

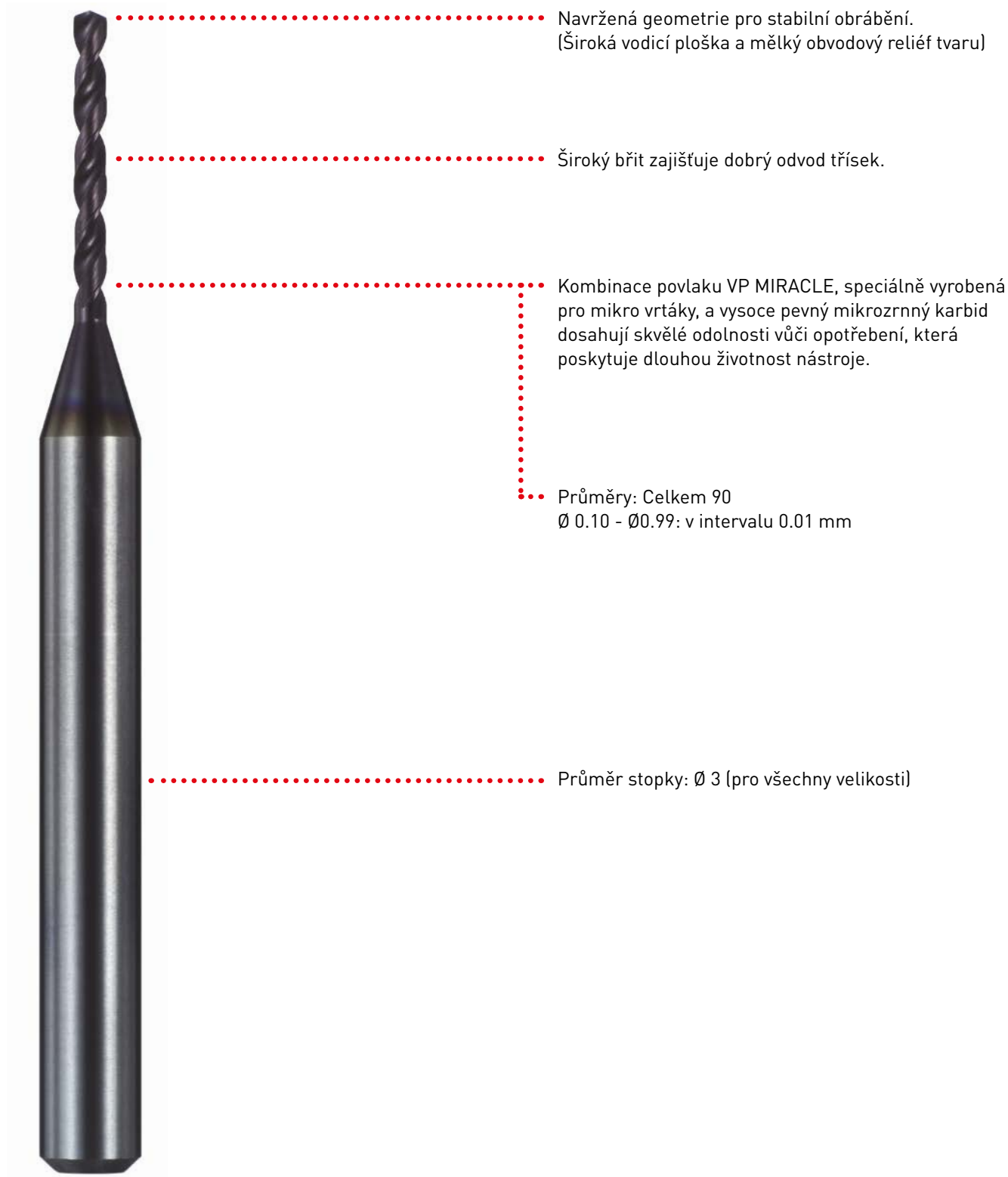
# MSE

DLOUHÁ ŽIVOTNOST NÁSTROJE A VYSOCE EFEKTIVNÍ  
MIKRO VRTÁNÍ UMOŽNĚNÉ ULTRA VYSOKOU PŘESNOSTÍ  
VÝROBY



# MSE

## DLOUHÁ ŽIVOTNOST NÁSTROJE A VYSOCE EFEKTIVNÍ MIKRO VRTÁNÍ UMOŽNĚNÉ ULTRA VYSOKOU PŘESNOSTÍ VÝROBY

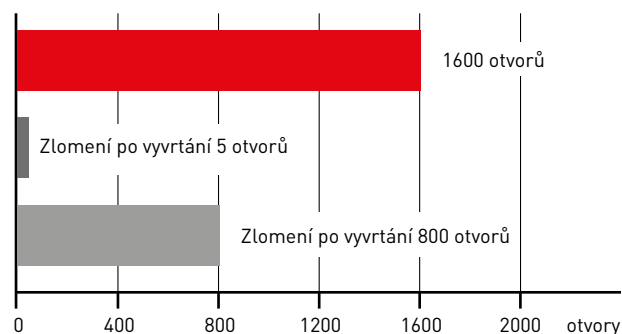


# ŘEZNÝ VÝKON

## VYHODNOCENÍ ŽIVOTNOSTI NÁSTROJE (VRTÁNÍ KOROZIVZDORNÉ OCELI)

- Vynikající odolnost vůči opotřebení a zlomení
- Dlouhá životnost nástroje

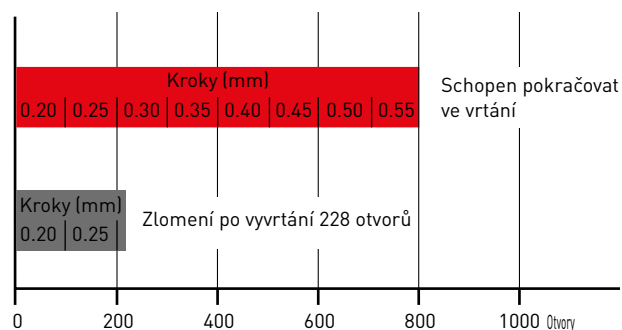
|                                 |                          |
|---------------------------------|--------------------------|
| Nástroj                         | MSE0050SB                |
| Obrobek                         | 17 240                   |
| Vc (m/min)                      | 9.4                      |
| n (min <sup>-1</sup> )          | 6.000                    |
| f (mm/ot.)                      | 0.015 (90 mm/min)        |
| Hloubka otvoru (mm) slepý otvor | 5.0                      |
| Kroky (mm)                      | 0.16                     |
| Řezná kapalina                  | Emulze rozpustná ve vodě |
| Stroj                           | Obráběcí centrum         |



## ODVOD TŘÍSEK (VRTÁNÍ HLINÍKOVÉ SLITINY)

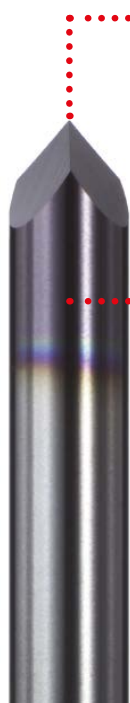
- Široký břit zabrání hromadění třísek
- Test stupňovitého vrtání: Zvýšená vzdálenost kroku o 0,05 mm na každých 100 otvorů

|                                 |                           |
|---------------------------------|---------------------------|
| Nástroj                         | MSE0050SB                 |
| Obrobek                         | Hliníkové slitiny 42 4222 |
| Vc (m/min)                      | 25                        |
| n (min <sup>-1</sup> )          | 16.000                    |
| f (mm/ot.)                      | 0.075 (1.200 mm/min)      |
| Hloubka otvoru (mm) slepý otvor | 5.0                       |
| Řezná kapalina                  | Emulze rozpustná ve vodě  |
