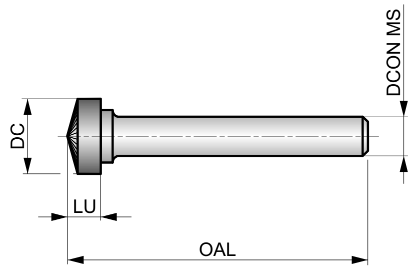
# P101

DORMER

## 2nd Stage Rotary Burr for Broken Bolt Removal, 150° Countersink

Second stage broken bolt removal solid carbide burr. When a bolt is broken and needs to be extracted, P101 creates a centerpoint into the flattened broken bolt. Prepare it for the 3rd stage, drilling the broken piece with a drill.




| | | |
|---|---|---|
| HM | Bright | 150° |
| BR | DORMER | |

Workpiece material group suitability. Recommended operating speed (RPM) on page 7 and 'how to use the tool' on page 2.

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | M1.1 | M1.2 | M2.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| M2.2 | M2.3 | M3.1 | M3.2 | M3.3 | | | | | | | | | |
| ■ | ■ | ■ | ■ | ■ | | | | | | | | | |

| Product | DC [mm] | DCON MS [mm] | LU [mm] | OAL [mm] | |
|---|---|---|---|---|---|
| P1014.9 | 4.90 | 6.00 | 20.00 | 50.0 | 1/4-20; 24; 28; M6 |
| P1016.4 | 6.40 | 6.00 | 5.00 | 50.0 | 5/16-18; 24; 32; M8 |
| P1017.8 | 7.80 | 6.00 | 5.00 | 50.0 | 3/8-16; 24; M10 |
| P1019.3 | 9.30 | 6.00 | 5.00 | 50.0 | 7/16-14; 20; M12 |
| P10110.7 | 10.70 | 6.00 | 5.00 | 50.0 | 1/2-13; 20; M14 |

# CARBIDE ROTARY BURRS

**FOR BOLT REMOVAL**

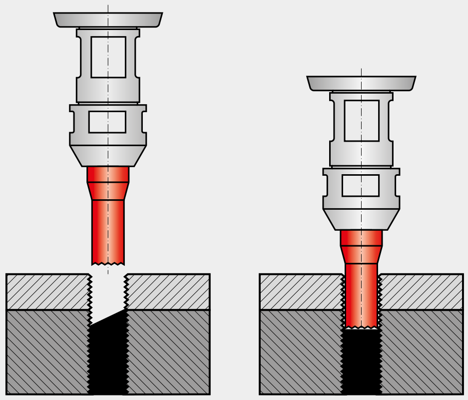
A specially designed range of burrs to prepare the surface of broken bolts to improve drill location and prevent damaging the threaded hole and component.

## FEATURES AND BENEFITS

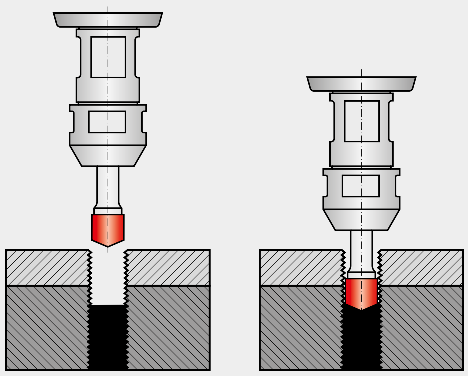
- Specific diameters and cutting lengths to suit various thread diameters
- Long reach and tapered shanks for easy access
- Developed cutting geometry for machining high tensile materials
- Reduces potential damage to existing threaded holes
- Improves drill location, ensuring damaged bolt is drilled on centre
- Prevents potential scrappage of component
- Highly consistent quality

## OPERATIONS

①



②



## CUT STYLES

**PLAIN CYLINDER WITH END CUT**

**150° COUNTERSINK**

## HOW TO USE THE TOOLS

- Choose the correct size burr for the broken bolt
- Use a right-handed die grinder
- Ensure the burr is perpendicular to the broken bolt
- Grind the broken surface flat – Operation ①
- Grind into the prepared surface to form a countersink location at the centre point of the bolt – Operation ②

# ROTARY BURRS – ICONS OVERVIEW

## General Icons

| | |
|---|---|
| ■ | Primary use |
| ◪ | Possible use |

## Material Code (BMC)

| | |
|---|---|
| HM | Hard Material (Solid Carbide) |

## Burr Shape

| | |
|---|---|
| A | Cylinder Shape without endcut |
| B | Cylinder Shape with endcut |
| C | Ball Nosed Cylinder Shape |
| D | Ball Shape |
| E | Oval Shape |
| F | Ball Nosed Tree Shape |
| G | Pointed Tree Shape |
| H | Flame Shape |
| J | 60° Countersink Shape |
| K | 90° Countersink Shape |
| L | Ball Nosed Cone Shape |
| M | Cone Shape |
| N | Inverted Cone Shape |

