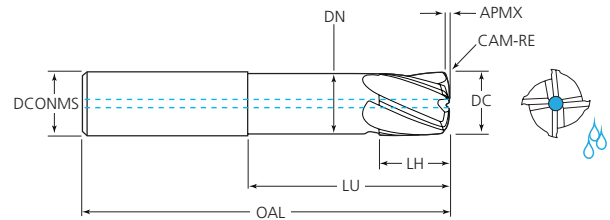


## TuffCut® HF Series FHFP N3



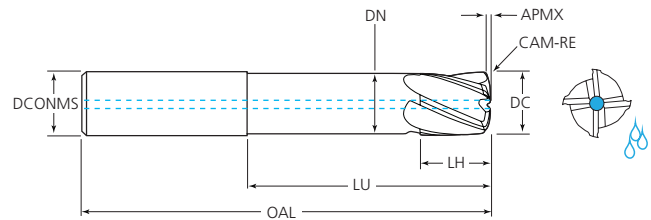
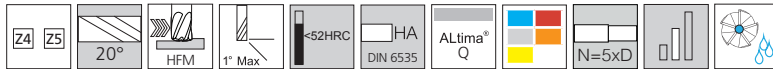
M.A. Ford **High-Feed, Positive**

High-feed roughing in 3D shapes, long reach applications, & difficult materials.

| Tool Number   | EDP   | DC   | DCONMS | DN   | OAL   | LH   | APMX | LU   | NOF | CAM-RE |
|---------------|-------|------|--------|------|-------|------|------|------|-----|--------|
| FHFP02N3-AQ   | 22081 | 2.0  | 6.0    | 1.8  | 57.0  | 2.0  | 0.10 | 7.0  | 4   | 0.2    |
| FHFP03N3-AQ   | 22082 | 3.0  | 6.0    | 2.8  | 57.0  | 3.0  | 0.15 | 10.0 | 4   | 0.3    |
| FHFP04N3-AQ   | 22083 | 4.0  | 6.0    | 3.8  | 57.0  | 4.0  | 0.20 | 13.0 | 4   | 0.4    |
| FHFP05N3-AQ   | 22084 | 5.0  | 6.0    | 4.8  | 57.0  | 5.0  | 0.25 | 16.0 | 4   | 0.5    |
| FHFP06N3-CCAQ | 19877 | 6.0  | 6.0    | 5.8  | 57.0  | 6.0  | 0.31 | 20.0 | 4   | 0.6    |
| FHFP08N3-CCAQ | 19878 | 8.0  | 8.0    | 7.8  | 63.0  | 8.0  | 0.44 | 26.0 | 4   | 0.8    |
| FHFP10N3-CCAQ | 19879 | 10.0 | 10.0   | 9.8  | 72.0  | 10.0 | 0.55 | 32.0 | 4   | 1.0    |
| FHFP12N3-CCAQ | 19880 | 12.0 | 12.0   | 11.8 | 83.0  | 12.0 | 0.63 | 38.0 | 5   | 1.2    |
| FHFP16N3-CCAQ | 19881 | 16.0 | 16.0   | 15.8 | 100.0 | 16.0 | 0.77 | 50.0 | 5   | 1.6    |

Note: Diameters 2-5mm do not include a through-coolant feature

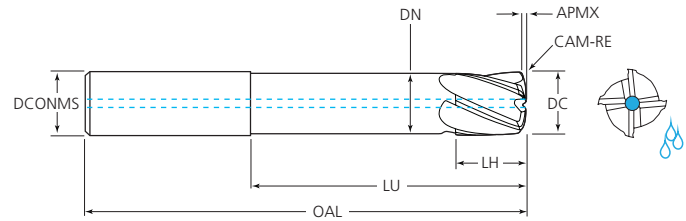
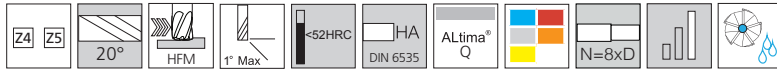
## TuffCut® HF Series FHFP N5



| Tool Number   | EDP   | DC   | DCONMS | DN   | OAL   | LH   | APMX | LU   | NOF | CAM-RE |
|---------------|-------|------|--------|------|-------|------|------|------|-----|--------|
| FHFP02N5-AQ   | 22085 | 2.0  | 6.0    | 1.8  | 57.0  | 2.0  | 0.10 | 11.0 | 4   | 0.2    |
| FHFP03N5-AQ   | 22086 | 3.0  | 6.0    | 2.8  | 57.0  | 3.0  | 0.15 | 16.0 | 4   | 0.3    |
| FHFP04N5-AQ   | 22087 | 4.0  | 6.0    | 3.8  | 64.0  | 4.0  | 0.20 | 21.0 | 4   | 0.4    |
| FHFP05N5-AQ   | 22088 | 5.0  | 6.0    | 4.8  | 64.0  | 5.0  | 0.25 | 26.0 | 4   | 0.5    |
| FHFP06N5-CCAQ | 19882 | 6.0  | 6.0    | 5.8  | 75.0  | 6.0  | 0.31 | 32.0 | 4   | 0.6    |
| FHFP08N5-CCAQ | 19883 | 8.0  | 8.0    | 7.8  | 83.0  | 8.0  | 0.44 | 42.0 | 4   | 0.8    |
| FHFP10N5-CCAQ | 19884 | 10.0 | 10.0   | 9.8  | 100.0 | 10.0 | 0.55 | 52.0 | 4   | 1.0    |
| FHFP12N5-CCAQ | 19885 | 12.0 | 12.0   | 11.8 | 110.0 | 12.0 | 0.63 | 62.0 | 5   | 1.2    |
| FHFP16N5-CCAQ | 19886 | 16.0 | 16.0   | 15.8 | 133.0 | 16.0 | 0.77 | 82.0 | 5   | 1.6    |