| Stroj                           | Obráběcí centrum          |



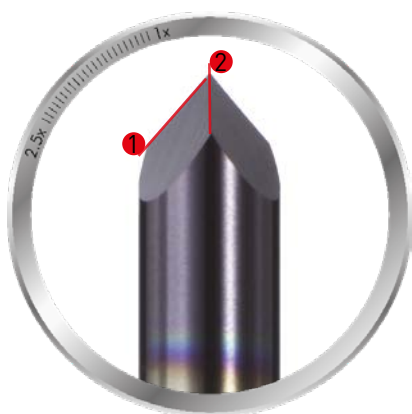
# MSE SPOT VRTÁK

## PRO BODOVÉ OBRÁBĚNÍ VODICÍHO OTVORU



Trojúhelníkový pyramidový tvar ideální pro bodové obrábění vysoká přesnost vodicích otvorů.

Povlak MIRACLE VP zajistí dlouhou životnost nástroje.



❶ Dvojitý účel, pro vrtání středových otvorů a obrábění 90° zkosení.

❷ Univerzální nástroj, vhodný pro vrtání velkého rozsahu otvorů od  $\varnothing 0.1$  do  $\varnothing 3.0$ .

# ŘEZNÝ VÝKON

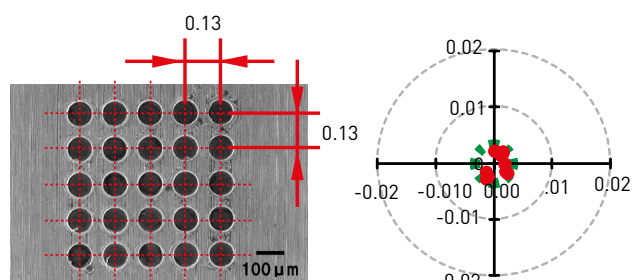
## POROVNÁNÍ PŘESNOSTI UMÍSTĚNÍ OTVORU

### Řezání vodicího otvoru

|                             |                          |
|-----------------------------|--------------------------|
| Nástroj                     | MSP0300SB                |
| Obrobek                     | 17 240                   |
| $n$ ( $\text{min}^{-1}$ )   | 10.000                   |
| $V_f$ (mm/min)              | 5.0                      |
| Průměr vodicího otvoru (mm) | 0.09                     |
| Řezná kapalina              | Emulze rozpustná ve vodě |

Maximální odlišnost 0.003 mm.

Dobrá přesnost rozteče.



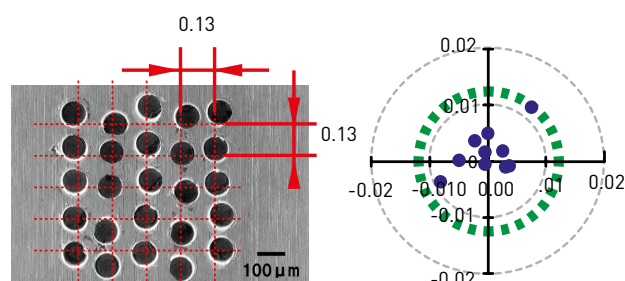
S vodicím otvorem

Odlišnost rozteče

### Vrtání

|                                 |                          |
|---------------------------------|--------------------------|
| Nástroj                         | MSE0010SB                |
| $V_c$ (m/min)                   | 3.1                      |
| $n$ ( $\text{min}^{-1}$ )       | 10.000                   |
| $f$ (mm/ot.)                    | 0.002                    |
| $V_f$ (mm/min)                  | 20                       |
| Hloubka otvoru (mm) slepý otvor | 0.8                      |
| Kroky (mm)                      | 0.01                     |
| Řezná kapalina                  | Emulze rozpustná ve vodě |

Vytvoření maximální odlišnosti 0.012 mm zapříčiní krátkou životnost nástroje.



