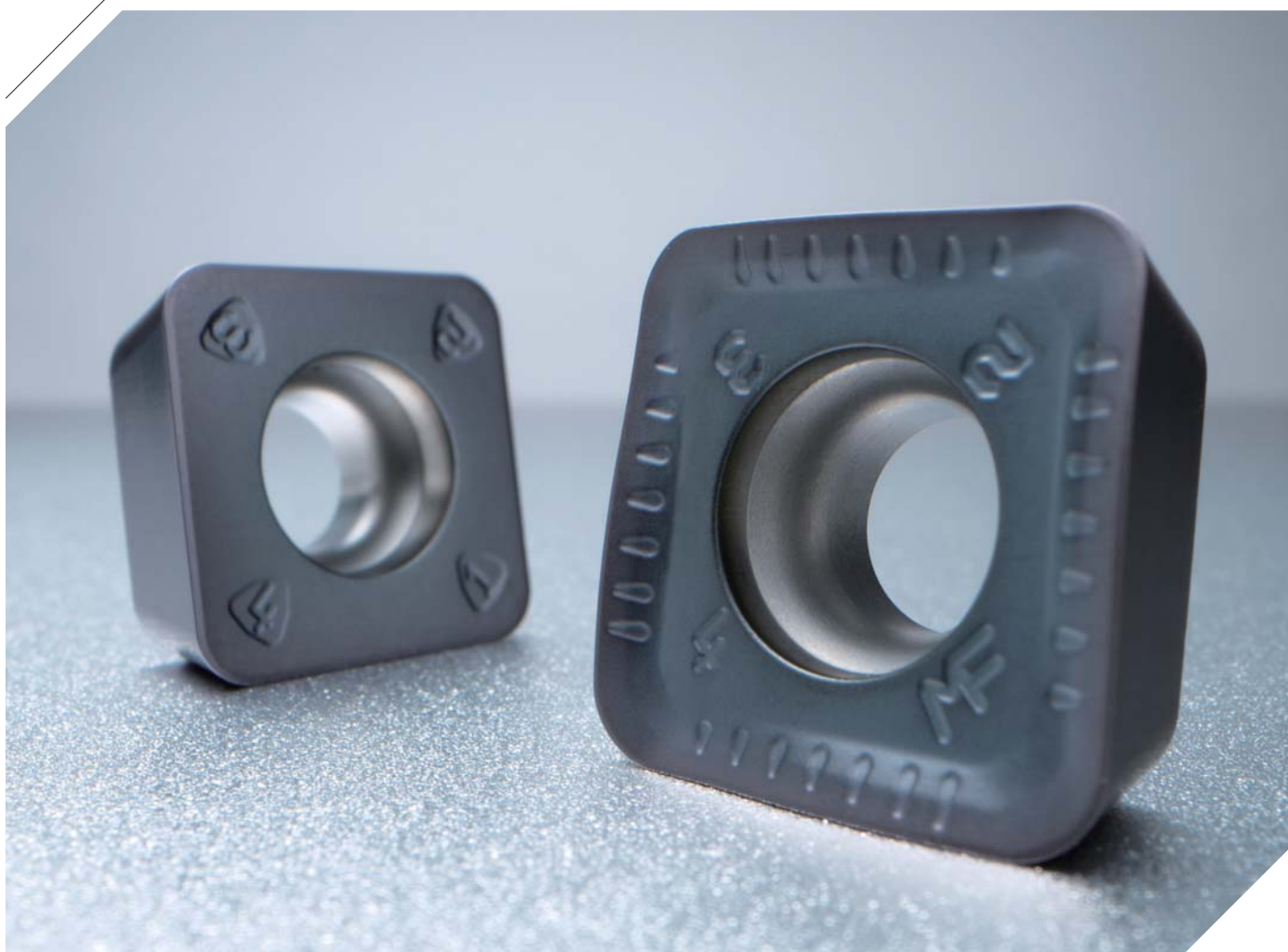


# HQM

## High feed sQuare Milling

- Stable and high efficient cutting due to the design with high rigidity of 4 planar corners
- High speed and high feed cutting from the optimal rake angle and high helix cutting edge



# HQM

High-feed machining is a highly efficient processing method that removes workpieces quickly by reducing chip thickness, and it has recently gained significant attention. However, this method also presents several challenges.

First of all, it shortens tool life due to high cutting resistance. The rapid feed rates in high-feed machining lead to increase in cutting resistance which can easily cause insert fracture. This becomes problematic when machining difficult-to-cut materials used in the aerospace and power generation industries. In addition, the chip management is challenging in high-feed machining. Volume of chips removed at once is significant, it disturbs proper chip evacuation and damages both the tool and the workpiece, resulting in reduced surface finish and tool life.

To address these issues and maximize the effectiveness of high-feed machining, KORLOY has launched the HQM.

The **HQM** features an optimized helical structure in its insert design and a high-rigidity clamping system which reduces cutting resistance during high-feed cutting and ramping operations, preventing insert fracture and maintaining stable tool life. Furthermore, the positive geometry and chip breaker design enable efficient chip management, protecting both the insert and the workpiece from damage, thereby extends tool life and ensures a clean surface finish. Additionally, the increased insert thickness and the application of large screws in the high-rigidity clamping system, along with a dimpled surface structure that effectively controls heat generated during machining, allow for over a 20% increase in feed rate compared to conventional high-feed machining, enhancing productivity.

The HQM provides excellent tool life by suppressing edge wear during machining and improves wear resistance through its geometric features and customized coatings tailored to the workpiece.

