbide
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/8" – 1" and 3.0 – 20.0mm

Click here for full details

TuffCut® XT Series 277N

- 4 flute, 38°/41° variable helix, necked, stub length with square end or corner radius, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/8" – 1"

Click here for full details

TuffCut® XT Series 278/278W

- 5 flute, 40° helix, stub, standard, long and X-long lengths, square end or corner radius, solid carbide, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance
- Standard offering includes Weldon shank flat option

Offering 1/8" – 1"

Click here for full details

TuffCut® XT Series 278N

- 5 flute, 40° helix, standard lengths, necked with corner radius, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/4" – 3/4" and 3.0 – 25.0mm

Click here for full details

Stainless Steel

END MILLS

TuffCut® XT Series 279

- 4 flute, ball nose, 35°/38° variable helix, stub and standard lengths, solid carbide, center cutting
- Enhanced cutting edge quality
- Variable helix and flute spacing for improved machining harmonics
- ALtima® Blaze coating for increased performance

Offering 1/8" – 3/4" and 3.0 – 16.0mm

Click here for full details

TuffCut® XT9 Series 380

- 9 flutes, 37° helix, standard and long lengths, solid carbide, non-center cutting
- Designed for high speed machining of Titanium, Inconel and similar materials
- New ALtima® Xtreme (AX) coating designed for high speed machining and dry machining
- Uneven number of flutes reduces harmonics to provide stable machining zones

Offering 3/8" – 3/4" and 8.0 – 20.0mm

Click here for full details

TuffCut DM® Series 157

- Multi-flute designed for hardened materials Rc 50-65, 45° helix, standard length, solid carbide, center cutting
- Available as a square end and in 7 standard corner radii
- Coated with ALtima® 52 for materials Rc 52 and above

Offering 1/8" – 5/8" and 3.0 – 25.0mm

Click here for full details

Stainless Steel

REAMERS

TrueSize® Carbide Range Reamer Straight Flute Series 270

- Right hand cutting
- 45° lead cutting angle
- Metric sizes to DIN1420 H7

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Carbide Range Reamer Left Hand Spiral Series 270L

Made to order from .0434" – .3860" and 1.10 – 9.80mm

Click here for full details

TrueSize® Carbide Range Reamer Precision Tolerance OD Series 270P

- Right hand cutting, straight flute
- 45° lead cutting angle
- Diameter Tolerance +.0001/+.0000" and +.0025/+.0000mm

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Series 272

- Designed for high-precision hole finishes, or tighter diameter control
- Precision ground between centers to assure maximum concentricity
- Recommended for general purpose reaming
- Straight flute, right hand cutting, 45° lead chamfer, solid carbide in over 900 standard sizes
- Metric sizes to DIN1420 H7

Offering .0130" – 5/8" and 0.35 – 16mm

Click here for full details

Titanium machining is often problematic due to the materials poor ability as a thermal conductor and its high hardness. Using the right cutting tool can mediate these challenges. M.A. Ford® offers a complete range of cutting tools designed specifically to machine Titanium for the applications most used within the aerospace industry.

DRILLS

Twister® MD Series 2MDCL Micro Drill

- 2 flute, coolant fed, solid carbide
- 10X drilling length
- Slow - 15° helix, 140° point angle
- ALtima® tip coated
- Designed for high performance drilling in a broad range of materials

Offering 2.0 – 2.95mm

Click here for full details

Twister® Micro-Tuff® Series 305 Micro Drill

- 2 flute, solid carbide
- Uncoated or ALtima® Micro coated
- 3-10X drilling lengths
- Slow - 12° helix, 135° point angle
- 1/8" shank x 1-1/2" OAL or 3.0mm shank x 38mm OAL

Offering #102 (.0039") – 1/8" and 0.1 – 3.0mm

Click here for full details

Cyclone Series CXDSS

- 2 flute, solid carbide, 140°-142° point angle, 30° helix, double margin
- ALtima® Plus coated
- 3X drilling lengths
- Metric sizes > 5mm to DIN6537K

Offering #31 (.1200") – 3/4" and 3.0 – 20.0mm

Click here for full details

Titanium

DRILLS

Cyclone Series CXDSR

- 2 flute, solid carbide, 140°-142° point angle, 30° helix, double margin
- ALtima® Plus coated
- 5X drilling lengths
- Metric sizes > 5mm to DIN6537L