Bez vodicího otvoru

Odlišnost rozteče

## STABILITA VRTÁNÍ

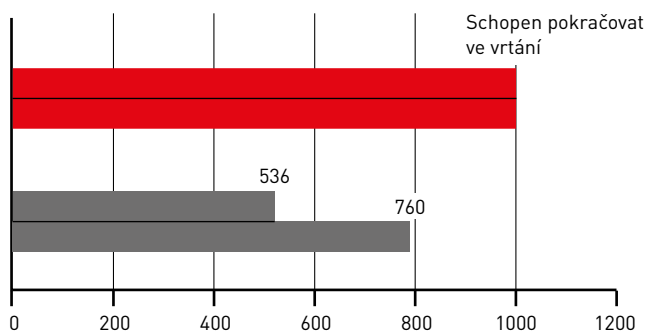
- Konzistentní počet vyvrtaných otvorů, poskytující stabilní výrobu.

### Vrtání

|                                 |                          |
|---------------------------------|--------------------------|
| Nástroj                         | MSE0020SB                |
| Obrobek                         | 17 240                   |
| $V_c$ (m/min)                   | 6.3                      |
| $n$ ( $\text{min}^{-1}$ )       | 10.000                   |
| $f$ (mm/ot.)                    | 0.002                    |
| $V_f$ (mm/min)                  | 20                       |
| Hloubka otvoru (mm) slepý otvor | 1.6                      |
| Kroky (mm)                      | 0.02                     |
| Řezná kapalina                  | Emulze rozpustná ve vodě |

### Řezání vodicího otvoru

|                             |                          |
|-----------------------------|--------------------------|
| Nástroj                     | MSP0300SB                |
| Obrobek                     | 17 240                   |
| $n$ ( $\text{min}^{-1}$ )   | 10.000                   |
| $V_f$ (mm/min)              | 5.0                      |
| Průměr vodicího otvoru (mm) | 0.15                     |
| Řezná kapalina              | Emulze rozpustná ve vodě |



Schopen pokračovat ve vrtání

■ : S předvrtaným otvorem ■ : Bez předvrtaného otvoru

# MSE



## MIKRO MONOLITNÍ VRTÁKY ZE SLINUTÉHO KARBIDU

P M K N S

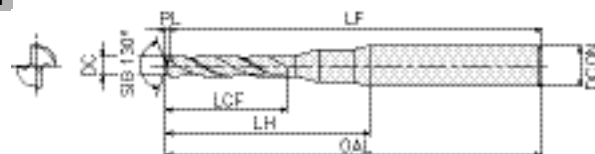

 $0.1 \leq DC \leq 0.99$ 

0  
- 0.009

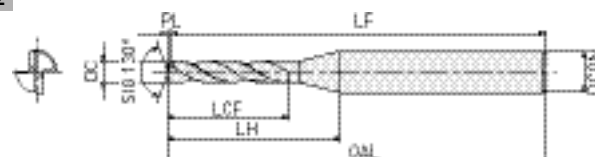

 $DCON = 3$ 

0  
- 0.006

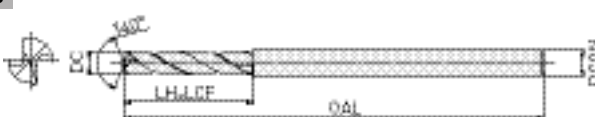
1



2



3



- Vrtáky MSE jsou vhodné pro tepelné upínání.

| Objednací kód | VP20MF | VP15TF | Ø    | LCF  | LH   | OAL   | LF | PL   | DCON | Typ |
|---------------|--------|--------|------|------|------|-------|----|------|------|-----|
| MSE0010SB     | ●      |        | 0.10 | 1.22 | 9.72 | 38.02 | 38 | 0.02 | 3    | 1   |
| MSE0011SB     | ●      |        | 0.11 | 1.23 | 9.73 | 38.03 | 38 | 0.03 | 3    | 1   |
| MSE0012SB     | ●      |        | 0.12 | 1.43 | 9.73 | 38.03 | 38 | 0.03 | 3    | 1   |
| MSE0013SB     | ●      |        | 0.13 | 1.43 | 9.73 | 38.03 | 38 | 0.03 | 3    | 1   |
| MSE0014SB     | ●      |        | 0.14 | 2.03 | 9.73 | 38.03 | 38 | 0.03 | 3    | 1   |
| MSE0015SB     | ●      |        | 0.15 | 2.03 | 9.73 | 38.03 | 38 | 0.03 | 3    | 1   |
| MSE0016SB     | ●      |        | 0.16 | 2.04 | 9.74 | 38.04 | 38 | 0.04 | 3    | 1   |
| MSE0017SB     | ●      |        | 0.17 | 2.04 | 9.74 | 38.04 | 38 | 0.04 | 3    | 1   |
| MSE0018SB     | ●      |        | 0.18 | 2.04 | 9.74 | 38.04 | 38 | 0.04 | 3    | 1   |
| MSE0019SB     | ●      |        | 0.19 | 2.04 | 9.74 | 38.04 | 38 | 0.04 | 3    | 1   |
| MSE0020SB     | ●      |        | 0.20 | 2.55 | 9.75 | 38.05 | 38 | 0.05 | 3    | 1   |
| MSE0021SB     | ●      |        | 0.21 | 2.55 | 9.75 | 38.05 | 38 | 0.05 | 3    | 1   |
| MSE0022SB     | ●      |        | 0.22 | 2.55 | 9.75 | 38.05 | 38 | 0.05 | 3    | 1   |
| MSE0023SB     | ●      |        | 0.23 | 2.55 | 9.75 | 38.05 | 38 | 0.05 | 3    | 1   |
| MSE0024SB     | ●      |        | 0.24 | 3.06 | 9.76 | 38.06 | 38 | 0.06 | 3    | 1   |
| MSE0025SB     | ●      |        | 0.25 | 3.06 | 9.76 | 38.06 | 38 | 0.06 | 3    | 1   |
| MSE0026SB     | ●      |        | 0.26 | 3.06 | 9.76 | 38.06 | 38 | 0.06 | 3    | 1   |
| MSE0027SB     | ●      |        | 0.27 | 3.06 | 9.76 | 38.06 | 38 | 0.06 | 3    | 1   |
| MSE0028SB     | ●      |        | 0.28 | 3.07 | 9.77 | 38.07 | 38 | 0.07 | 3    | 1   |
| MSE0029SB     | ●      |        | 0.29 | 3.07 | 9.77 | 38.07 | 38 | 0.07 | 3    | 1   |