## Burr End Shot

- Drill Point Burr End
- End Cut Burr End
- End Mill Burr End

## Coating

| | |
|---|---|
| Bright | Bright (uncoated) |
| TiAlN | Titanium Aluminium Nitride Coating |

## Application Angle

| | | | | | |
|---|---|---|---|---|---|
| 60° | 60° Countersink | 135° | Drill Point 135° | 150° | Spot Drill Point 150° |
| 90° | 90° Countersink | 180° | Drill Point 180° | | |

## Burr Cut Flute Style (BTC)

| | | | | | |
|---|---|---|---|---|---|
| DC | Double Cut Geometry | AL | Aluminium Cut Geometry | AS | Superalloy Cut Geometry |
| ST | Steel Cut Geometry | GRP | Fibreglass and Composite Materials Cut Geometry | | |
| VA | Stainless Steel Cut Geometry | BR | Bolt Removal Cut Geometry | | |

## Basic Standard Group (BSG)

| | |
|---|---|
| DORMER | Dormer Standards |

## Operations Deburring

| | | |
|---|---|---|
| Deburring - Bolt removal operation 1 | Curved surface deburring and carving | Inverted back deburring |
| Deburring - Bolt removal operation 2 | Fillet radii deburring | Plain surface deburring |
| Closed groove deburring and carving | Free hand deburring and carving | Shoulder deburring |
| Composite fibre routing | Chamfer deburring | V-groove deburring |

## Other Icons

| |
|---|
| Bolt size |

## ROTARY BURRS – SURFACE AND TREATMENTS COATINGS NAVIGATOR

### Surface Treatments

| | | |
|---|---|---|
| **Bright (uncoated)** | Bright | Bright finish (uncoated surface) improves chip flow in soft or non-ferrous materials and maintains sharp cutting edges in abrasive materials. |

### Surface Coatings

| | | |
|---|---|---|
| **Titanium Aluminium Nitride Coating (TiAlN)** | TiAlN | Titanium Aluminium Nitride is a multi layer ceramic coating applied by PVD coating technology, which exhibits high toughness and oxidation stability. These properties make it ideal for higher speeds and feeds, while at the same time improving tool life. TiAlN is used in drilling, tapping, and milling applications and can be suitable for use when machining without coolant. |

## ROTARY BURRS – TOOL MATERIALS NAVIGATOR

### HM materials

| | | |
|---|---|---|
| **Carbide Materials (or Hard Materials)** | **HM** | A sintered powder metallurgy substrate, consisting of a metallic carbide composite with binder metal. The most central raw material is tungsten carbide (WC). Tungsten carbide contributes to the hardness of the material. Tantalum carbide (TaC), titanium carbide (TiC) and niobium carbide (NbC) complements WC and adjusts the properties to what is desired. These three materials are called cubic carbides. Cobalt (Co) acts as a binder and keeps the material together.<br>Carbide materials are often characterised by high compression strength, high hardness and therefore high wear resistance, but also by limited flexural strength and toughness. Carbide is used in taps, reamers, milling cutters, drills and thread milling cutters. |