## » Stable and high feed cutting

- high rigidity helix structure

## » Good chip control

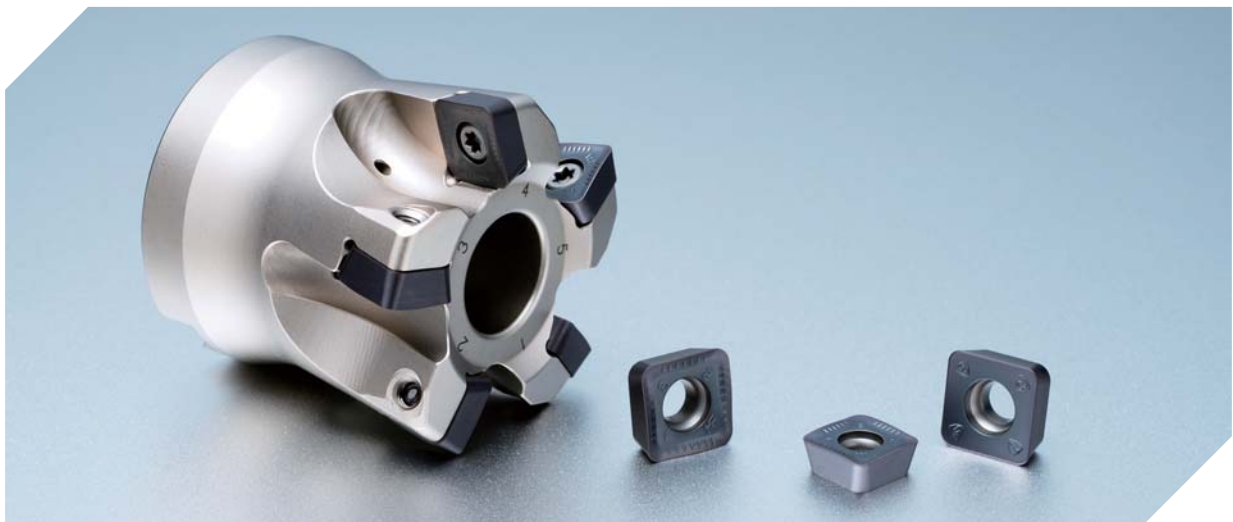
- Positive shape and sharp chip breaker

## » Higher productivity (increased more than 20% of existing tools' performance)

- High rigidity clamping system

## » Effective controlling cutting heat

- The dimple shape of the insert rake surface



## Code system

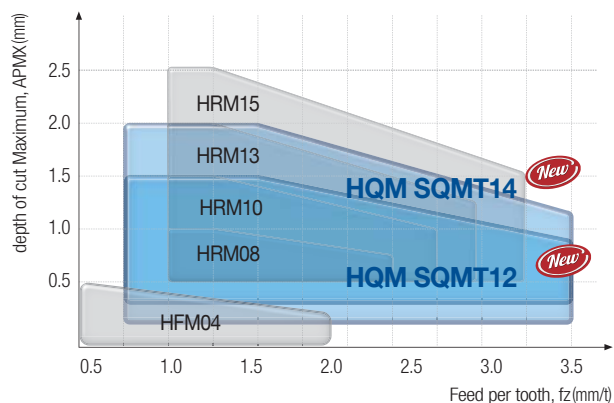
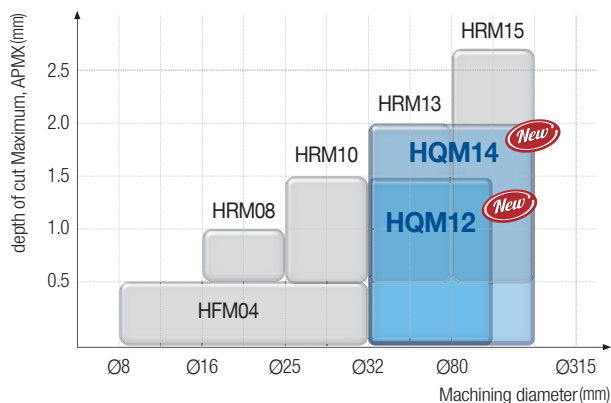
### Cutter type

| HQM                         | C                 | M                                           | 063                              | R                                                                                       | - | 22                             | - | 6                          | - | SQ14                                             |
|-----------------------------|-------------------|---------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------|---|--------------------------------|---|----------------------------|---|--------------------------------------------------|
| High feed<br>sQuare Milling | Type<br>C: Cutter | Arbor<br>M: Metric<br>A: Inch<br>None: Asia | Machining diameter<br>063: Ø63mm | Oil hole & hand<br>R: With oil hole, Right-handed<br>NR: Without oil hole, Right-handed |   | Internal diameter<br>22: Ø22mm |   | No. of tooth<br>6: 6 teeth |   | Available insert<br>SQ12: SQMT12<br>SQ14: SQMT14 |