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**MSE – MIKRO MONOLITNÍ VRTÁKY ZE SLINUTÉHO KARBIDU**

| Objednáací kód | VP20MF | VP15TF | Ø    | LCF  | LH    | OAL   | LF | PL   | DCON | Typ |
|----------------|--------|--------|------|------|-------|-------|----|------|------|-----|
| MSE0030SB      |        | ●      | 0.30 | 5.07 | 10.27 | 38.07 | 38 | 0.07 | 3    | 2   |
| MSE0031SB      |        | ●      | 0.31 | 5.07 | 10.27 | 38.07 | 38 | 0.07 | 3    | 2   |
| MSE0032SB      |        | ●      | 0.32 | 5.07 | 10.27 | 38.07 | 38 | 0.07 | 3    | 2   |
| MSE0033SB      |        | ●      | 0.33 | 5.08 | 10.28 | 38.08 | 38 | 0.08 | 3    | 2   |
| MSE0034SB      |        | ●      | 0.34 | 6.08 | 11.28 | 38.08 | 38 | 0.08 | 3    | 2   |
| MSE0035SB      |        | ●      | 0.35 | 6.08 | 11.18 | 38.08 | 38 | 0.08 | 3    | 2   |
| MSE0036SB      |        | ●      | 0.36 | 6.08 | 11.18 | 38.08 | 38 | 0.08 | 3    | 2   |
| MSE0037SB      |        | ●      | 0.37 | 6.09 | 11.19 | 38.09 | 38 | 0.09 | 3    | 2   |
| MSE0038SB      |        | ●      | 0.38 | 6.09 | 11.19 | 38.09 | 38 | 0.09 | 3    | 2   |
| MSE0039SB      |        | ●      | 0.39 | 6.09 | 11.19 | 38.09 | 38 | 0.09 | 3    | 2   |
| MSE0040SB      |        | ●      | 0.40 | 7.09 | 12.19 | 38.09 | 38 | 0.09 | 3    | 2   |
| MSE0041SB      |        | ●      | 0.41 | 7.10 | 12.10 | 38.10 | 38 | 0.10 | 3    | 2   |
| MSE0042SB      |        | ●      | 0.42 | 7.10 | 12.10 | 38.10 | 38 | 0.10 | 3    | 2   |
| MSE0043SB      |        | ●      | 0.43 | 7.10 | 12.10 | 38.10 | 38 | 0.10 | 3    | 2   |
| MSE0044SB      |        | ●      | 0.44 | 7.10 | 12.10 | 38.10 | 38 | 0.10 | 3    | 2   |
| MSE0045SB      |        | ●      | 0.45 | 7.10 | 12.10 | 38.10 | 38 | 0.10 | 3    | 2   |
| MSE0046SB      |        | ●      | 0.46 | 7.11 | 12.01 | 38.11 | 38 | 0.11 | 3    | 2   |
| MSE0047SB      |        | ●      | 0.47 | 7.11 | 12.01 | 38.11 | 38 | 0.11 | 3    | 2   |
| MSE0048SB      |        | ●      | 0.48 | 7.11 | 12.01 | 38.11 | 38 | 0.11 | 3    | 2   |
| MSE0049SB      |        | ●      | 0.49 | 7.11 | 12.01 | 38.11 | 38 | 0.11 | 3    | 2   |
| MSE0050SB      |        | ●      | 0.50 | 7.12 | 12.02 | 38.12 | 38 | 0.12 | 3    | 2   |
| MSE0051SB      |        | ●      | 0.51 | 7.12 | 11.92 | 38.12 | 38 | 0.12 | 3    | 2   |
| MSE0052SB      |        | ●      | 0.52 | 7.12 | 11.92 | 38.12 | 38 | 0.12 | 3    | 2   |
| MSE0053SB      |        | ●      | 0.53 | 7.12 | 11.92 | 38.12 | 38 | 0.12 | 3    | 2   |
| MSE0054SB      |        | ●      | 0.54 | 7.13 | 11.93 | 38.13 | 38 | 0.13 | 3    | 2   |
| MSE0055SB      |        | ●      | 0.55 | 7.13 | 11.93 | 38.13 | 38 | 0.13 | 3    | 2   |
| MSE0056SB      |        | ●      | 0.56 | 7.13 | 11.93 | 38.13 | 38 | 0.13 | 3    | 2   |
| MSE0057SB      |        | ●      | 0.57 | 7.13 | 11.83 | 38.13 | 38 | 0.13 | 3    | 2   |
| MSE0058SB      |        | ●      | 0.58 | 7.14 | 11.84 | 38.14 | 38 | 0.14 | 3    | 2   |
| MSE0059SB      |        | ●      | 0.59 | 7.14 | 11.84 | 38.14 | 38 | 0.14 | 3    | 2   |
| MSE0060SB      |        | ●      | 0.60 | 7.14 | 11.84 | 38.14 | 38 | 0.14 | 3    | 2   |
| MSE0061SB      |        | ●      | 0.61 | 7.14 | 11.84 | 38.14 | 38 | 0.14 | 3    | 2   |
| MSE0062SB      |        | ●      | 0.62 | 7.14 | 11.74 | 38.14 | 38 | 0.14 | 3    | 2   |
| MSE0063SB      |        | ●      | 0.63 | 7.15 | 11.75 | 38.15 | 38 | 0.15 | 3    | 2   |
| MSE0064SB      |        | ●      | 0.64 | 7.15 | 11.75 | 38.15 | 38 | 0.15 | 3    | 2   |
| MSE0065SB      |        | ●      | 0.65 | 7.15 | 11.75 | 38.15 | 38 | 0.15 | 3    | 2   |
| MSE0066SB      |        | ●      | 0.66 | 7.15 | 11.75 | 38.15 | 38 | 0.15 | 3    | 2   |
| MSE0067SB      |        | ●      | 0.67 | 7.16 | 11.66 | 38.16 | 38 | 0.16 | 3    | 2   |
| MSE0068SB      |        | ●      | 0.68 | 7.16 | 11.66 | 38.16 | 38 | 0.16 | 3    | 2   |
| MSE0069SB      |        | ●      | 0.69 | 7.16 | 11.66 | 38.16 | 38 | 0.16 | 3    | 2   |
| MSE0070SB      |        | ●      | 0.70 | 8.16 | 12.66 | 38.16 | 38 | 0.16 | 3    | 2   |
| MSE0071SB      |        | ●      | 0.71 | 8.17 | 12.67 | 38.17 | 38 | 0.17 | 3    | 2   |
| MSE0072SB      |        | ●      | 0.72 | 8.17 | 12.67 | 38.17 | 38 | 0.17 | 3    | 2   |
| MSE0073SB      |        | ●      | 0.73 | 8.17 | 12.57 | 38.17 | 38 | 0.17 | 3    | 2   |
| MSE0074SB      |        | ●      | 0.74 | 8.17 | 12.57 | 38.17 | 38 | 0.17 | 3    | 2   |
| MSE0075SB      |        | ●      | 0.75 | 8.17 | 12.57 | 38.17 | 38 | 0.17 | 3    | 2   |
| MSE0076SB      |        | ●      | 0.76 | 8.18 | 12.58 | 38.18 | 38 | 0.18 | 3    | 2   |
| MSE0077SB      |        | ●      | 0.77 | 8.18 | 12.58 | 38.18 | 38 | 0.18 | 3    | 2   |
| MSE0078SB      |        | ●      | 0.78 | 8.18 | 12.48 | 38.18 | 38 | 0.18 | 3    | 2   |
| MSE0079SB      |        | ●      | 0.79 | 8.18 | 12.48 | 38.18 | 38 | 0.18 | 3    | 2   |