Note: Diameters 2-5mm do not include a through-coolant feature

# TuffCut® HF Series FHFP N8

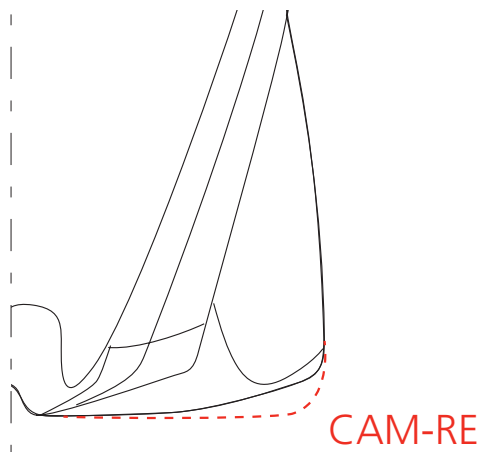


| Tool Number   | EDP   | DC   | DCONMS | DN   | OAL   | LH   | APMX | LU   | NOF | CAM-RE |
|---------------|-------|------|--------|------|-------|------|------|------|-----|--------|
| FHFP02N8-AQ   | 22089 | 2.0  | 6.0    | 1.8  | 57.0  | 2.0  | 0.10 | 17.0 | 4   | 0.2    |
| FHFP03N8-AQ   | 22090 | 3.0  | 6.0    | 2.8  | 64.0  | 3.0  | 0.15 | 25.0 | 4   | 0.3    |
| FHFP04N8-AQ   | 22091 | 4.0  | 6.0    | 3.8  | 75.0  | 4.0  | 0.20 | 33.0 | 4   | 0.4    |
| FHFP05N8-AQ   | 22092 | 5.0  | 6.0    | 4.8  | 75.0  | 5.0  | 0.25 | 41.0 | 4   | 0.5    |
| FHFP06N8-CCAQ | 19887 | 6.0  | 6.0    | 5.8  | 90.0  | 6.0  | 0.31 | 50.0 | 4   | 0.6    |
| FHFP08N8-CCAQ | 19888 | 8.0  | 8.0    | 7.8  | 110.0 | 8.0  | 0.44 | 66.0 | 4   | 0.8    |
| FHFP10N8-CCAQ | 19889 | 10.0 | 10.0   | 9.8  | 130.0 | 10.0 | 0.55 | 82.0 | 4   | 1.0    |
| FHFP12N8-CCAQ | 19890 | 12.0 | 12.0   | 11.8 | 150.0 | 12.0 | 0.63 | 98.0 | 5   | 1.2    |

Note: Diameters 2-5mm do not include a through-coolant feature

## CAM-RE

- CAM-RE = theoretical radius
- Used to create tool definition in CAM to ensure high accuracy, near-net shape 3D roughing



### Safety Note

Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded.



**WARNING:** This product can expose you to chemicals including cobalt, which is known to the State of California to cause cancer. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## Recommended Cutting Data - 3xD Inch

| Series FHFP - 3xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .0787                |       |       | .1181 |       |       | .1575 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | o   | 985        | .0039                | .0591 | .0051 | .0059 | .0886 | .0079 | .0079 | .1181 | .0102 |
| Medium Carbon Steels           |             | ●        | ●   | o   | 820        | .0039                | .0591 | .0047 | .0059 | .0886 | .0071 | .0079 | .1181 | .0094 |
| Alloy Steels                   |             | ●        | ●   | o   | 655        | .0039                | .0591 | .0043 | .0059 | .0886 | .0067 | .0079 | .1181 | .0087 |
| Die/Tool Steels                |             | ●        | ●   | o   | 490        | .0039                | .0591 | .0039 | .0059 | .0886 | .0059 | .0079 | .1181 | .0079 |
| Austenitic Stainless Steels    | M           | ●        | X   | o   | 395        | .0031                | .0472 | .0031 | .0047 | .0709 | .0047 | .0063 | .0945 | .0063 |
| Duplex (22%)                   |             | ●        | X   | o   | 295        | .0028                | .0472 | .0031 | .0041 | .0709 | .0047 | .0055 | .0945 | .0063 |
| Super Duplex (25%)             |             | ●        | X   | o   | 245        | .0024                | .0315 | .0031 | .0035 | .0472 | .0047 | .0047 | .0630 | .0063 |
| Titanium Alloys                | S           | ●        | X   | X   | 330        | .0024                | .0315 | .0031 | .0035 | .0472 | .0047 | .0047 | .0630 | .0063 |
| High Temp Alloys               |             | ●        | X   | X   | 100        | .0020                | .0236 | .0020 | .0030 | .0354 | .0031 | .0039 | .0472 | .0043 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | o   | 295        | .0035                | .0591 | .0035 | .0053 | .0886 | .0055 | .0071 | .1181 | .0071 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | o   | 260        | .0031                | .0472 | .0028 | .0047 | .0709 | .0043 | .0063 | .0945 | .0055 |

| Series FHFP - 3xD - Inch    |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|-----------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                             |             | Emulsion | Air | MQL |            | .1968                |       |       | .2362 |       |       | .3150 |       |       |
|                             |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels           | P           | ●        | ●   | o   | 985        | .0098                | .1476 | .0130 | .0118 | .1772 | .0154 | .0157 | .2362 | .0205 |
| Medium Carbon Steels        |             | ●        | ●   | o   | 820        | .0098                | .1476 | .0118 | .0118 | .1772 | .0142 | .0157 | .2362 | .0189 |
| Alloy Steels                |             | ●        | ●   | o   | 655        | .0098                | .1476 | .0110 | .0118 | .1772 | .0130 | .0157 | .2362 | .0173 |
| Die/Tool Steels             |             | ●        | ●   | o   | 490        | .0098                | .1476 | .0098 | .0118 | .1772 | .0118 | .0157 | .2362 | .0157 |
| Austenitic Stainless Steels | M           | ●        | X   | o   | 395        | .0079                | .1181 | .0079 | .0094 | .1417 | .0094 | .0126 | .1890 | .0126 |
| Duplex (22%)                |             | ●        | X   | o   | 295        | .0069                | .1181 | .0079 | .0083 | .1417 | .0094 | .0110 | .1890 | .0126 |
| Super Duplex (25%)          |             | ●        | X   | o   | 245        | .0059                | .0787 | .0079 | .0071 | .0945 | .0094 | .0094 | .1260 | .0126 |
| Titanium Alloys             | S           | ●        | X   | X   | 330        | .0059                | .0787 | .0079 | .0071 | .0945 | .0094 | .0094 | .1260 | .0126 |
| High Temp Alloys            |             | ●        | X   | X   | 100        | .0049                | .0591 | .0055 | .0059 | .0709 | .0063 | .0079 | .0945 | .0087 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | o   | 295        | .0089                | .1476 | .0091 | .0106 | .1772 | .0106 | .0142 | .2362 | .0142 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | o   | 260        | .0079                | .1181 | .0071 | .0094 | .1417 | .0083 | .0126 | .1890 | .0110 |