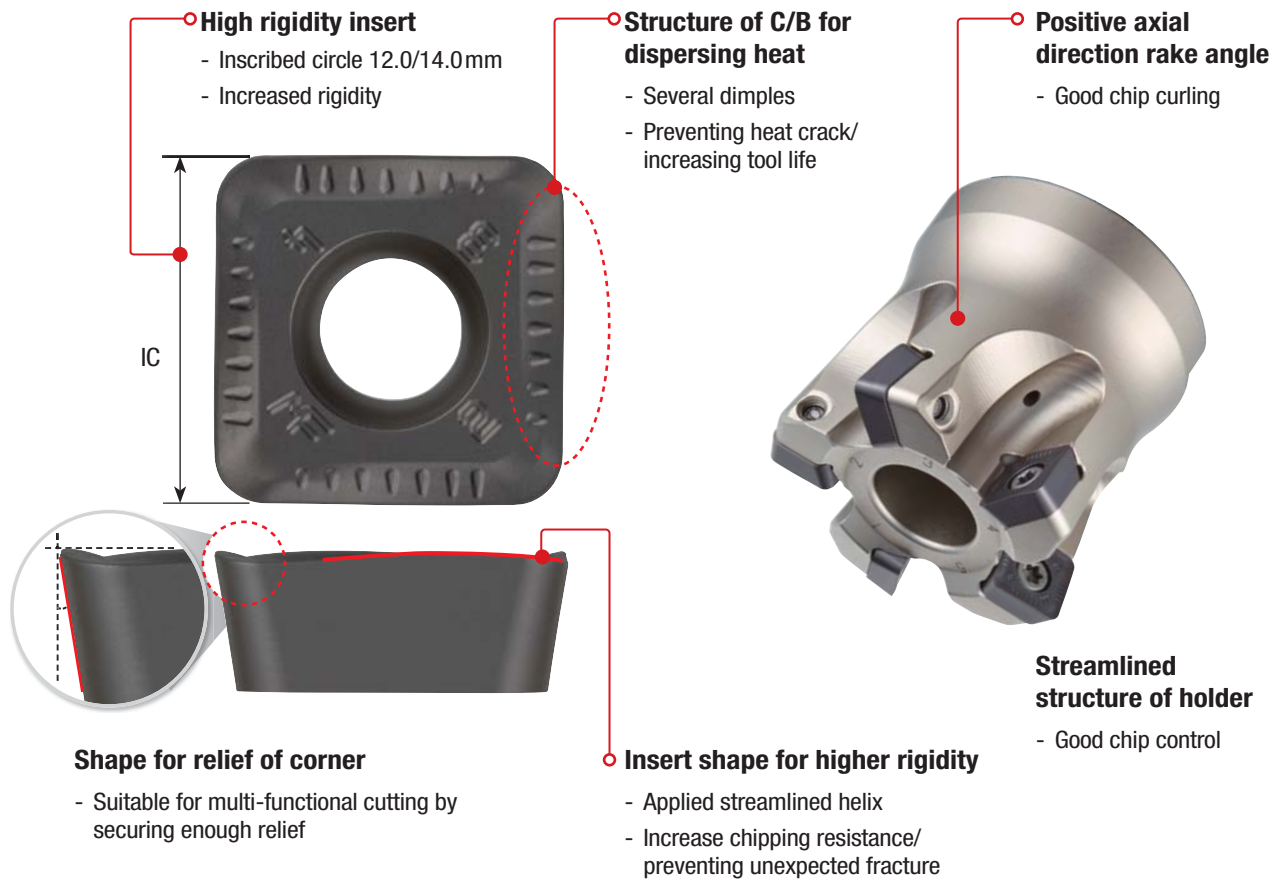
### Shank type

| HQM                         | S                | 032                              | R                                                                                       | - | 3                          | W                                         | 32                          | - | 150                          | - | SQ14                                             |
|-----------------------------|------------------|----------------------------------|-----------------------------------------------------------------------------------------|---|----------------------------|-------------------------------------------|-----------------------------|---|------------------------------|---|--------------------------------------------------|
| High feed<br>sQuare Milling | Type<br>S: Shank | Machining diameter<br>032: Ø32mm | Oil hole & hand<br>R: With oil hole, Right-handed<br>NR: Without oil hole, Right-handed |   | No. of tooth<br>3: 3 teeth | Shank type<br>W: Weldon<br>C: Cylindrical | Shank diameter<br>32: Ø32mm |   | Overall length<br>150: 150mm |   | Available insert<br>SQ12: SQMT12<br>SQ14: SQMT14 |

## Application range



## Feature



## Application and features of chip breakers

| Chip breaker | Cutting edge                                                                        | Application               | Feature                                                                                                                                               |
|--------------|-------------------------------------------------------------------------------------|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| ML           |  | For HRSA and Titanium     | Guarantees high quality of performance from applying suitable for low cutting resistance chip breaker for HRSA cutting and high hardness cutting edge |
| MF           |  | For finishing             | Optimal for finishing due to low cutting load and low resistance chip breaker                                                                         |
| MM           |  | For general cutting       | Suitable for general cutting range from design structure for general high feed cutting                                                                |
| None         |  | For high hardness cutting | Good for high hardness die steel due to shape of strong cutting edge                                                                                  |

## Recommended grade and cutting edge

| Designation                              | Recommended insert and grade for different workpieces (●: 1 <sup>st</sup> recommendation) |                      |              |                      |              |                      |              |                                  |        |                      |
|------------------------------------------|-------------------------------------------------------------------------------------------|----------------------|--------------|----------------------|--------------|----------------------|--------------|----------------------------------|--------|----------------------|
|                                          | P                                                                                         |                      | M            |                      | K            |                      | S            |                                  | H      |                      |
|                                          | C/B                                                                                       | Grade                | C/B          | Grade                | C/B          | Grade                | C/B          | Grade                            | C/B    | Grade                |
| <b>SQMT120516R</b><br><b>SQMT140620R</b> | ● MM<br>○ MF<br>○ ML                                                                      | ● PC3700<br>○ PC5300 | ● ML<br>○ MF | ● PC9540<br>○ PC5300 | ● MF<br>○ MM | ● PC6100<br>○ PC5300 | ● ML<br>○ MF | ● UNC840<br>○ UPC845<br>○ PC5300 | ○ MM   | ○ PC2510<br>○ PC2505 |
| <b>SQMW120516</b><br><b>SQMW140520</b>   | ○ None                                                                                    | ○ PC5300             | -            | -                    | -            | -                    | -            | -                                | ● None | ● PC2510<br>○ PC2505 |

## Recommended cutting conditions \_ SQ12

| Workpiece |                                      |                |             | Specific cutting force (N/mm <sup>2</sup> ) | Brinell hardness (HB) | Grade      | C/B       |     | Grade      | C/B       |     | MM, MF    |
|-----------|--------------------------------------|----------------|-------------|---------------------------------------------|-----------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO       | Workpiece material                   | KS             | ISO         |                                             |                       | PC3700     | MM        | MF  | PC5300     | MM        | MF  | APMX (mm) |
|           |                                      |                |             |                                             |                       | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     |           |
| P         | Non-ferrous alloy steel<br>Mn < 1.65 | SM25C          | C25         | 1500                                        | 125                   | 230        | 1.8       | 2.0 | 210        | 1.8       | 2.0 | ≥ 1.5     |
|           |                                      |                |             |                                             |                       | 305        | 1.4       | 1.5 | 280        | 1.4       | 1.5 |           |
|           |                                      |                |             |                                             |                       | 380        | 0.9       | 1.0 | 350        | 0.9       | 1.0 |           |
|           |                                      | SM45C          | C45         | 1700                                        | 190                   | 210        | 1.4       | 1.5 | 190        | 1.4       | 1.5 |           |
|           |                                      |                |             |                                             |                       | 280        | 0.9       | 1.0 | 255        | 0.9       | 1.0 |           |
|           |                                      |                |             |                                             |                       | 350        | 0.5       | 0.6 | 320        | 0.5       | 0.6 |           |
|           | Low alloy steel<br>≤ 5%              | SCM440         | 42CrMo4     | 1700                                        | 175                   | 160        | 1.6       | 1.8 | 150        | 1.6       | 1.8 |           |
|           |                                      |                |             |                                             |                       | 215        | 1.4       | 1.5 | 195        | 1.4       | 1.5 |           |
|           |                                      |                |             |                                             |                       | 270        | 0.9       | 1.0 | 240        | 0.9       | 1.0 |           |
|           | High alloy steel<br>> 5%             | STD11<br>STD61 | X40CrMoV5-1 | 1950                                        | 200                   | 120        | 0.9       | 1.0 | 110        | 0.9       | 1.0 |           |
|           |                                      |                |             |                                             |                       | 160        | 0.7       | 0.8 | 150        | 0.7       | 0.8 |           |
|           |                                      |                |             |                                             |                       | 200        | 0.4       | 0.4 | 190        | 0.4       | 0.4 |           |