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## MSE – MIKRO MONOLITNÍ VRTÁKY ZE SLINUTÉHO KARBIDU

| Objednací kód | VP20MF | VP15TF | Ø    | LCF   | LH    | OAL   | LF | PL   | DCON | Typ |
|---------------|--------|--------|------|-------|-------|-------|----|------|------|-----|
| MSE0080SB     |        | ●      | 0.80 | 10.19 | 14.49 | 38.19 | 38 | 0.19 | 3    | 2   |
| MSE0081SB     |        | ●      | 0.81 | 10.19 | 14.49 | 38.19 | 38 | 0.19 | 3    | 2   |
| MSE0082SB     |        | ●      | 0.82 | 10.19 | 14.49 | 38.19 | 38 | 0.19 | 3    | 2   |
| MSE0083SB     |        | ●      | 0.83 | 10.19 | 14.49 | 38.19 | 38 | 0.19 | 3    | 2   |
| MSE0084SB     |        | ●      | 0.84 | 10.20 | 14.40 | 38.20 | 38 | 0.20 | 3    | 2   |
| MSE0085SB     |        | ●      | 0.85 | 10.20 | 14.40 | 38.20 | 38 | 0.20 | 3    | 2   |
| MSE0086SB     |        | ●      | 0.86 | 10.20 | 14.40 | 38.20 | 38 | 0.20 | 3    | 2   |
| MSE0087SB     |        | ●      | 0.87 | 10.20 | 14.40 | 38.20 | 38 | 0.20 | 3    | 2   |
| MSE0088SB     |        | ●      | 0.88 | 10.21 | 14.41 | 38.21 | 38 | 0.21 | 3    | 2   |
| MSE0089SB     |        | ●      | 0.89 | 10.21 | 14.31 | 38.21 | 38 | 0.21 | 3    | 2   |
| MSE0090SB     |        | ●      | 0.90 | 10.21 | 14.31 | 38.21 | 38 | 0.21 | 3    | 2   |
| MSE0091SB     |        | ●      | 0.91 | 10.21 | 14.31 | 38.21 | 38 | 0.21 | 3    | 2   |
| MSE0092SB     |        | ●      | 0.92 | 10.21 | 14.31 | 38.21 | 38 | 0.21 | 3    | 2   |
| MSE0093SB     |        | ●      | 0.93 | 10.22 | 14.32 | 38.22 | 38 | 0.22 | 3    | 2   |
| MSE0094SB     |        | ●      | 0.94 | 10.22 | 14.22 | 38.22 | 38 | 0.22 | 3    | 2   |
| MSE0095SB     |        | ●      | 0.95 | 10.22 | 14.22 | 38.22 | 38 | 0.22 | 3    | 2   |
| MSE0096SB     |        | ●      | 0.96 | 10.22 | 14.22 | 38.22 | 38 | 0.22 | 3    | 2   |
| MSE0097SB     |        | ●      | 0.97 | 10.23 | 14.23 | 38.23 | 38 | 0.23 | 3    | 2   |
| MSE0098SB     |        | ●      | 0.98 | 10.23 | 14.23 | 38.23 | 38 | 0.23 | 3    | 2   |
| MSE0099SB     |        | ●      | 0.99 | 10.23 | 14.23 | 38.23 | 38 | 0.23 | 3    | 2   |