# WMG (WORK MATERIAL GROUP)

| ISO group | WMG (Work Material Group) | | | | Hardness (HB or HRC) | Ultimate Tensile Strength (MPa) |
|---|---|---|---|---|---|---|
| P | P1 | P1.1 | Free machining steel (carbon steels with increased machinability) | Sulfurized | < 240 HB | ≤ 830 |
| | | P1.2 | | Sulfurized and phosphorized | < 180 HB | ≤ 620 |
| | | P1.3 | | Sulfurized/phosphorized and leaded | < 180 HB | ≤ 620 |
| | P2 | P2.1 | Plain carbon steel (steels comprised of mainly iron and carbon) | Containing <0.25 % C | < 180 HB | ≤ 620 |
| | | P2.2 | | Containing <0.55 % C | < 240 HB | ≤ 830 |
| | | P2.3 | | Containing >0.55 % C | < 300 HB | ≤ 1030 |
| | P3 | P3.1 | Alloy steel (carbon steels with an alloying content ≤ 10%) | Annealed | < 180 HB | ≤ 620 |
| | | P3.2 | | Hardened and tempered | 180 – 260 HB | > 620 ≤ 900 |
| | | P3.3 | | | 260 – 360 HB | > 900 ≤ 1240 |
| | P4 | P4.1 | Tool steel (special alloy steel for tools, dies and molds) | Annealed | < 26 HRC | ≤ 900 |
| | | P4.2 | | Hardened and tempered | 26 – 39 HRC | > 900 ≤ 1240 |
| | | P4.3 | | | 39 – 45 HRC | > 1240 ≤ 1450 |
| M | M1 | M1.1 | Ferritic stainless steel (straight chromium non-hardenable alloys) | | < 160 HB | ≤ 520 |
| | | M1.2 | | | 160 – 220 HB | > 520 ≤ 700 |
| | M2 | M2.1 | Martensitic stainless steel (straight chromium hardenable alloys) | Annealed | < 200 HB | ≤ 670 |
| | | M2.2 | | Quenched and tempered | 200 – 280 HB | > 670 ≤ 950 |
| | | M2.3 | | Precipitation-hardened | 280 – 380 HB | > 950 ≤ 1300 |
| | M3 | M3.1 | Austenitic stainless steel (chromium-nickel and chromium-nickel-manganese alloys) | | < 200 HB | ≤ 750 |
| | | M3.2 | | | 200 – 260 HB | > 750 ≤ 870 |
| | | M3.3 | | | 260 – 300 HB | > 870 ≤ 1040 |
| | M4 | M4.1 | Austenitic-ferritic (DUPLEX) or super-austenitic stainless steel | | < 300 HB | ≤ 990 |
| | | M4.2 | Precipitation hardening austenitic stainless steel | | 300 – 380 HB | ≤ 1320 |
| K | K1 | K1.1 | Gray iron or Automotive Gray iron (GG) (iron-carbon castings with a lamellar graphite microstructure) | Ferritic or ferritic-pearlitic | < 180 HB | ≤ 190 |
| | | K1.2 | | Ferritic-pearlictic or pearlitic | 180 – 240 HB | > 190 ≤ 310 |
| | | K1.3 | | Pearlitic | 240 – 280 HB | > 310 ≤ 390 |
| | K2 | K2.1 | Malleable iron (GTS/GTW) (iron-carbon castings with a graphite-free microstructure) | Ferritic | < 160 HB | ≤ 400 |
| | | K2.2 | | Ferritic or pearlitic | 160 – 200 HB | > 400 ≤ 550 |
| | | K2.3 | | Pearlitic | 200 – 240 HB | > 550 ≤ 660 |
| | K3 | K3.1 | Ductile iron (GGG) (iron-carbon castings with a nodular graphite microstructure) | Ferritic | < 180 HB | ≤ 560 |
| | | K3.2 | | Ferritic or pearlitic | 180 – 220 HB | > 560 ≤ 680 |
| | | K3.3 | | Pearlitic | 220 – 260 HB | > 680 ≤ 800 |
| | K4 | K4.1 | Austenitic gray iron (ASTM A436) (iron-carbon alloy castings with an austenitic lamellar graphite microstructure) | | < 180 HB | ≤ 190 |
| | | K4.2 | Austenitic ductile iron (ASTM A439 or ASTM A571) (iron-carbon alloy castings with an austenitic nodular graphite microstructure) | | < 240 HB | ≤ 740 |
| | | K4.3 | Austempered ductile iron (ASTM A897) (iron-carbon alloy castings with an ausferrite microstructure) | | < 280 HB | > 840 ≤ 980 |
| | | K4.4 | | | 280 – 320 HB | > 980 ≤ 1130 |
| | | K4.5 | | | 320 – 360 HB | > 1130 ≤ 1280 |
| | K5 | K5.1 | Compacted graphite iron CGI (ASTM A842) (iron-carbon castings with a vermicular graphite structure) | Ferritic | < 180 HB | ≤ 400 |
| | | K5.2 | | Ferritic-pearlitic | 180 – 220 HB | > 400 ≤ 450 |
| | | K5.3 | | Pearlitic | 220 – 260 HB | > 450 ≤ 500 |
| N | N1 | N1.1 | Commercially pure wrought aluminium | | < 60 HB | ≤ 240 |
| | | N1.2 | Wrought aluminium alloys | Half hard tempered | 60 – 100 HB | > 240 ≤ 400 |
| | | N1.3 | | Full hard tempered | 100 – 150 HB | > 400 ≤ 590 |
| | N2 | N2.1 | Cast aluminium alloys | | < 75 HB | ≤ 240 |
| | | N2.2 | | | 75 – 90 HB | > 240 ≤ 270 |
| | | N2.3 | | | 90 – 140 HB | > 270 ≤ 440 |
| | N3 | N3.1 | Free-cutting copper-alloys materials with excellent machining properties | | – | – |
| | | N3.2 | Short-chip copper-alloys with good to moderate machining properties | | – | – |
| | | N3.3 | Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties | | – | – |
| | N4 | N4.1 | Thermoplastic polymers | | – | – |
| | | N4.2 | Thermosetting polymers | | – | – |
| | | N4.3 | Reinforced polymers or composites | | – | – |
| | N5 | N5.1 | Graphite | | – | – |
| S | S1 | S1.1 | Titanium or titanium alloys | | < 200 HB | ≤ 660 |
| | | S1.2 | | | 200 – 280 HB | > 660 ≤ 950 |
| | | S1.3 | | | 280 – 360 HB | > 950 ≤ 1200 |
| | S2 | S2.1 | Fe-based high-temperature alloys | | < 200 HB | ≤ 690 |
| | | S2.2 | | | 200 – 280 HB | > 690 ≤ 970 |
| | S3 | S3.1 | Ni-based high-temperature alloys | | < 280 HB | ≤ 940 |
| | | S3.2 | | | 280 – 360 HB | > 940 ≤ 1200 |
| | S4 | S4.1 | Co-based high-temperature alloys | | < 240 HB | ≤ 800 |
| | | S4.2 | | | 240 – 320 HB | > 800 ≤ 1070 |
| H | H1 | H1.1 | Chilled cast iron | | < 440 HB | – |
| | H2 | H2.1 | Hardened cast iron | | < 55 HRC | – |
| | | H2.2 | | | > 55 HRC | – |
| | H3 | H3.1 | Hardened steel <55 HRC | | < 51 HRC | – |
| | | H3.2 | | | 51 – 55 HRC | – |
| | H4 | H4.1 | Hardened steel >55 HRC | | 55 – 59 HRC | – |
| | | H4.2 | | | > 59 HRC | – |