| Workpiece |                          |                  |                                                               | Specific cutting force (N/mm²) | Brinell hardness (HB) | Grade      | C/B       |     | Grade      | C/B       |     | ML, MF    |
|-----------|--------------------------|------------------|---------------------------------------------------------------|--------------------------------|-----------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO       | Workpiece material       | KS               | ISO                                                           |                                |                       | PC9540     | ML        | MF  | PC5300     | ML        | MF  |           |
|           |                          |                  |                                                               |                                |                       | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| M         | Ferritic/<br>martensitic | STS405<br>STS430 | X6CrAl13<br>X6Cr17                                            | 1800                           | 200                   | 100        | 1.4       | 1.6 | 130        | 1.4       | 1.6 | ≥ 1.5     |
|           |                          |                  |                                                               |                                |                       | 135        | 0.9       | 1.0 | 170        | 0.9       | 1.0 |           |
|           |                          |                  |                                                               |                                |                       | 170        | 0.4       | 0.5 | 210        | 0.4       | 0.5 |           |
|           |                          | STS416<br>STS434 | X12CrS13<br>X6CrMo17-1                                        | 2850                           | 330                   | 100        | 1.4       | 1.6 | 130        | 1.4       | 1.6 |           |
|           |                          |                  |                                                               |                                |                       | 135        | 0.9       | 1.0 | 170        | 0.9       | 1.0 |           |
|           |                          |                  |                                                               |                                |                       | 170        | 0.4       | 0.5 | 210        | 0.4       | 0.5 |           |
|           |                          | STS403<br>STS410 | X12Cr13                                                       | 2350                           | 330                   | 100        | 1.4       | 1.6 | 130        | 1.4       | 1.6 |           |
|           |                          |                  |                                                               |                                |                       | 135        | 0.9       | 1.0 | 170        | 0.9       | 1.0 |           |
|           |                          |                  |                                                               |                                |                       | 170        | 0.4       | 0.5 | 210        | 0.4       | 0.5 |           |
|           | Austenitic               | STS304<br>STS316 | X5CrNi18-9<br>X2CrNi18-9<br>X5CrNiMo17-12-2<br>XCrNiMo17-12-3 | 2000                           | 180                   | 80         | 1.4       | 1.6 | 105        | 1.4       | 1.6 |           |
|           |                          |                  |                                                               |                                |                       | 110        | 0.9       | 1.0 | 140        | 0.9       | 1.0 |           |
|           |                          |                  |                                                               |                                |                       | 140        | 0.4       | 0.5 | 175        | 0.4       | 0.5 |           |
|           | Austenitic/<br>ferritic  | -                | -                                                             | 2450                           | 260                   | 65         | 1.4       | 1.6 | 80         | 1.4       | 1.6 |           |
|           |                          |                  |                                                               |                                |                       | 85         | 0.9       | 1.0 | 110        | 0.9       | 1.0 |           |
|           |                          |                  |                                                               |                                |                       | 105        | 0.45      | 0.5 | 140        | 0.45      | 0.5 |           |

## ✓ Recommended cutting conditions \_ SQ12

| Workpiece |                            |        |       | Specific cutting force (N/mm²) | Brinell hardness (HB) | Grade      | C/B       |     | Grade      | C/B       |     | MM, MF    |
|-----------|----------------------------|--------|-------|--------------------------------|-----------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO       | Workpiece material         | KS     | ISO   |                                |                       | PC6100     | MF        | MM  | PC5300     | MF        | MM  |           |
|           |                            |        |       |                                |                       | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| K         | Gray cast iron             | GC200  | 200   | 900                            | 180                   | 180        | 1.8       | 2.0 | 140        | 1.8       | 2.0 | ≥ 1.5     |
|           |                            |        |       |                                |                       | 240        | 0.9       | 1.0 | 190        | 0.9       | 1.0 |           |
|           |                            |        |       |                                |                       | 300        | 0.45      | 0.5 | 240        | 0.45      | 0.5 |           |
|           | Nodular graphite cast iron | GCD500 | 500-7 | 870                            | 155                   | 120        | 1.8       | 2.0 | 100        | 1.8       | 2.0 |           |
|           |                            |        |       |                                |                       | 160        | 0.9       | 1.0 | 130        | 0.9       | 1.0 |           |
|           |                            |        |       |                                |                       | 200        | 0.45      | 0.5 | 160        | 0.45      | 0.5 |           |

| Workpiece |                    |            |          | Specific cutting force (N/mm²) | Brinell hardness (HB) | Grade      | C/B       |     | ML, MF    |
|-----------|--------------------|------------|----------|--------------------------------|-----------------------|------------|-----------|-----|-----------|
| ISO       | Workpiece material | KS         | ISO      |                                |                       | UNC840     | ML        | MF  |           |
|           |                    |            |          |                                |                       | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| S         | Nickel based       | Inconel625 | 15156-3  | 2650                           | 250                   | 30         | 1         | 1.2 | ≥ 1.5     |
|           |                    |            |          |                                |                       | 40         | 0.7       | 0.8 |           |
|           |                    |            |          |                                |                       | 50         | 0.3       | 0.3 |           |
|           |                    | Inconel718 | 9723     | 3000                           | 320                   | 30         | 1         | 1.2 |           |
|           |                    |            |          |                                |                       | 40         | 0.7       | 0.8 |           |
|           |                    |            |          |                                |                       | 50         | 0.3       | 0.3 |           |
|           | Cobalt based alloy | Stellite   | Stellite | 3000~3100                      | 300~320               | 15         | 1         | 1.2 |           |
|           |                    |            |          |                                |                       | 20         | 0.7       | 0.8 |           |
|           |                    |            |          |                                |                       | 25         | 0.3       | 0.3 |           |
|           | Titanium alloy     | Ti-6Al-4V  | 5832-11  | 1400                           | 320                   | 40         | 1         | 1.2 |           |
|           |                    |            |          |                                |                       | 50         | 0.7       | 0.8 |           |
|           |                    |            |          |                                |                       | 60         | 0.3       | 0.3 |           |

| Workpiece |                                            |       |             | Specific<br>cutting<br>force<br>(N/mm²) | Rockwell<br>hardness<br>(HRC) | Grade      | C/B       | Grade      | C/B       | MM        |
|-----------|--------------------------------------------|-------|-------------|-----------------------------------------|-------------------------------|------------|-----------|------------|-----------|-----------|
| ISO       | Workpiece<br>material                      | KS    | ISO         |                                         |                               | PC2510     | None      | PC2510     | MM        |           |
|           |                                            |       |             |                                         |                               | vc (m/min) | fz (mm/t) | vc (m/min) | fz (mm/t) | APMX (mm) |
| H         | High<br>hardened steel<br>(heat treatment) | STD61 | X40CrMoV5-1 | 2750                                    | 50                            | 80         | 0.1       | 80         | 0.1       | ≥ 1.5     |
|           |                                            |       |             |                                         |                               | 100        | 0.05      | 100        | 0.05      |           |
|           |                                            |       |             |                                         |                               | 130        | 0.05      | 130        | 0.05      |           |