| Series FHFP - 3xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .3937                |       |       | .4724 |       |       | .6299 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | o   | 985        | .0197                | .2953 | .0256 | .0236 | .3543 | .0307 | .0276 | .4724 | .0409 |
| Medium Carbon Steels           |             | ●        | ●   | o   | 820        | .0197                | .2953 | .0236 | .0236 | .3543 | .0283 | .0276 | .4724 | .0378 |
| Alloy Steels                   |             | ●        | ●   | o   | 655        | .0197                | .2953 | .0217 | .0236 | .3543 | .0260 | .0276 | .4724 | .0346 |
| Die/Tool Steels                |             | ●        | ●   | o   | 490        | .0197                | .2953 | .0197 | .0236 | .3543 | .0236 | .0276 | .4724 | .0315 |
| Austenitic Stainless Steels    | M           | ●        | X   | o   | 395        | .0157                | .2362 | .0157 | .0189 | .2835 | .0189 | .0220 | .3780 | .0252 |
| Duplex (22%)                   |             | ●        | X   | o   | 295        | .0138                | .2362 | .0157 | .0165 | .2835 | .0189 | .0193 | .3780 | .0252 |
| Super Duplex (25%)             |             | ●        | X   | o   | 245        | .0118                | .1575 | .0157 | .0142 | .1890 | .0189 | .0165 | .2520 | .0252 |
| Titanium Alloys                | S           | ●        | X   | X   | 330        | .0118                | .1575 | .0157 | .0142 | .1890 | .0189 | .0165 | .2520 | .0252 |
| High Temp Alloys               |             | ●        | X   | X   | 100        | .0098                | .1181 | .0106 | .0118 | .1417 | .0126 | .0138 | .1890 | .0169 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | o   | 295        | .0177                | .2953 | .0177 | .0213 | .3543 | .0213 | .0248 | .4724 | .0283 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | o   | 260        | .0157                | .2362 | .0138 | .0189 | .2835 | .0165 | .0220 | .3780 | .0220 |

● Preferred    o Possible    X Not Possible

## Recommended Cutting Data - 3xD Metric

| Series FHFP - 3xD - Metric  |     |          |     |     |            |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-----|----------|-----|-----|------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | ISO | Coolant  |     |     | Vc - m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |     | Emulsion | Air | MQL |            | 2                  |     |      | 3    |     |      | 4    |     |      |
|                             |     |          |     |     |            | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P   | ●        | ●   | ○   | 300        | 0.10               | 1.5 | 0.13 | 0.15 | 2.3 | 0.20 | 0.20 | 3.0 | 0.26 |
| Medium Carbon Steels        |     | ●        | ●   | ○   | 250        | 0.10               | 1.5 | 0.12 | 0.15 | 2.3 | 0.18 | 0.20 | 3.0 | 0.24 |
| Alloy Steels                |     | ●        | ●   | ○   | 200        | 0.10               | 1.5 | 0.11 | 0.15 | 2.3 | 0.17 | 0.20 | 3.0 | 0.22 |
| Die/Tool Steels             |     | ●        | ●   | ○   | 150        | 0.10               | 1.5 | 0.10 | 0.15 | 2.3 | 0.15 | 0.20 | 3.0 | 0.20 |
| Austenitic Stainless Steels | M   | ●        | X   | ○   | 120        | 0.08               | 1.2 | 0.08 | 0.12 | 1.8 | 0.12 | 0.16 | 2.4 | 0.16 |
| Duplex (22%)                |     | ●        | X   | ○   | 90         | 0.07               | 1.2 | 0.08 | 0.11 | 1.8 | 0.12 | 0.14 | 2.4 | 0.16 |
| Super Duplex (25%)          |     | ●        | X   | ○   | 75         | 0.06               | 0.8 | 0.08 | 0.09 | 1.2 | 0.12 | 0.12 | 1.6 | 0.16 |
| Titanium Alloys             | S   | ●        | X   | X   | 100        | 0.06               | 0.8 | 0.08 | 0.09 | 1.2 | 0.12 | 0.12 | 1.6 | 0.16 |
| High Temp Alloys            |     | ●        | X   | X   | 30         | 0.05               | 0.6 | 0.05 | 0.08 | 0.9 | 0.08 | 0.10 | 1.2 | 0.11 |
| Hardened Steels 45 - 50HRC  | H   | ●        | ●   | ○   | 90         | 0.09               | 1.5 | 0.09 | 0.14 | 2.3 | 0.14 | 0.18 | 3.0 | 0.18 |
| Hardened Steels 50 - 55HRC  |     | ●        | ●   | ○   | 80         | 0.08               | 1.2 | 0.07 | 0.12 | 1.8 | 0.11 | 0.16 | 2.4 | 0.14 |