## RECOMMENDED OPERATING SPEED (RPM)

AL DC

| ISO | | RPM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | DC [mm] | | | | | | |
| | | 3 | 6 | 8 | 10 | 12 | 16 | 20 |
| P | min | 64 000 | 32 000 | 24 000 | 20 000 | 16 000 | 12 000 | 10 000 |
| | max | 83 000 | 42 000 | 32 000 | 25 000 | 21 000 | 16 000 | 13 000 |
| M | min | 45 000 | 23 000 | 17 000 | 14 000 | 12 000 | 9 000 | 7 000 |
| | max | 64 000 | 32 000 | 24 000 | 20 000 | 16 000 | 12 000 | 10 000 |
| K | min | 58 000 | 29 000 | 22 000 | 19 000 | 15 000 | 11 000 | 9 000 |
| | max | 77 000 | 39 000 | 29 000 | 23 000 | 20 000 | 15 000 | 12 000 |
| N | min | 64 000 | 32 000 | 24 000 | 20 000 | 16 000 | 12 000 | 10 000 |
| | max | 96 000 | 48 000 | 36 000 | 29 000 | 24 000 | 18 000 | 15 000 |
| S | min | 45 000 | 23 000 | 17 000 | 14 000 | 12 000 | 9 000 | 7 000 |
| | max | 58 000 | 29 000 | 22 000 | 18 000 | 15 000 | 11 000 | 9 000 |
| H | min | 51 000 | 26 000 | 20 000 | 16 000 | 13 000 | 10 000 | 8 000 |
| | max | 71 000 | 36 000 | 27 000 | 22 000 | 18 000 | 14 000 | 11 000 |

ST BR

| ISO | | RPM | | | | |
|---|---|---|---|---|---|---|
| | | DC [mm] | | | | |
| | | 3 | 6 | 8 | 10 | 12 |
| P | min | 100 000 | 65 000 | 60 000 | 55 000 | 35 000 |
| | max | 60 000 | 45 000 | 35 000 | 30 000 | 20 000 |

VA BR

| ISO | | RPM | | | | |
|---|---|---|---|---|---|---|
| | | DC [mm] | | | | |
| | | 3 | 6 | 8 | 10 | 12 |
| M | min | 100 000 | 65 000 | 60 000 | 55 000 | 35 000 |
| | max | 60 000 | 30 000 | 25 000 | 20 000 | 15 000 |

GRP

| ISO | | RPM | | |
|---|---|---|---|---|
| | | DC [mm] | | |
| | | 3 | 6 | 8 |
| N4 | min | 25 000 | 20 000 | 18 000 |
| | max | 30 000 | 25 000 | 22 000 |

AS

| ISO | | RPM |
|---|---|---|
| | | DC [mm] |
| | | 3 |
| S | min | 60 000 |
| | max | 80 000 |