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Pro jakékoli speciální sorty a geometrie jiné než naše standardní produkty, např. jiné průměry nebo délky, použijte kontaktní údaje evropských prodejných společností Mitsubishi Materials na zadní straně této brožury.



# MSE SPOT VRTÁK

## PRO OBRÁBĚNÍ VODICÍCH OTVORŮ



| Objednací kód | VP15TF | LCF | DC | OAL | DCON | Rozsah průměru (mm) |
|---------------|--------|-----|----|-----|------|---------------------|
| MSP0300SB     | ●      | 1.5 | 3  | 38  | 3    | 0.1–3.0             |

Pro jakékoli speciální sorty a geometrie jiné než naše standardní produkty, např. jiné průměry nebo délky, použijte kontaktní údaje evropských prodejných společností Mitsubishi Materials na zadní straně této brožury.



# MSE

## DOPORUČENÉ ŘEZNÉ PODMÍNKY

| Obráběný materiál                               | DC   | Vc | n     | f                     | Vf  | Krok |
|-------------------------------------------------|------|----|-------|-----------------------|-----|------|
| Nízkouhlíková ocel (≤180HB)                     | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.2  | 13 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.25 | 16 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.32 | 20 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.4  | 25 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.5  | 31 | 20000 | 0.006 [0.005 – 0.007] | 120 | 0.1  |
|                                                 | 0.63 | 40 | 20000 | 0.008 [0.006 – 0.01 ] | 160 | 0.1  |
|                                                 | 0.8  | 50 | 20000 | 0.02 [0.015 – 0.025]  | 400 | 0.3  |
| Nelegovaná ocel,<br>Legovaná ocel (180 – 280HB) | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.2  | 13 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.25 | 16 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.32 | 20 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.4  | 25 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.5  | 31 | 20000 | 0.006 [0.005 – 0.007] | 120 | 0.1  |
|                                                 | 0.63 | 40 | 20000 | 0.008 [0.006 – 0.01 ] | 160 | 0.1  |
|                                                 | 0.8  | 50 | 20000 | 0.015 [0.012 – 0.018] | 300 | 0.3  |
| Nelegovaná ocel,<br>Legovaná ocel (280 – 350HB) | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.2  | 13 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.25 | 16 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.32 | 20 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.4  | 25 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.5  | 31 | 20000 | 0.006 [0.005 – 0.007] | 120 | 0.1  |
|                                                 | 0.63 | 40 | 20000 | 0.008 [0.006 – 0.01 ] | 160 | 0.1  |
|                                                 | 0.8  | 50 | 20000 | 0.015 [0.012 – 0.018] | 300 | 0.3  |
| Kalená a popouštěná ocel<br>(35 – 45HRC)        | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003] | 40  | 0.02 |
|                                                 | 0.2  | 13 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.25 | 16 | 20000 | 0.003 [0.002 – 0.004] | 60  | 0.04 |
|                                                 | 0.32 | 20 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.4  | 25 | 20000 | 0.004 [0.003 – 0.005] | 80  | 0.05 |
|                                                 | 0.5  | 31 | 20000 | 0.006 [0.005 – 0.007] | 120 | 0.1  |
|                                                 | 0.63 | 40 | 20000 | 0.008 [0.006 – 0.01 ] | 160 | 0.1  |
|                                                 | 0.8  | 50 | 20000 | 0.015 [0.012 – 0.018] | 300 | 0.3  |
|                                                 | 0.99 | 62 | 20000 | 0.02 [0.015 – 0.025]  | 400 | 0.3  |