| Series FHFP - 3xD - Metric  |             |          |     |     |               |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |             | Emulsion | Air | MQL |               | 5                  |     |      | 6    |     |      | 8    |     |      |
|                             |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P           | ●        | ●   | ○   | 300           | 0.25               | 3.8 | 0.33 | 0.30 | 4.5 | 0.39 | 0.40 | 6.0 | 0.52 |
| Medium Carbon Steels        |             | ●        | ●   | ○   | 250           | 0.25               | 3.8 | 0.30 | 0.30 | 4.5 | 0.36 | 0.40 | 6.0 | 0.48 |
| Alloy Steels                |             | ●        | ●   | ○   | 200           | 0.25               | 3.8 | 0.28 | 0.30 | 4.5 | 0.33 | 0.40 | 6.0 | 0.44 |
| Die/Tool Steels             |             | ●        | ●   | ○   | 150           | 0.25               | 3.8 | 0.25 | 0.30 | 4.5 | 0.30 | 0.40 | 6.0 | 0.40 |
| Austenitic Stainless Steels | M           | ●        | X   | ○   | 120           | 0.20               | 3.0 | 0.20 | 0.24 | 3.6 | 0.24 | 0.32 | 4.8 | 0.32 |
| Duplex (22%)                |             | ●        | X   | ○   | 90            | 0.18               | 3.0 | 0.20 | 0.21 | 3.6 | 0.24 | 0.28 | 4.8 | 0.32 |
| Super Duplex (25%)          |             | ●        | X   | ○   | 75            | 0.15               | 2.0 | 0.20 | 0.18 | 2.4 | 0.24 | 0.24 | 3.2 | 0.32 |
| Titanium Alloys             | S           | ●        | X   | X   | 100           | 0.15               | 2.0 | 0.20 | 0.18 | 2.4 | 0.24 | 0.24 | 3.2 | 0.32 |
| High Temp Alloys            |             | ●        | X   | X   | 30            | 0.13               | 1.5 | 0.14 | 0.15 | 1.8 | 0.16 | 0.20 | 2.4 | 0.22 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | ○   | 90            | 0.23               | 3.8 | 0.23 | 0.27 | 4.5 | 0.27 | 0.36 | 6.0 | 0.36 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | ○   | 80            | 0.20               | 3.0 | 0.18 | 0.24 | 3.6 | 0.21 | 0.32 | 4.8 | 0.28 |

| Series FHFP - 3xD - Metric     |             |          |     |     |               |                    |     |      |      |     |      |      |      |      |
|--------------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|------|------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |      |      |
|                                |             | Emulsion | Air | MQL |               | 10                 |     |      | 12   |     |      | 16   |      |      |
|                                |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae   | Fz   |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 300           | 0.50               | 7.5 | 0.65 | 0.60 | 9.0 | 0.78 | 0.70 | 12.0 | 1.04 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 250           | 0.50               | 7.5 | 0.60 | 0.60 | 9.0 | 0.72 | 0.70 | 12.0 | 0.96 |
| Alloy Steels                   |             | ●        | ●   | ○   | 200           | 0.50               | 7.5 | 0.55 | 0.60 | 9.0 | 0.66 | 0.70 | 12.0 | 0.88 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 150           | 0.50               | 7.5 | 0.50 | 0.60 | 9.0 | 0.60 | 0.70 | 12.0 | 0.80 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 120           | 0.40               | 6.0 | 0.40 | 0.48 | 7.2 | 0.48 | 0.56 | 9.6  | 0.64 |
| Duplex (22%)                   |             | ●        | X   | ○   | 90            | 0.35               | 6.0 | 0.40 | 0.42 | 7.2 | 0.48 | 0.49 | 9.6  | 0.64 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 75            | 0.30               | 4.0 | 0.40 | 0.36 | 4.8 | 0.48 | 0.42 | 6.4  | 0.64 |
| Titanium Alloys                | S           | ●        | X   | X   | 100           | 0.30               | 4.0 | 0.40 | 0.36 | 4.8 | 0.48 | 0.42 | 6.4  | 0.64 |
| High Temp Alloys               |             | ●        | X   | X   | 30            | 0.25               | 3.0 | 0.27 | 0.30 | 3.6 | 0.32 | 0.35 | 4.8  | 0.43 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 90            | 0.45               | 7.5 | 0.45 | 0.54 | 9.0 | 0.54 | 0.63 | 12.0 | 0.72 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 80            | 0.40               | 6.0 | 0.35 | 0.48 | 7.2 | 0.42 | 0.56 | 9.6  | 0.56 |

● Preferred    ○ Possible    X Not Possible

## Recommended Cutting Data - 5xD Inch

| Series FHFP - 5xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .0787                |       |       | .1181 |       |       | .1575 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 885        | .0031                | .0591 | .0051 | .0047 | .0886 | .0079 | .0063 | .1181 | .0102 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 740        | .0031                | .0591 | .0047 | .0047 | .0886 | .0071 | .0063 | .1181 | .0094 |
| Alloy Steels                   |             | ●        | ●   | ○   | 590        | .0031                | .0591 | .0043 | .0047 | .0886 | .0067 | .0063 | .1181 | .0087 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 445        | .0031                | .0591 | .0039 | .0047 | .0886 | .0059 | .0063 | .1181 | .0079 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 360        | .0024                | .0472 | .0031 | .0039 | .0709 | .0047 | .0051 | .0945 | .0063 |
| Duplex (22%)                   |             | ●        | X   | ○   | 260        | .0024                | .0472 | .0031 | .0035 | .0709 | .0047 | .0043 | .0945 | .0063 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 230        | .0020                | .0315 | .0031 | .0028 | .0472 | .0047 | .0039 | .0630 | .0063 |
| Titanium Alloys                | S           | ●        | X   | X   | 295        | .0020                | .0315 | .0031 | .0028 | .0472 | .0047 | .0039 | .0630 | .0063 |
| High Temp Alloys               |             | ●        | X   | X   | 100        | .0016                | .0236 | .0020 | .0024 | .0354 | .0031 | .0031 | .0472 | .0043 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 260        | .0028                | .0591 | .0035 | .0043 | .0886 | .0055 | .0059 | .1181 | .0071 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 230        | .0024                | .0472 | .0028 | .0039 | .0709 | .0043 | .0051 | .0945 | .0055 |