Offering #31 (.1200") – 5/8" and 3.0 – 16.0mm

Click here for full details

Cyclone Series CXDCS

- 2 flute, coolant fed, solid carbide, 140°-142° point angle, 30° helix, double margin
- ALtima® Plus coated
- 3X drilling lengths
- Metric sizes > 5mm to DIN6537K

Offering #31 (.1200") – 5/8" and 3.0 – 16.0mm

Click here for full details

Cyclone Series CXDCR

- 2 flute, coolant fed, solid carbide, 140°-142° point angle, 30° helix, double margin
- ALtima® Plus coated
- 5X drilling lengths
- Metric sizes > 5mm to DIN6537L

Offering #31 (.1200") – 3/4" and 3.0 – 20.0mm

Click here for full details

DRILLS

Cyclone Series CXDCL

- 2 flute, coolant fed, solid carbide, 140°-142° point angle, 30° helix, double margin
- ALtima® Plus coated
- 8X drilling lengths

Offering #31 (.1200") – 5/8" and 3.0 – 16.0mm

Click here for full details

END MILLS

TuffCut® XR7 Series 180/180CB/180N

- ALtima® Blaze coating for increased performance
- 7 flutes, 38° helix, solid carbide, non-center cutting
- Available in stub, standard, XL and XXL cutting lengths with square end, corner radius, chipbreaker and neck relief options

Offering 1/4" – 1" and 6.0 – 20.0mm

Click here for full details

TuffCut® XT Series 277/277W

- 4 flute, 38°/41° variable helix, center cutting
- Standard offering includes Weldon shank flat option, square end or corner radius, stub, standard, long and X-long lengths, solid carbide
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/8" – 1" and 3.0 – 20.0mm

Click here for full details

Titanium

END MILLS

TuffCut® XT Series 277N

- 4 flute, 38°/41° variable helix, necked, stub length with square end or corner radius, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/8" – 1"

Click here for full details

TuffCut® XT Series 278/278W

- 5 flute, 40° helix, stub, standard, long and X-long lengths, square end or corner radius, solid carbide, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance
- Standard offering includes Weldon shank flat option

Offering 1/8" – 1"

Click here for full details

TuffCut® XT Series 278N

- 5 flute, 40° helix, standard lengths, necked with corner radius, center cutting
- Improved geometries
- Enhanced corner protection
- ALtima® Blaze coating for increased performance

Offering 1/4" – 3/4" and 3.0 – 25.0mm

Click here for full details

END MILLS

TuffCut® XT Series 279

- 4 flute, ball nose, 35°/38° variable helix, stub and standard lengths, solid carbide, center cutting
- Enhanced cutting edge quality
- Variable helix and flute spacing for improved machining harmonics
- ALtima® Blaze coating for increased performance

Offering 1/8" – 3/4" and 3.0 – 16.0mm

Click here for full details

TuffCut® XT9 Series 380

- 9 flutes, 37° helix, standard and long lengths, solid carbide, non-center cutting
- Designed for high speed machining of Titanium, Inconel and similar materials
- New ALtima® Xtreme (AX) coating designed for high speed machining and dry machining
- Uneven number of flutes reduces harmonics to provide stable machining zones

Offering 3/8" – 3/4" and 8.0 – 20.0mm

Click here for full details

REAMERS

TrueSize® Carbide Range Reamer Straight Flute Series 270

- Right hand cutting
- 45° lead cutting angle
- Metric sizes to DIN 1420 H7

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Carbide Range Reamer Left Hand Spiral Series 270L

Made to order from .0434" – .3860" and 1.10 – 9.80mm

Click here for full details

Titanium

REAMERS

TrueSize® Carbide Range Reamer Precision Tolerance OD Series 270P

- Right hand cutting, straight flute
- 45° lead cutting angle
- Diameter Tolerance +.0001/+.0000" and +.0025/+.0000mm

Made to order from .0434" – .6350" and 1.10 – 16.13mm

Click here for full details

TrueSize® Series 272

- Designed for high-precision hole finishes, or tighter diameter control
- Precision ground between centers to assure maximum concentricity
- Recommended for general purpose reaming
- Straight flute, right hand cutting, 45° lead chamfer, solid carbide in over 900 standard sizes
- Metric sizes to DIN1420 H7

Offering .0130" – 5/8" and 0.35 – 16mm

Click here for full details

COUNTERSINKS

HSS Micro-Stop Series 83

- The integral pilot can be specified to any diameter within a specified range
- 2 flute, included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