## ✓ Recommended cutting conditions \_ SQ14

| Workpiece |                                      |                |             | Specific cutting force (N/mm <sup>2</sup> ) | Brinell hardness (HB) | Grade      | C/B       |     | Grade      | C/B       |     | MM, MF    |
|-----------|--------------------------------------|----------------|-------------|---------------------------------------------|-----------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO       | Workpiece material                   | KS             | ISO         |                                             |                       | PC3700     | MM        | MF  | PC5300     | MM        | MF  |           |
|           |                                      |                |             |                                             |                       | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| P         | Non-ferrous alloy steel<br>Mn < 1.65 | SM25C          | C25         | 1500                                        | 125                   | 230        | 2.0       | 2.4 | 210        | 2.0       | 2.4 | ≥ 2       |
|           |                                      |                |             |                                             |                       | 305        | 1.5       | 1.8 | 280        | 1.5       | 1.8 |           |
|           |                                      |                |             |                                             |                       | 380        | 1.0       | 1.2 | 350        | 1.0       | 1.2 |           |
|           |                                      | SM45C          | C45         | 1700                                        | 190                   | 210        | 1.5       | 1.8 | 190        | 1.5       | 1.8 |           |
|           |                                      |                |             |                                             |                       | 280        | 1.0       | 1.2 | 255        | 1.0       | 1.2 |           |
|           |                                      |                |             |                                             |                       | 350        | 0.6       | 0.7 | 320        | 0.6       | 0.7 |           |
|           | Low alloy steel<br>≤ 5%              | SCM440         | 42CrMo4     | 1700                                        | 175                   | 160        | 1.8       | 2.2 | 150        | 1.8       | 2.2 |           |
|           |                                      |                |             |                                             |                       | 215        | 1.5       | 1.8 | 195        | 1.5       | 1.8 |           |
|           |                                      |                |             |                                             |                       | 270        | 1.0       | 1.2 | 240        | 1.0       | 1.2 |           |
|           | High alloy steel<br>> 5%             | STD11<br>STD61 | X40CrMoV5-1 | 1950                                        | 200                   | 120        | 1.0       | 1.2 | 110        | 1.0       | 1.2 |           |
|           |                                      |                |             |                                             |                       | 160        | 0.8       | 0.9 | 150        | 0.8       | 0.9 |           |
|           |                                      |                |             |                                             |                       | 200        | 0.4       | 0.5 | 190        | 0.4       | 0.5 |           |

## Recommended cutting conditions \_ SQ14

| Workpiece               |                          |                  |                                                               | Specific<br>cutting<br>force<br>(N/mm²) | Brinell<br>hardness<br>(HB) | Grade      | C/B       |     | Grade      | C/B       |     | ML, MF    |
|-------------------------|--------------------------|------------------|---------------------------------------------------------------|-----------------------------------------|-----------------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO                     | Workpiece<br>material    | KS               | ISO                                                           |                                         |                             | PC9540     | ML        | MF  | PC5300     | ML        | MF  | APMX (mm) |
|                         |                          |                  |                                                               |                                         |                             | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     |           |
| M                       | Ferritic/<br>martensitic | STS405<br>STS430 | X6CrAl13<br>X6Cr17                                            | 1800                                    | 200                         | 100        | 1.6       | 1.9 | 130        | 1.6       | 1.9 | ≥ 2       |
|                         |                          |                  |                                                               |                                         |                             | 135        | 1.0       | 1.2 | 170        | 1.0       | 1.2 |           |
|                         |                          |                  |                                                               |                                         |                             | 170        | 0.5       | 0.6 | 210        | 0.5       | 0.6 |           |
|                         |                          | STS416<br>STS434 | X12CrS13<br>X6CrMo17-1                                        | 2850                                    | 330                         | 100        | 1.6       | 1.9 | 130        | 1.6       | 1.9 |           |
|                         |                          |                  |                                                               |                                         |                             | 135        | 1.0       | 1.2 | 170        | 1.0       | 1.2 |           |
|                         |                          |                  |                                                               |                                         |                             | 170        | 0.5       | 0.6 | 210        | 0.5       | 0.6 |           |
|                         | STS403<br>STS410         | X12Cr13          | 2350                                                          | 330                                     | 100                         | 1.6        | 1.9       | 130 | 1.6        | 1.9       |     |           |
|                         |                          |                  |                                                               |                                         | 135                         | 1.0        | 1.2       | 170 | 1.0        | 1.2       |     |           |
|                         |                          |                  |                                                               |                                         | 170                         | 0.5        | 0.6       | 210 | 0.5        | 0.6       |     |           |
|                         | Austenitic               | STS304<br>STS316 | X5CrNi18-9<br>X2CrNi18-9<br>X5CrNiMo17-12-2<br>XCrNiMo17-12-3 | 2000                                    | 180                         | 80         | 1.6       | 1.9 | 105        | 1.6       | 1.9 |           |
|                         |                          |                  |                                                               |                                         |                             | 110        | 1.0       | 1.2 | 140        | 1.0       | 1.2 |           |
|                         |                          |                  |                                                               |                                         |                             | 140        | 0.5       | 0.6 | 175        | 0.5       | 0.6 |           |
| Austenitic/<br>ferritic | -                        | -                | 2450                                                          | 260                                     | 65                          | 1.6        | 1.9       | 080 | 1.6        | 1.9       |     |           |
|                         |                          |                  |                                                               |                                         | 85                          | 1.0        | 1.2       | 110 | 1.0        | 1.2       |     |           |
|                         |                          |                  |                                                               |                                         | 105                         | 0.5        | 0.6       | 140 | 0.5        | 0.6       |     |           |

| Workpiece |                               |        |       | Specific<br>cutting<br>force<br>(N/mm²) | Brinell<br>hardness<br>(HB) | Grade      | C/B       |     | Grade      | C/B       |     | MM, MF    |
|-----------|-------------------------------|--------|-------|-----------------------------------------|-----------------------------|------------|-----------|-----|------------|-----------|-----|-----------|
| ISO       | Workpiece<br>material         | KS     | ISO   |                                         |                             | PC6100     | MF        | MM  | PC5300     | MF        | MM  |           |
|           |                               |        |       |                                         |                             | vc (m/min) | fz (mm/t) |     | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| K         | Gray cast iron                | GC200  | 200   | 900                                     | 180                         | 180        | 2.0       | 2.4 | 140        | 2.0       | 2.4 | ≥ 2       |
|           |                               |        |       |                                         |                             | 240        | 1.0       | 1.2 | 190        | 1.0       | 1.2 |           |
|           |                               |        |       |                                         |                             | 300        | 0.5       | 0.6 | 240        | 0.5       | 0.6 |           |
|           | Nodular graphite<br>cast iron | GCD500 | 500-7 | 870                                     | 155                         | 120        | 2.0       | 2.4 | 100        | 2.0       | 2.4 |           |
|           |                               |        |       |                                         |                             | 160        | 1.0       | 1.2 | 130        | 1.0       | 1.2 |           |
|           |                               |        |       |                                         |                             | 200        | 0.5       | 0.6 | 160        | 0.5       | 0.6 |           |