| Series FHFP - 5xD - Inch    |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|-----------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                             |             | Emulsion | Air | MQL |            | .1968                |       |       | .2362 |       |       | .3150 |       |       |
|                             |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels           | P           | ●        | ●   | ○   | 885        | .0079                | .1476 | .0130 | .0094 | .1772 | .0154 | .0126 | .2362 | .0205 |
| Medium Carbon Steels        |             | ●        | ●   | ○   | 740        | .0079                | .1476 | .0118 | .0094 | .1772 | .0142 | .0126 | .2362 | .0189 |
| Alloy Steels                |             | ●        | ●   | ○   | 590        | .0079                | .1476 | .0110 | .0094 | .1772 | .0130 | .0126 | .2362 | .0173 |
| Die/Tool Steels             |             | ●        | ●   | ○   | 445        | .0079                | .1476 | .0098 | .0094 | .1772 | .0118 | .0126 | .2362 | .0157 |
| Austenitic Stainless Steels | M           | ●        | X   | ○   | 360        | .0063                | .1181 | .0079 | .0075 | .1417 | .0094 | .0102 | .1890 | .0126 |
| Duplex (22%)                |             | ●        | X   | ○   | 260        | .0055                | .1181 | .0079 | .0067 | .1417 | .0094 | .0087 | .1890 | .0126 |
| Super Duplex (25%)          |             | ●        | X   | ○   | 230        | .0047                | .0787 | .0079 | .0055 | .0945 | .0094 | .0075 | .1260 | .0126 |
| Titanium Alloys             | S           | ●        | X   | X   | 295        | .0047                | .0787 | .0079 | .0055 | .0945 | .0094 | .0075 | .1260 | .0126 |
| High Temp Alloys            |             | ●        | X   | X   | 100        | .0039                | .0591 | .0055 | .0047 | .0709 | .0063 | .0063 | .0945 | .0087 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | ○   | 260        | .0071                | .1476 | .0091 | .0087 | .1772 | .0106 | .0114 | .2362 | .0142 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | ○   | 230        | .0063                | .1181 | .0071 | .0075 | .1417 | .0083 | .0102 | .1890 | .0110 |

| Series FHFP - 5xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .3937                |       |       | .4724 |       |       | .6299 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 885        | .0157                | .2953 | .0256 | .0189 | .3543 | .0307 | .0220 | .4724 | .0409 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 740        | .0157                | .2953 | .0236 | .0189 | .3543 | .0283 | .0220 | .4724 | .0378 |
| Alloy Steels                   |             | ●        | ●   | ○   | 590        | .0157                | .2953 | .0217 | .0189 | .3543 | .0260 | .0220 | .4724 | .0346 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 445        | .0157                | .2953 | .0197 | .0189 | .3543 | .0236 | .0220 | .4724 | .0315 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 360        | .0126                | .2362 | .0157 | .0150 | .2835 | .0189 | .0177 | .3780 | .0252 |
| Duplex (22%)                   |             | ●        | X   | ○   | 260        | .0110                | .2362 | .0157 | .0134 | .2835 | .0189 | .0154 | .3780 | .0252 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 230        | .0094                | .1575 | .0157 | .0114 | .1890 | .0189 | .0134 | .2520 | .0252 |
| Titanium Alloys                | S           | ●        | X   | X   | 295        | .0094                | .1575 | .0157 | .0114 | .1890 | .0189 | .0134 | .2520 | .0252 |
| High Temp Alloys               |             | ●        | X   | X   | 100        | .0079                | .1181 | .0106 | .0094 | .1417 | .0126 | .0110 | .1890 | .0169 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 260        | .0142                | .2953 | .0177 | .0169 | .3543 | .0213 | .0197 | .4724 | .0283 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 230        | .0126                | .2362 | .0138 | .0150 | .2835 | .0165 | .0177 | .3780 | .0220 |

● Preferred    ○ Possible    X Not Possible

## Recommended Cutting Data - 5xD Metric

| Series FHFP - 5xD - Metric  |     |          |     |     |            |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-----|----------|-----|-----|------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | ISO | Coolant  |     |     | Vc - m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |     | Emulsion | Air | MQL |            | 2                  |     |      | 3    |     |      | 4    |     |      |
|                             |     |          |     |     |            | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P   | ●        | ●   | ○   | 270        | 0.08               | 1.5 | 0.13 | 0.12 | 2.3 | 0.20 | 0.16 | 3.0 | 0.26 |
| Medium Carbon Steels        |     | ●        | ●   | ○   | 225        | 0.08               | 1.5 | 0.12 | 0.12 | 2.3 | 0.18 | 0.16 | 3.0 | 0.24 |
| Alloy Steels                |     | ●        | ●   | ○   | 180        | 0.08               | 1.5 | 0.11 | 0.12 | 2.3 | 0.17 | 0.16 | 3.0 | 0.22 |
| Die/Tool Steels             |     | ●        | ●   | ○   | 135        | 0.08               | 1.5 | 0.10 | 0.12 | 2.3 | 0.15 | 0.16 | 3.0 | 0.20 |
| Austenitic Stainless Steels | M   | ●        | X   | ○   | 110        | 0.06               | 1.2 | 0.08 | 0.10 | 1.8 | 0.12 | 0.13 | 2.4 | 0.16 |
| Duplex (22%)                |     | ●        | X   | ○   | 80         | 0.06               | 1.2 | 0.08 | 0.09 | 1.8 | 0.12 | 0.11 | 2.4 | 0.16 |
| Super Duplex (25%)          |     | ●        | X   | ○   | 70         | 0.05               | 0.8 | 0.08 | 0.07 | 1.2 | 0.12 | 0.10 | 1.6 | 0.16 |
| Titanium Alloys             | S   | ●        | X   | X   | 90         | 0.05               | 0.8 | 0.08 | 0.07 | 1.2 | 0.12 | 0.10 | 1.6 | 0.16 |
| High Temp Alloys            |     | ●        | X   | X   | 30         | 0.04               | 0.6 | 0.05 | 0.06 | 0.9 | 0.08 | 0.08 | 1.2 | 0.11 |
| Hardened Steels 45 - 50HRC  | H   | ●        | ●   | ○   | 80         | 0.07               | 1.5 | 0.09 | 0.11 | 2.3 | 0.14 | 0.15 | 3.0 | 0.18 |
| Hardened Steels 50 - 55HRC  |     | ●        | ●   | ○   | 70         | 0.06               | 1.2 | 0.07 | 0.10 | 1.8 | 0.11 | 0.13 | 2.4 | 0.14 |