## MSE

| Obráběný materiál |                                           | DC   | Vc | n     | f                      | Vf   | Krok |
|-------------------|-------------------------------------------|------|----|-------|------------------------|------|------|
| M                 | Austenitické korozivzdorné oceli (≤200HB) | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.2  | 11 | 18000 | 0.003 [0.002 – 0.004]  | 54   | 0.04 |
|                   |                                           | 0.25 | 14 | 18000 | 0.003 [0.002 – 0.004]  | 54   | 0.04 |
|                   |                                           | 0.32 | 15 | 15000 | 0.004 [0.003 – 0.005]  | 60   | 0.05 |
|                   |                                           | 0.4  | 19 | 15000 | 0.004 [0.003 – 0.005]  | 60   | 0.05 |
|                   |                                           | 0.5  | 16 | 10000 | 0.006 [0.005 – 0.007]  | 60   | 0.1  |
|                   |                                           | 0.63 | 20 | 10000 | 0.008 [0.006 – 0.01 ]  | 80   | 0.1  |
|                   |                                           | 0.8  | 15 | 6000  | 0.015 [0.012 – 0.018]  | 90   | 0.2  |
| K                 | Šedá litina (≤350MPa)                     | 0.99 | 19 | 6000  | 0.02 [0.015 – 0.025]   | 120  | 0.2  |
|                   |                                           | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.12 | 8  | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.16 | 10 | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.02 |
|                   |                                           | 0.2  | 13 | 20000 | 0.003 [0.002 – 0.004]  | 60   | 0.04 |
|                   |                                           | 0.25 | 16 | 20000 | 0.003 [0.002 – 0.004]  | 60   | 0.04 |
|                   |                                           | 0.32 | 20 | 20000 | 0.004 [0.003 – 0.005]  | 80   | 0.05 |
|                   |                                           | 0.4  | 25 | 20000 | 0.004 [0.003 – 0.005]  | 80   | 0.05 |
|                   |                                           | 0.5  | 31 | 20000 | 0.006 [0.005 – 0.007]  | 120  | 0.1  |
|                   |                                           | 0.63 | 40 | 20000 | 0.008 [0.006 – 0.01 ]  | 160  | 0.1  |
| N                 | Hliníkové slitiny (Si<5%)                 | 0.8  | 50 | 20000 | 0.02 [0.015 – 0.025]   | 400  | 0.3  |
|                   |                                           | 0.99 | 62 | 20000 | 0.04 [0.03 – 0.05 ]    | 800  | 0.3  |
|                   |                                           | 0.1  | 6  | 20000 | 0.002 [0.001 – 0.003]  | 40   | 0.05 |
|                   |                                           | 0.12 | 8  | 20000 | 0.003 [0.002 – 0.004]  | 60   | 0.05 |
|                   |                                           | 0.16 | 10 | 20000 | 0.004 [0.003 – 0.005]  | 80   | 0.05 |
|                   |                                           | 0.2  | 13 | 20000 | 0.006 [0.005 – 0.007]  | 120  | 0.1  |
|                   |                                           | 0.25 | 16 | 20000 | 0.008 [0.006 – 0.01 ]  | 160  | 0.1  |
|                   |                                           | 0.32 | 20 | 20000 | 0.01 [0.008 – 0.012]   | 200  | 0.3  |
|                   |                                           | 0.4  | 25 | 20000 | 0.02 [0.015 – 0.025]   | 400  | 0.3  |
|                   |                                           | 0.5  | 31 | 20000 | 0.03 [0.025 – 0.035]   | 600  | 0.5  |
| S                 | Žáruvzdorné slitiny                       | 0.63 | 40 | 20000 | 0.04 [0.035 – 0.045]   | 800  | 0.5  |
|                   |                                           | 0.8  | 50 | 20000 | 0.05 [0.045 – 0.055]   | 1000 | 0.8  |
|                   |                                           | 0.99 | 62 | 20000 | 0.06 [0.055 – 0.065]   | 1200 | 0.8  |
|                   |                                           | 0.1  | 2  | 7000  | 0.001 [0.0005 – 0.001] | 7    | 0.02 |
|                   |                                           | 0.12 | 3  | 7000  | 0.001 [0.0005 – 0.001] | 7    | 0.02 |
|                   |                                           | 0.16 | 4  | 7000  | 0.001 [0.0005 – 0.001] | 7    | 0.02 |
|                   |                                           | 0.2  | 3  | 5000  | 0.002 [0.001 – 0.002]  | 10   | 0.04 |
|                   |                                           | 0.25 | 4  | 5000  | 0.002 [0.001 – 0.002]  | 10   | 0.04 |
|                   |                                           | 0.32 | 4  | 4000  | 0.002 [0.001 – 0.002]  | 8    | 0.05 |
|                   |                                           | 0.4  | 5  | 4000  | 0.002 [0.001 – 0.002]  | 8    | 0.05 |
|                   |                                           | 0.5  | 5  | 3000  | 0.003 [0.001 – 0.003]  | 9    | 0.1  |
|                   |                                           | 0.63 | 6  | 3000  | 0.004 [0.002 – 0.004]  | 12   | 0.1  |
|                   |                                           | 0.8  | 5  | 1800  | 0.006 [0.004 – 0.006]  | 10.8 | 0.2  |
|                   |                                           | 0.99 | 6  | 1800  | 0.01 [0.008 – 0.01 ]   | 18   | 0.2  |
|                   |                                           |      |    |       |                        |      |      |

2/2

Doporučuje se použití bodových vrtáků.

Změňte řezné podmínky podle obráběcího stroje a tuhosti obrobku.

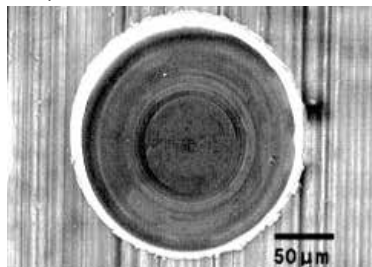
Při vrtání za výše uvedených řezných podmínek je doporučeno použití emulzní řezné kapaliny (s koncentrací 5 %).

Při použití řezných olejů nebo mlhy snižte otáčky.

# MSE

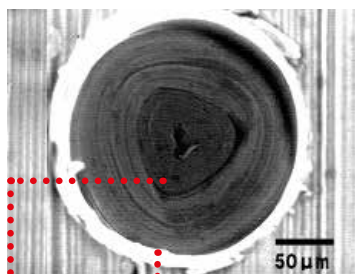
Kombinované použití MSE vrtáku a bodového vrtáku zvyšuje přesnost.

Při použití bodového vrtáku



Vrtá vysoce přesný otvor

Bez vodicího otvoru



Velký otřep

Spodní část otvoru je nerovná, protože vrták se vychyloval.