| Workpiece |                    |            |          | Specific cutting force (N/mm <sup>2</sup> ) | Brinell hardness (HB) | Grade      | C/B       |     | ML, MF    |
|-----------|--------------------|------------|----------|---------------------------------------------|-----------------------|------------|-----------|-----|-----------|
| ISO       | Workpiece material | KS         | ISO      |                                             |                       | UNC840     | ML        | MF  |           |
|           |                    |            |          |                                             |                       | vc (m/min) | fz (mm/t) |     | APMX (mm) |
| S         | Nickel based       | Inconel625 | 15156-3  | 2650                                        | 250                   | 30         | 1.2       | 1.3 | ≥ 2       |
|           |                    |            |          |                                             |                       | 40         | 0.8       | 0.8 |           |
|           |                    |            |          |                                             |                       | 50         | 0.3       | 0.3 |           |
|           |                    | Inconel718 | 9723     | 3000                                        | 320                   | 30         | 1.2       | 1.3 |           |
|           |                    |            |          |                                             |                       | 40         | 0.8       | 0.8 |           |
|           |                    |            |          |                                             |                       | 50         | 0.3       | 0.3 |           |
|           | Cobalt based alloy | Stellite   | Stellite | 3000~3100                                   | 300~320               | 15         | 1.2       | 1.3 |           |
|           |                    |            |          |                                             |                       | 20         | 0.8       | 0.8 |           |
|           |                    |            |          |                                             |                       | 25         | 0.3       | 0.3 |           |
|           | Titanium alloy     | Ti-6Al-4V  | 5832-11  | 1400                                        | 320                   | 40         | 1.2       | 1.3 |           |
|           |                    |            |          |                                             |                       | 50         | 0.8       | 0.8 |           |
|           |                    |            |          |                                             |                       | 60         | 0.3       | 0.3 |           |

| Workpiece |                                      |       |             | Specific cutting force (N/mm <sup>2</sup> ) | Rockwell hardness (HRC) | Grade      | C/B       |      | Grade      | C/B       |      | MM        |
|-----------|--------------------------------------|-------|-------------|---------------------------------------------|-------------------------|------------|-----------|------|------------|-----------|------|-----------|
| ISO       | Workpiece material                   | KS    | ISO         |                                             |                         | PC2510     | MM        | None | PC2510     | MM        | None |           |
|           |                                      |       |             |                                             |                         | vc (m/min) | fz (mm/t) |      | vc (m/min) | fz (mm/t) |      | APMX (mm) |
| H         | High hardened steel (heat treatment) | STD61 | X40CrMoV5-1 | 2750                                        | 50                      | 80         | 0.1       |      | 70         | 0.1       |      | ≥ 2       |
|           |                                      |       |             |                                             |                         | 100        | 0.05      |      | 90         | 0.05      |      |           |
|           |                                      |       |             |                                             |                         | 130        | 0.05      |      | 120        | 0.05      |      |           |



## Performance evaluation

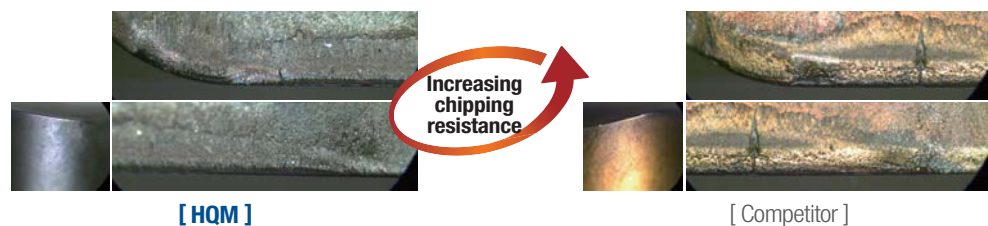
### Wear resistance

|                           |                                                                              |                                   |
|---------------------------|------------------------------------------------------------------------------|-----------------------------------|
| <b>Workpiece</b>          | Die steel(KP4M), 300(L) × 200(W) × 100(H), Square lumber                     |                                   |
| <b>Cutting conditions</b> | $vc(m/min) = 147$ , $fz(mm/t) = 1.66$ , $ap(mm) = 1.0$ , $ae(mm) = 58$ , Dry |                                   |
| <b>Tools</b>              | <b>Insert</b> SQMT140520R-MM(PC5300)                                         | <b>Holder</b> HQMCM080R-27-5-SQ14 |



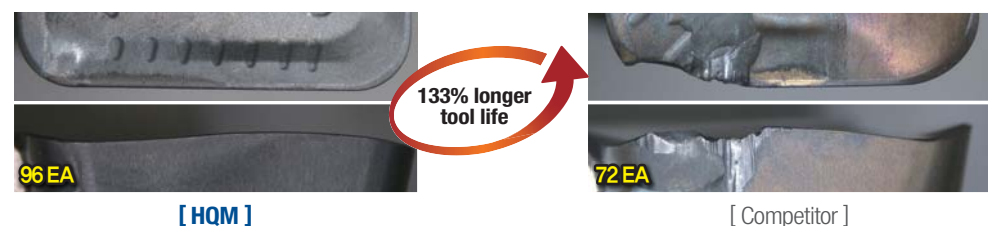
### Chipping resistance

|                           |                                                                              |                                   |
|---------------------------|------------------------------------------------------------------------------|-----------------------------------|
| <b>Workpiece</b>          | Die steel(KP4M), 300(L) × 200(W) × 100(H), Square lumber                     |                                   |
| <b>Cutting conditions</b> | $vc(m/min) = 135$ , $fz(mm/t) = 1.75$ , $ap(mm) = 0.8$ , $ae(mm) = 55$ , Dry |                                   |
| <b>Tools</b>              | <b>Insert</b> SQMT140520R-MM(PC5300)                                         | <b>Holder</b> HQMCM080R-27-5-SQ14 |



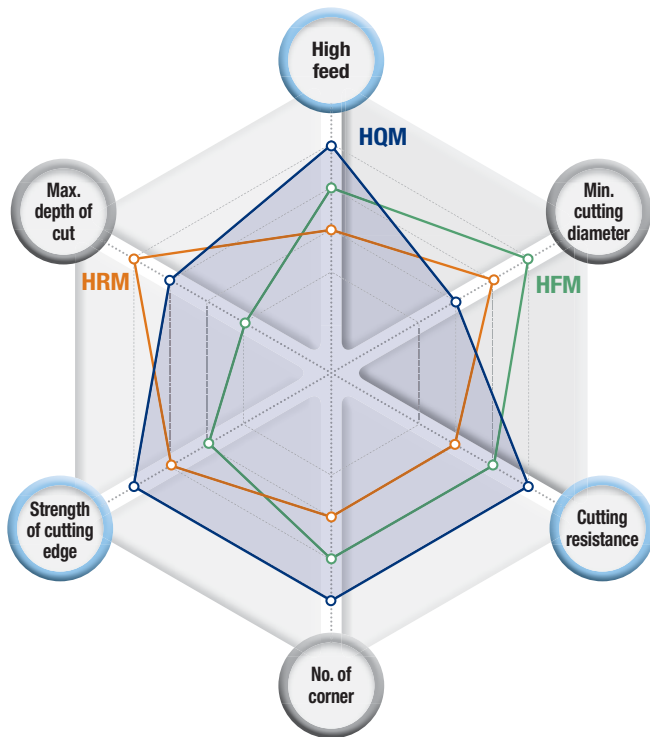
### Wear resistance

|                           |                                                                             |                                   |
|---------------------------|-----------------------------------------------------------------------------|-----------------------------------|
| <b>Workpiece</b>          | Die steel(KP4M), 300(L) × 200(W) × 100(H), Square lumber                    |                                   |
| <b>Cutting conditions</b> | $vc(m/min) = 150$ , $fz(mm/t) = 1.7$ , $ap(mm) = 1.2$ , $ae(mm) = 60$ , Dry |                                   |
| <b>Tools</b>              | <b>Insert</b> SQMT140520R-MM(PC5300)                                        | <b>Holder</b> HQMCM080R-27-5-SQ14 |