| Series FHFP - 5xD - Metric  |             |          |     |     |               |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |             | Emulsion | Air | MQL |               | 5                  |     |      | 6    |     |      | 8    |     |      |
|                             |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P           | ●        | ●   | ○   | 270           | 0.20               | 3.8 | 0.33 | 0.24 | 4.5 | 0.39 | 0.32 | 6.0 | 0.52 |
| Medium Carbon Steels        |             | ●        | ●   | ○   | 225           | 0.20               | 3.8 | 0.30 | 0.24 | 4.5 | 0.36 | 0.32 | 6.0 | 0.48 |
| Alloy Steels                |             | ●        | ●   | ○   | 180           | 0.20               | 3.8 | 0.28 | 0.24 | 4.5 | 0.33 | 0.32 | 6.0 | 0.44 |
| Die/Tool Steels             |             | ●        | ●   | ○   | 135           | 0.20               | 3.8 | 0.25 | 0.24 | 4.5 | 0.30 | 0.32 | 6.0 | 0.40 |
| Austenitic Stainless Steels | M           | ●        | X   | ○   | 110           | 0.16               | 3.0 | 0.20 | 0.19 | 3.6 | 0.24 | 0.26 | 4.8 | 0.32 |
| Duplex (22%)                |             | ●        | X   | ○   | 80            | 0.14               | 3.0 | 0.20 | 0.17 | 3.6 | 0.24 | 0.22 | 4.8 | 0.32 |
| Super Duplex (25%)          |             | ●        | X   | ○   | 70            | 0.12               | 2.0 | 0.20 | 0.14 | 2.4 | 0.24 | 0.19 | 3.2 | 0.32 |
| Titanium Alloys             | S           | ●        | X   | X   | 90            | 0.12               | 2.0 | 0.20 | 0.14 | 2.4 | 0.24 | 0.19 | 3.2 | 0.32 |
| High Temp Alloys            |             | ●        | X   | X   | 30            | 0.10               | 1.5 | 0.14 | 0.12 | 1.8 | 0.16 | 0.16 | 2.4 | 0.22 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | ○   | 80            | 0.18               | 3.8 | 0.23 | 0.22 | 4.5 | 0.27 | 0.29 | 6.0 | 0.36 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | ○   | 70            | 0.16               | 3.0 | 0.18 | 0.19 | 3.6 | 0.21 | 0.26 | 4.8 | 0.28 |

| Series FHFP - 5xD - Metric     |             |          |     |     |               |                    |     |      |      |     |      |      |      |      |
|--------------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|------|------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |      |      |
|                                |             | Emulsion | Air | MQL |               | 10                 |     |      | 12   |     |      | 16   |      |      |
|                                |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae   | Fz   |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 270           | 0.40               | 7.5 | 0.65 | 0.48 | 9.0 | 0.78 | 0.56 | 12.0 | 1.04 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 225           | 0.40               | 7.5 | 0.60 | 0.48 | 9.0 | 0.72 | 0.56 | 12.0 | 0.96 |
| Alloy Steels                   |             | ●        | ●   | ○   | 180           | 0.40               | 7.5 | 0.55 | 0.48 | 9.0 | 0.66 | 0.56 | 12.0 | 0.88 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 135           | 0.40               | 7.5 | 0.50 | 0.48 | 9.0 | 0.60 | 0.56 | 12.0 | 0.80 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 110           | 0.32               | 6.0 | 0.40 | 0.38 | 7.2 | 0.48 | 0.45 | 9.6  | 0.64 |
| Duplex (22%)                   |             | ●        | X   | ○   | 80            | 0.28               | 6.0 | 0.40 | 0.34 | 7.2 | 0.48 | 0.39 | 9.6  | 0.64 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 70            | 0.24               | 4.0 | 0.40 | 0.29 | 4.8 | 0.48 | 0.34 | 6.4  | 0.64 |
| Titanium Alloys                | S           | ●        | X   | X   | 90            | 0.24               | 4.0 | 0.40 | 0.29 | 4.8 | 0.48 | 0.34 | 6.4  | 0.64 |
| High Temp Alloys               |             | ●        | X   | X   | 30            | 0.20               | 3.0 | 0.27 | 0.24 | 3.6 | 0.32 | 0.28 | 4.8  | 0.43 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 80            | 0.36               | 7.5 | 0.45 | 0.43 | 9.0 | 0.54 | 0.50 | 12.0 | 0.72 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 70            | 0.32               | 6.0 | 0.35 | 0.38 | 7.2 | 0.42 | 0.45 | 9.6  | 0.56 |

● Preferred    ○ Possible    X Not Possible

## Recommended Cutting Data - 8xD Inch

| Series FHFP - 8xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .0787                |       |       | .1181 |       |       | .1575 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 490        | .0024                | .0472 | .0051 | .0035 | .0709 | .0079 | .0047 | .0945 | .0102 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 395        | .0024                | .0472 | .0047 | .0035 | .0709 | .0071 | .0047 | .0945 | .0094 |
| Alloy Steels                   |             | ●        | ●   | ○   | 330        | .0024                | .0472 | .0043 | .0035 | .0709 | .0067 | .0047 | .0945 | .0087 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 330        | .0024                | .0472 | .0039 | .0035 | .0709 | .0059 | .0047 | .0945 | .0079 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 260        | .0020                | .0472 | .0031 | .0028 | .0709 | .0047 | .0039 | .0945 | .0063 |
| Duplex (22%)                   |             | ●        | X   | ○   | 195        | .0016                | .0315 | .0031 | .0028 | .0472 | .0047 | .0035 | .0630 | .0063 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 165        | .0016                | .0315 | .0031 | .0024 | .0472 | .0047 | .0028 | .0630 | .0063 |
| Titanium Alloys                | S           | ●        | X   | X   | 230        | .0016                | .0315 | .0031 | .0024 | .0472 | .0047 | .0028 | .0630 | .0063 |
| High Temp Alloys               |             | ●        | X   | X   | 65         | .0012                | .0236 | .0020 | .0020 | .0354 | .0031 | .0024 | .0472 | .0043 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 195        | .0020                | .0472 | .0035 | .0031 | .0709 | .0055 | .0043 | .0945 | .0071 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 165        | .0020                | .0315 | .0028 | .0028 | .0472 | .0043 | .0039 | .0630 | .0055 |