Obrábění vodicího otvoru

|                             |                          |
|-----------------------------|--------------------------|
| Nástroj                     | MSP0300SB                |
| Průměr vodicího otvoru (mm) | 0.15                     |
| $n$ ( $\text{min}^{-1}$ )   | 10.000                   |
| $V_f$ (mm/min)              | 5.0                      |
| Řezná kapalina              | Emulze rozpustná ve vodě |

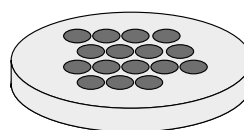
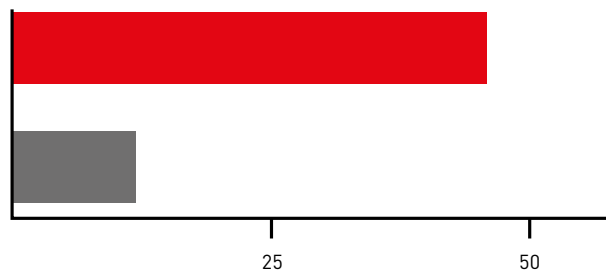
Vrtání

|                                 |                          |
|---------------------------------|--------------------------|
| Nástroj                         | MSE0020SB                |
| $V_c$ (m/min)                   | 6.3                      |
| $n$ ( $\text{min}^{-1}$ )       | 10.000                   |
| $f$ (mm/ot.)                    | 0.002                    |
| $V_f$ (mm/min)                  | 20                       |
| Hloubka otvoru (mm) slepý otvor | 0.3                      |
| Kroky (mm)                      | 0.02                     |
| Řezná kapalina                  | Emulze rozpustná ve vodě |

# PŘÍKLAD POUŽITÍ

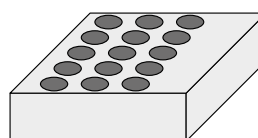
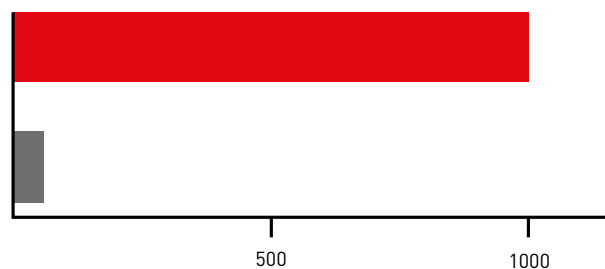
## ŽÁRUVZDORNÁ SLITINA (INCONEL®718)

|                        |                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------|
| Nástroj                | MSE0050SB                                                                                      |
| Komponent              | Testovací kus                                                                                  |
| Vc (m/min)             | 4.7                                                                                            |
| n (min <sup>-1</sup> ) | 3.000                                                                                          |
| f (mm/ot.)             | 0.005                                                                                          |
| Vf (mm/min)            | 15                                                                                             |
| Kroky (mm)             | 0.1                                                                                            |
| Řezná kapalina         | Ólej rozpustný ve vodě                                                                         |
| Stroj                  | Obráběcí centrum                                                                               |
| Výsledky               | Konkurenční produkt se zlomil po vyvrtání 15 otvorů. MSE vrták mohl úspěšně vyvrtat 47 otvorů. |



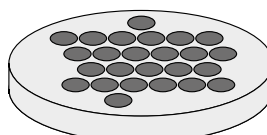
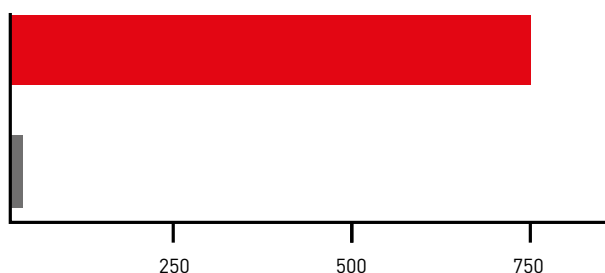
## KALENÁ A POPOUŠTĚNÁ OCEL (45HRC)

|                        |                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------|
| Nástroj                | MSE0050SB                                                                                                      |
| Komponent              | Deska                                                                                                          |
| Vc (m/min)             | 24                                                                                                             |
| n (min <sup>-1</sup> ) | 15.000                                                                                                         |
| f (mm/ot.)             | 0.01                                                                                                           |
| Vf (mm/min)            | 150                                                                                                            |
| Kroky (mm)             | 0.1                                                                                                            |
| Řezná kapalina         | Mlha                                                                                                           |
| Stroj                  | Obráběcí centrum                                                                                               |
| Výsledky               | Konkurenční produkt se zlomil po 13 otvorech. MSE vrták vyvrtal 100 otvorů a byl schopen pokračovat ve vrtání. |



## HLINÍKOVÁ SLITINA (ČSN 42 4222)

|                        |                                                                                                                                                              |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nástroj                | MSE0100SB                                                                                                                                                    |
| Komponent              | Deska                                                                                                                                                        |
| Vc (m/min)             | 80                                                                                                                                                           |
| n (min <sup>-1</sup> ) | 25.000                                                                                                                                                       |
| f (mm/ot.)             | 0.08                                                                                                                                                         |
| Vf (mm/min)            | 2.000                                                                                                                                                        |
| Kroky (mm)             | 1.0                                                                                                                                                          |
| Řezná kapalina         | Ólej rozpustný ve vodě                                                                                                                                       |
| Stroj                  | Obráběcí centrum                                                                                                                                             |
| Výsledky               | Konkurenční produkt se zlomil po vyvrtání jednoho otvoru kvůli hromadění třísek. MSE vrták byl schopen stabilního vrtání dokonce při použití dlouhých kroků. |



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