## High feed tool selection guide



### HQM *New*

- High rigidity and high feed cutting
- 4-cornered cutting
- Good chip evacuation



### HFM

- Small cutting diameter
- At least Ø8mm



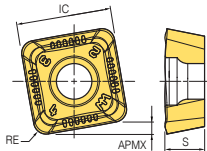
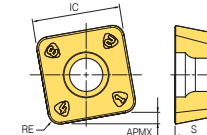
### HRM

- For general cutting
- 3-cornered cutting



| Tools          | High feed | Min. cutting diameter | Cutting resistance | No. of Corner | Strength of cutting edge | Max. depth of cut |
|----------------|-----------|-----------------------|--------------------|---------------|--------------------------|-------------------|
| HQM <i>New</i> | ★★★★★     | ★★                    | ★★★★★              | ★★★★★         | ★★★★★                    | ★★★               |
| HFM            | ★★★       | ★★★★★                 | ★★★                | ★★★           | ★★                       | ★                 |
| HRM            | ★★        | ★★★                   | ★★                 | ★★            | ★★★                      | ★★★★★             |

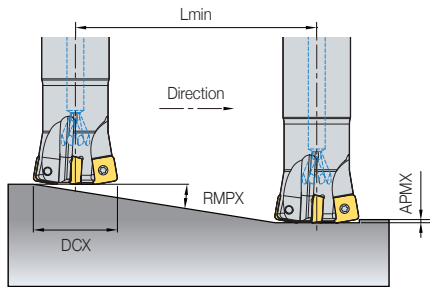
## Inserts

| Workpiece                     | Picture                                                                             | Designation     | Coated |        |        |        |        |        | Dimension (mm) |    |     |      | Geometry |                                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------|-----------------|--------|--------|--------|--------|--------|--------|----------------|----|-----|------|----------|---------------------------------------------------------------------------------------|
|                               |                                                                                     |                 | PC2510 | PC3700 | PC6100 | PC9540 | PC5300 | UNC840 | UPC845         | IC | RE  | S    |          | APMX                                                                                  |
| Titanium,<br>Stainless steel  |  | SQMT 120516R-ML |        |        |        |        | ●      | ●      | ●              | 12 | 1.6 | 5    | 1.5      |  |
|                               |                                                                                     | 140520R-ML      |        |        |        |        | ●      | ●      | ●              | 14 | 2   | 5.56 | 2        |                                                                                       |
| Stainless steel,<br>Cast iron |  | SQMT 120516R-MF |        | ●      | ●      | ●      | ●      | ●      | ●              | 12 | 1.6 | 5    | 1.5      |                                                                                       |
|                               |                                                                                     | 140520R-MF      |        | ●      | ●      | ●      | ●      | ●      | ●              | 14 | 2   | 5.56 | 2        |                                                                                       |
| Steel                         |  | SQMT 120516R-MM |        | ●      | ●      |        | ●      |        |                | 12 | 1.6 | 5    | 1.5      |                                                                                       |
|                               |                                                                                     | 140520R-MM      |        | ●      | ●      |        | ●      |        |                | 14 | 2   | 5.56 | 2        |                                                                                       |
| High<br>hardness              |  | SQMW 120516     | ●      |        |        |        | ●      |        |                | 12 | 1.6 | 5    | 1.5      |  |
|                               |                                                                                     | 140520          | ●      |        |        |        | ●      |        |                | 14 | 2   | 5.56 | 2        |                                                                                       |

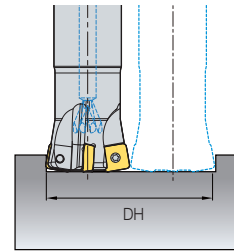
●: Stock item

## ✓ Ramping and helical cutting

### Ramping



### Helical cutting



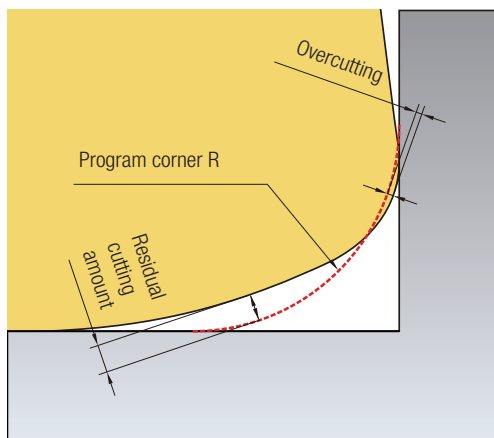
(mm)

| Designation | DCX | IC | APMX | Ramping |       | Helical cutting      |           |                      |           |
|-------------|-----|----|------|---------|-------|----------------------|-----------|----------------------|-----------|
|             |     |    |      | RMPX    | Lmin  | Min diameter (DHmin) | Max pitch | Max diameter (DHmax) | Max pitch |
| SQ12        | 32  | 12 | 1.5  | 1.7°    | 50.5  | 47                   | 1.4       | 64                   | 1.5       |
|             | 40  | 12 | 1.5  | 1.8°    | 47.7  | 60                   | 1.5       | 80                   | 1.5       |
|             | 50  | 12 | 1.5  | 1.1°    | 78.1  | 80                   | 1.5       | 100                  | 1.5       |
|             | 52  | 12 | 1.5  | 1.1°    | 78.1  | 84                   | 1.5       | 104                  | 1.5       |
|             | 63  | 12 | 1.5  | 0.7°    | 122.8 | 106                  | 1.5       | 126                  | 1.5       |
|             | 66  | 12 | 1.5  | 0.7°    | 122.8 | 112                  | 1.5       | 132                  | 1.5       |
|             | 80  | 12 | 1.5  | 0.5°    | 171.9 | 140                  | 1.5       | 160                  | 1.5       |
| SQ14        | 100 | 12 | 1.5  | 0.4°    | 214.9 | 180                  | 1.5       | 200                  | 1.5       |
|             | 32  | 14 | 2    | 2.2°    | 52.1  | 48                   | 1.9       | 64                   | 2.0       |
|             | 40  | 14 | 2    | 2.9°    | 39.5  | 57                   | 2.0       | 80                   | 2.0       |
|             | 52  | 14 | 2    | 1.5°    | 76.4  | 81                   | 2.0       | 104                  | 2.0       |
|             | 63  | 14 | 2    | 1.1°    | 104.2 | 103                  | 2.0       | 126                  | 2.0       |
|             | 66  | 14 | 2    | 0.9°    | 127.3 | 109                  | 2.0       | 132                  | 2.0       |
|             | 80  | 14 | 2    | 0.8°    | 143.2 | 137                  | 2.0       | 160                  | 2.0       |
|             | 100 | 14 | 2    | 0.6°    | 191.0 | 177                  | 2.0       | 200                  | 2.0       |

- When ramping and helical milling, table feed, vf (ipm) should be lower than 70% of the recommended cutting conditions.
- When helical milling, Max. pitch, DHmax should be lower than max. depth of cut, APMX.
- When ramping, the depth of cut should be lower than max. depth of cut, APMX.