| Series FHFP - 8xD - Inch    |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|-----------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                             |             | Emulsion | Air | MQL |            | .1968                |       |       | .2362 |       |       | .3150 |       |       |
|                             |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels           | P           | ●        | ●   | ○   | 490        | .0059                | .1181 | .0130 | .0071 | .1417 | .0154 | .0094 | .1890 | .0205 |
| Medium Carbon Steels        |             | ●        | ●   | ○   | 395        | .0059                | .1181 | .0118 | .0071 | .1417 | .0142 | .0094 | .1890 | .0189 |
| Alloy Steels                |             | ●        | ●   | ○   | 330        | .0059                | .1181 | .0110 | .0071 | .1417 | .0130 | .0094 | .1890 | .0173 |
| Die/Tool Steels             |             | ●        | ●   | ○   | 330        | .0059                | .1181 | .0098 | .0071 | .1417 | .0118 | .0094 | .1890 | .0157 |
| Austenitic Stainless Steels | M           | ●        | X   | ○   | 260        | .0047                | .1181 | .0079 | .0055 | .1417 | .0094 | .0075 | .1890 | .0126 |
| Duplex (22%)                |             | ●        | X   | ○   | 195        | .0043                | .0787 | .0079 | .0051 | .0945 | .0094 | .0067 | .1260 | .0126 |
| Super Duplex (25%)          |             | ●        | X   | ○   | 165        | .0035                | .0787 | .0079 | .0043 | .0945 | .0094 | .0055 | .1260 | .0126 |
| Titanium Alloys             | S           | ●        | X   | X   | 230        | .0035                | .0787 | .0079 | .0043 | .0945 | .0094 | .0055 | .1260 | .0126 |
| High Temp Alloys            |             | ●        | X   | X   | 65         | .0031                | .0591 | .0055 | .0035 | .0709 | .0063 | .0047 | .0945 | .0087 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | ○   | 195        | .0055                | .1181 | .0091 | .0063 | .1417 | .0106 | .0087 | .1890 | .0142 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | ○   | 165        | .0047                | .0787 | .0071 | .0055 | .0945 | .0083 | .0075 | .1260 | .0110 |

| Series FHFP - 8xD - Inch       |             |          |     |     |            |                      |       |       |       |       |       |       |       |       |
|--------------------------------|-------------|----------|-----|-----|------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc-<br>SFM | Tool Diameter (inch) |       |       |       |       |       |       |       |       |
|                                |             | Emulsion | Air | MQL |            | .3937                |       |       | .4724 |       |       | .6299 |       |       |
|                                |             |          |     |     |            | Ap                   | Ae    | Fz    | Ap    | Ae    | Fz    | Ap    | Ae    | Fz    |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 490        | .0118                | .2362 | .0256 | .0142 | .2835 | .0307 | .0165 | .3780 | .0409 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 395        | .0118                | .2362 | .0236 | .0142 | .2835 | .0283 | .0165 | .3780 | .0378 |
| Alloy Steels                   |             | ●        | ●   | ○   | 330        | .0118                | .2362 | .0217 | .0142 | .2835 | .0260 | .0165 | .3780 | .0346 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 330        | .0118                | .2362 | .0197 | .0142 | .2835 | .0236 | .0165 | .3780 | .0315 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 260        | .0094                | .2362 | .0157 | .0114 | .2835 | .0189 | .0134 | .3780 | .0252 |
| Duplex (22%)                   |             | ●        | X   | ○   | 195        | .0083                | .1575 | .0157 | .0098 | .1890 | .0189 | .0114 | .2520 | .0252 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 165        | .0071                | .1575 | .0157 | .0087 | .1890 | .0189 | .0098 | .2520 | .0252 |
| Titanium Alloys                | S           | ●        | X   | X   | 230        | .0071                | .1575 | .0157 | .0087 | .1890 | .0189 | .0098 | .2520 | .0252 |
| High Temp Alloys               |             | ●        | X   | X   | 65         | .0059                | .1181 | .0106 | .0071 | .1417 | .0126 | .0083 | .1890 | .0169 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 195        | .0106                | .2362 | .0177 | .0126 | .2835 | .0213 | .0150 | .3780 | .0283 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 165        | .0094                | .1575 | .0138 | .0114 | .1890 | .0165 | .0134 | .2520 | .0220 |

● Preferred    ○ Possible    X Not Possible

## Recommended Cutting Data - 8xD Metric

| Series FHFP - 8xD - Metric  |     |          |     |     |            |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-----|----------|-----|-----|------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | ISO | Coolant  |     |     | Vc - m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |     | Emulsion | Air | MQL |            | 2                  |     |      | 3    |     |      | 4    |     |      |
|                             |     |          |     |     |            | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P   | ●        | ●   | ○   | 150        | 0.06               | 1.2 | 0.13 | 0.09 | 1.8 | 0.20 | 0.12 | 2.4 | 0.26 |
| Medium Carbon Steels        |     | ●        | ●   | ○   | 120        | 0.06               | 1.2 | 0.12 | 0.09 | 1.8 | 0.18 | 0.12 | 2.4 | 0.24 |
| Alloy Steels                |     | ●        | ●   | ○   | 100        | 0.06               | 1.2 | 0.11 | 0.09 | 1.8 | 0.17 | 0.12 | 2.4 | 0.22 |
| Die/Tool Steels             |     | ●        | ●   | ○   | 100        | 0.06               | 1.2 | 0.10 | 0.09 | 1.8 | 0.15 | 0.12 | 2.4 | 0.20 |
| Austenitic Stainless Steels | M   | ●        | X   | ○   | 80         | 0.05               | 1.2 | 0.08 | 0.07 | 1.8 | 0.12 | 0.10 | 2.4 | 0.16 |
| Duplex (22%)                |     | ●        | X   | ○   | 60         | 0.04               | 0.8 | 0.08 | 0.07 | 1.2 | 0.12 | 0.09 | 1.6 | 0.16 |
| Super Duplex (25%)          |     | ●        | X   | ○   | 50         | 0.04               | 0.8 | 0.08 | 0.06 | 1.2 | 0.12 | 0.07 | 1.6 | 0.16 |
| Titanium Alloys             | S   | ●        | X   | X   | 70         | 0.04               | 0.8 | 0.08 | 0.06 | 1.2 | 0.12 | 0.07 | 1.6 | 0.16 |
| High Temp Alloys            |     | ●        | X   | X   | 20         | 0.03               | 0.6 | 0.05 | 0.05 | 0.9 | 0.08 | 0.06 | 1.2 | 0.11 |
| Hardened Steels 45 - 50HRC  | H   | ●        | ●   | ○   | 60         | 0.05               | 1.2 | 0.09 | 0.08 | 1.8 | 0.14 | 0.11 | 2.4 | 0.18 |
| Hardened Steels 50 - 55HRC  |     | ●        | ●   | ○   | 50         | 0.05               | 0.8 | 0.07 | 0.07 | 1.2 | 0.11 | 0.10 | 1.6 | 0.14 |