COUNTERSINKS

HSS Micro-Stop Series 84

- Pilot hole for an interchangeable inserted steel pilot
- 2 flute, with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Micro-Stop Series 86

- The integral pilot that can be specified to any diameter within a specified range
- 3 flute with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Micro-Stop Series 87

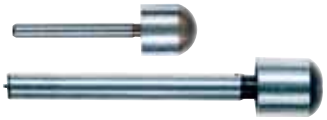
- Pilot hole for an interchangeable inserted steel pilot
- 3 flute with included angles of 82°, 90°, 100° and 120° as standard

Countersink body diameters of 3/8", 7/16", 1/2" and 5/8" to choose from

Click here for full details

HSS Pilots Series 850 and 851

- Two HSS countersink pilot series to use with the micro-stop countersink Series 84 and 87
- Series 850 has a .086" shank
- Series 851 has a .093" shank



The pilot head diameter range is from 3/32" – 3/8"

Click here for full details

Custom Tool Division focuses on meeting the growing need in the aerospace industry for unique and increasingly complex special cutting tools. Custom Tools are proven to increase speeds and feeds, save setup and handling time which in turn leads to faster run times and more efficient manufacturing.

Custom Tool Capabilities

To support your productivity improvement efforts, the Custom Tool Division offers the following services:

- Technical assistance in prototype custom tool design.
- Re-engineering of existing custom tooling to optimize tool performance.
- Tool manufacturing lead times which meet or exceed your delivery requirements.
- Immediate response to quotation request.
- Readily available technical phone support.
- Field representative support service.
- Emergency tool service.
- Custom tools of the highest quality.

For aerospace applications, the Custom Tool Division offers the following application development, design and manufacturing expertise in the following product classifications:

- High Performance Drills and Step Drills
- Step Reamers
- Reamers
- Coolant Thru Specials
- Custom End Mills
- Custom Form Tools

Coatings

ALtima®
Aluminum Titanium Nitride (AlTiN). ALtima® is the original high performance coating. This coating allows tools to be run at higher speeds and feeds in a wide array of materials. Also, it allows the option of running tools dry due to the high oxidation temperature of the coating.

ALtima® Plus
This Aluminum Titanium Nitride (AlTiN) multi-layer coating has optimized coating structure, with pre and post treatment of the coating for optimized high performance drilling in any ferrous material.

ALtima® 52
Aluminum Titanium Nitride (AlTiN). ALtima® 52 is specially designed for milling hardened steels 52 Rc and above. It has very high hardness and the oxidation temperature of the coating makes this the absolute best choice for hardened steel milling. ALtima® 52 is designed to allow for dry machining.

ALtima® Blaze
Aluminum Chromium Nitride (AlCrN). ALtima® Blaze is designed to allow higher material removal rates. This coating has a higher oxidation temperature than a typical TiAlN coating. It has shown very good results in nickel alloys, titanium, and other difficult to machine materials. Tools coated with ALtima® Blaze can be used in dry machining.

ALtima® Micro
An ultra thin, nano structured, TiAlN coating developed specifically for micro tool applications.

ALtima® Xtreme
Designed for high speed machining and dry machining.

Fordlube
Titanium DiBoride (TiB_2) is a unique coating with low Aluminum affinity, smooth surface finish and high hardness. It is ideal for Aluminum and Magnesium alloys as it prevents build-up on cutting edge, provides superior chip flow along with extended wear resistance.

Gem+
Recommended for aluminium and aluminium alloys up to 12% Si, non-ferrous metals and composites. Gem+ provides excellent wear resistance and maintains sharp cutting edges.

GemX
A CVD diamond coating for composites and aluminum that offers the maximum hardness and wear resistance of any of our coatings.

TiN
Titanium Nitride (TiN). TiN coating has shown good results in low carbon steels and many iron-based applications. It is a very popular coating used in the industry today.

TiCN
Titanium Carbonitride (TiCN). TiCN is a multi-layer coating. Because of the multi-layer composition, TiCN is tougher than TiN, even though TiCN is harder. The added toughness of the TiCN coating makes it a good choice for mechanically stressed edges like in end mill applications. The higher hardness makes TiCN a good choice for abrasive applications where higher wear resistance is required.

CERAedge®
CERAedge® is a unique coating that provides excellent performance in titanium, aluminium, and composites.

Special Coatings
Upon request, M.A. Ford® can provide any commercially available coating. Any standard M.A. Ford® cutting tool can be provided with coating if requested.

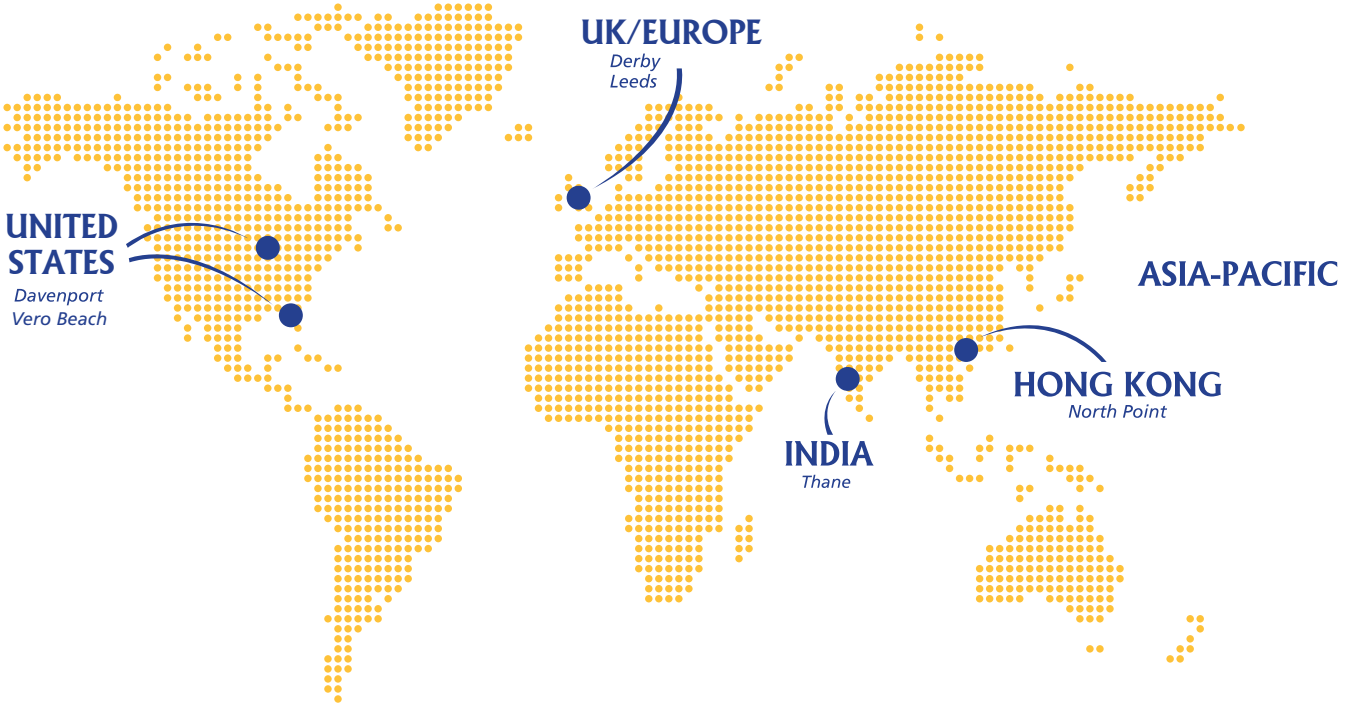
Coating Properties

M.A. Ford® Coating	M.A. Ford® Tool Number Designation	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
ALtima®	A	3100	1100° C / 2012° F	0.42
ALtima® Plus	AP	3200	1100° C / 2012° F	0.25
ALtima® 52	A	3600	1200° C / 2192° F	0.40
ALtima® Blaze	B	3200	1100° C / 2012° F	0.35
ALtima® Micro	AM	3300	900° C / 1652° F	0.30-0.35
ALtima® Xtreme	AX	3800	1100° C / 2012° F	0.30-0.50
Fordlube	F	4000	700° C / 1292° F	0.30
Gem+	GP	4710	500° C / 932° F	0.30
GemX	GX	10000	600° C / 1100° F	0.10
TiN	T	2300	600° C / 1112° F	0.40
TiCN	C	3000	400° C / 752° F	0.40
CERAedge®	CE	3400	1100° C / 2012° F	0.25

M.A. FORD® Worldwide

*Where **high performance** is the **standard**®*

Centrally located in Davenport, Iowa, with national and international distribution through an extensive network of distributors and manufacturer's representatives, M.A. Ford® responds effectively to customer tooling needs. Our extensive line of standard products are on the shelf for immediate shipping and technical support is just a phone call away.
Visit **www.maford.com** for your local M.A. Ford® representative.



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