| Series FHFP - 8xD - Metric  |             |          |     |     |               |                    |     |      |      |     |      |      |     |      |
|-----------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece Material Group    | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                             |             | Emulsion | Air | MQL |               | 5                  |     |      | 6    |     |      | 8    |     |      |
|                             |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels           | P           | ●        | ●   | ○   | 150           | 0.15               | 3.0 | 0.33 | 0.18 | 3.6 | 0.39 | 0.24 | 4.8 | 0.52 |
| Medium Carbon Steels        |             | ●        | ●   | ○   | 120           | 0.15               | 3.0 | 0.30 | 0.18 | 3.6 | 0.36 | 0.24 | 4.8 | 0.48 |
| Alloy Steels                |             | ●        | ●   | ○   | 100           | 0.15               | 3.0 | 0.28 | 0.18 | 3.6 | 0.33 | 0.24 | 4.8 | 0.44 |
| Die/Tool Steels             |             | ●        | ●   | ○   | 100           | 0.15               | 3.0 | 0.25 | 0.18 | 3.6 | 0.30 | 0.24 | 4.8 | 0.40 |
| Austenitic Stainless Steels | M           | ●        | X   | ○   | 80            | 0.12               | 3.0 | 0.20 | 0.14 | 3.6 | 0.24 | 0.19 | 4.8 | 0.32 |
| Duplex (22%)                |             | ●        | X   | ○   | 60            | 0.11               | 2.0 | 0.20 | 0.13 | 2.4 | 0.24 | 0.17 | 3.2 | 0.32 |
| Super Duplex (25%)          |             | ●        | X   | ○   | 50            | 0.09               | 2.0 | 0.20 | 0.11 | 2.4 | 0.24 | 0.14 | 3.2 | 0.32 |
| Titanium Alloys             | S           | ●        | X   | X   | 70            | 0.09               | 2.0 | 0.20 | 0.11 | 2.4 | 0.24 | 0.14 | 3.2 | 0.32 |
| High Temp Alloys            |             | ●        | X   | X   | 20            | 0.08               | 1.5 | 0.14 | 0.09 | 1.8 | 0.16 | 0.12 | 2.4 | 0.22 |
| Hardened Steels 45 - 50HRC  | H           | ●        | ●   | ○   | 60            | 0.14               | 3.0 | 0.23 | 0.16 | 3.6 | 0.27 | 0.22 | 4.8 | 0.36 |
| Hardened Steels 50 - 55HRC  |             | ●        | ●   | ○   | 50            | 0.12               | 2.0 | 0.18 | 0.14 | 2.4 | 0.21 | 0.19 | 3.2 | 0.28 |

| Series FHFP - 8xD - Metric     |             |          |     |     |               |                    |     |      |      |     |      |      |     |      |
|--------------------------------|-------------|----------|-----|-----|---------------|--------------------|-----|------|------|-----|------|------|-----|------|
| Workpiece<br>Material<br>Group | I<br>S<br>O | Coolant  |     |     | Vc -<br>m/min | Tool Diameter (mm) |     |      |      |     |      |      |     |      |
|                                |             | Emulsion | Air | MQL |               | 10                 |     |      | 12   |     |      | 16   |     |      |
|                                |             |          |     |     |               | Ap                 | Ae  | Fz   | Ap   | Ae  | Fz   | Ap   | Ae  | Fz   |
| Low Carbon Steels              | P           | ●        | ●   | ○   | 150           | 0.30               | 6.0 | 0.65 | 0.36 | 7.2 | 0.78 | 0.42 | 9.6 | 1.04 |
| Medium Carbon Steels           |             | ●        | ●   | ○   | 120           | 0.30               | 6.0 | 0.60 | 0.36 | 7.2 | 0.72 | 0.42 | 9.6 | 0.96 |
| Alloy Steels                   |             | ●        | ●   | ○   | 100           | 0.30               | 6.0 | 0.55 | 0.36 | 7.2 | 0.66 | 0.42 | 9.6 | 0.88 |
| Die/Tool Steels                |             | ●        | ●   | ○   | 100           | 0.30               | 6.0 | 0.50 | 0.36 | 7.2 | 0.60 | 0.42 | 9.6 | 0.80 |
| Austenitic Stainless Steels    | M           | ●        | X   | ○   | 80            | 0.24               | 6.0 | 0.40 | 0.29 | 7.2 | 0.48 | 0.34 | 9.6 | 0.64 |
| Duplex (22%)                   |             | ●        | X   | ○   | 60            | 0.21               | 4.0 | 0.40 | 0.25 | 4.8 | 0.48 | 0.29 | 6.4 | 0.64 |
| Super Duplex (25%)             |             | ●        | X   | ○   | 50            | 0.18               | 4.0 | 0.40 | 0.22 | 4.8 | 0.48 | 0.25 | 6.4 | 0.64 |
| Titanium Alloys                | S           | ●        | X   | X   | 70            | 0.18               | 4.0 | 0.40 | 0.22 | 4.8 | 0.48 | 0.25 | 6.4 | 0.64 |
| High Temp Alloys               |             | ●        | X   | X   | 20            | 0.15               | 3.0 | 0.27 | 0.18 | 3.6 | 0.32 | 0.21 | 4.8 | 0.43 |
| Hardened Steels 45 - 50HRC     | H           | ●        | ●   | ○   | 60            | 0.27               | 6.0 | 0.45 | 0.32 | 7.2 | 0.54 | 0.38 | 9.6 | 0.72 |
| Hardened Steels 50 - 55HRC     |             | ●        | ●   | ○   | 50            | 0.24               | 4.0 | 0.35 | 0.29 | 4.8 | 0.42 | 0.34 | 6.4 | 0.56 |

● Preferred ○ Possible X Not Possible