- $Lmin = APMX / \tan(RMPX)$  (mm)
- Lmin: Min. length of ramping
- APMX: depth of cut Maximum
- RMPX: Max. rake angle in ramping

## ✓ Precautions in corner R cutting



----- Program corner R

(mm)

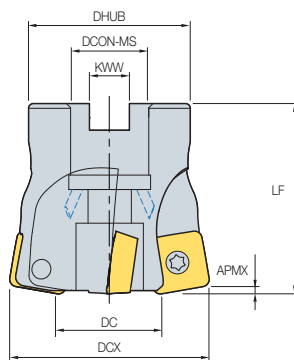
| Insert         | Program corner R | Nose R RE | APMX | Over cut | Uncut |
|----------------|------------------|-----------|------|----------|-------|
| SQMT120516R-MM | R1.5             | 1.6       | 1.5  | 0        | 1.5   |
|                | R2.0             |           |      | 0        | 1.42  |
|                | R3.0             |           |      | 0        | 1.26  |
|                | R3.5             |           |      | 0.05     | 1.18  |
|                | R4.0             |           |      | 0.17     | 1.10  |
|                | R4.5             |           |      | 0.33     | 1.02  |
|                | R5.0             |           |      | 0.50     | 0.94  |
| SQMT140520R-MM | R1.5             | 2.0       | 2    | 0        | 1.73  |
|                | R3.0             |           |      | 0        | 1.46  |
|                | R3.5             |           |      | 0        | 1.37  |
|                | R4.0             |           |      | 0.03     | 1.29  |
|                | R4.5             |           |      | 0.14     | 1.21  |
|                | R5.0             |           |      | 0.27     | 1.12  |
|                | R5.5             |           |      | 0.45     | 1.04  |
|                | R6.0             |           |      | 0.63     | 0.95  |

- When writing CNC programs, entering the appropriate corner radius (R value) for each insert can lead to overcutting and residual cutting amounts in the corner machining areas, as described.
- To prevent overcutting, it is essential to create CNC programs that take the aforementioned overcutting amounts into account.

# HQMCM-SQ12



KAPR  
**10°**  
• AR: 3°  
• RR: -4°



(mm)

|              | Designation    | Stock | DCX | CICT | DCON-MS | DHUB | LF | KWW  | APMX |
|--------------|----------------|-------|-----|------|---------|------|----|------|------|
| <b>HQMCM</b> | 050R-22-3-SQ12 | ●     | 50  | 3    | 22      | 47   | 50 | 10.4 | 1.5  |
|              | 050R-22-4-SQ12 | ●     | 50  | 4    | 22      | 47   | 50 | 10.4 | 1.5  |
|              | 052R-22-4-SQ12 | ●     | 52  | 4    | 22      | 47   | 50 | 10.4 | 1.5  |
|              | 052R-22-5-SQ12 | ●     | 52  | 5    | 22      | 47   | 50 | 10.4 | 1.5  |
|              | 063R-22-5-SQ12 |       | 63  | 5    | 22      | 58   | 50 | 10.4 | 1.5  |
|              | 063R-22-6-SQ12 | ●     | 63  | 6    | 22      | 58   | 50 | 10.4 | 1.5  |
|              | 066R-27-5-SQ12 | ●     | 66  | 5    | 27      | 58   | 50 | 12.4 | 1.5  |
|              | 066R-27-6-SQ12 |       | 66  | 6    | 27      | 58   | 50 | 12.4 | 1.5  |
|              | 066R-27-7-SQ12 |       | 66  | 7    | 27      | 58   | 50 | 12.4 | 1.5  |
|              | 080R-27-6-SQ12 |       | 80  | 6    | 27      | 70   | 60 | 12.4 | 1.5  |
|              | 080R-27-8-SQ12 | ●     | 80  | 8    | 27      | 70   | 60 | 12.4 | 1.5  |
|              | 100R-32-6-SQ12 |       | 100 | 6    | 32      | 78   | 70 | 14.4 | 1.5  |
|              | 100R-32-8-SQ12 | ●     | 100 | 8    | 32      | 78   | 70 | 14.4 | 1.5  |

●: Stock item

## Available inserts



SQMT-ML



SQMT-MF



SQMT-MM



SQMW

| Designation | Coated     |        |        |        |        |        |        |
|-------------|------------|--------|--------|--------|--------|--------|--------|
|             | PC2510     | PC3700 | PC6100 | PC9540 | PC5300 | UNC840 | UPC845 |
| <b>SQMT</b> | 120516R-ML |        |        |        | ●      | ●      | ●      |
|             | 120516R-MF | ●      | ●      | ●      | ●      | ●      | ●      |
|             | 120516R-MM |        | ●      |        | ●      |        |        |
| <b>SQMW</b> | 120516     | ●      |        |        | ●      |        |        |

●: Stock item

## Available arbors

| Designation    | DCON-MS | Available arbors |
|----------------|---------|------------------|
| <b>HQMCM</b>   |         |                  |
| 050R-22-□-SQ12 | 22      | BT□□-FMC22-□□    |
| 052R-22-□-SQ12 |         |                  |
| 063R-22-□-SQ12 |         |                  |
| 066R-22-□-SQ12 |         |                  |
|                |         |                  |

| Designation    | DCON-MS | Available arbors |
|----------------|---------|------------------|
| <b>HQMCM</b>   |         |                  |
| 066R-27-□-SQ12 | 27      | BT□□-FMC27-□□    |
| 080R-27-□-SQ12 |         |                  |
| 100R-32-□-SQ12 | 32      | BT□□-FMC32-□□    |

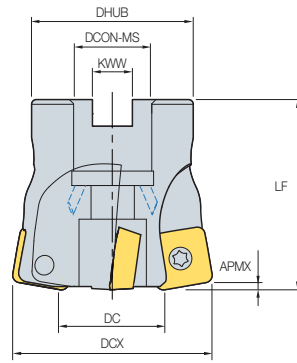
## Parts

| Specification | Screw    | Wrench |
|---------------|----------|--------|
| Ø50 ~ Ø100    | FTKA0408 | TW15S  |

# HQMCM-SQ14



KAPR  
10°  
• AR: 2°  
• RR: -3.5°



(mm)

|              | Designation    | Stock | DCX | CICT | DCON-MS | DHUB | LF | KWW  | APMX |
|--------------|----------------|-------|-----|------|---------|------|----|------|------|
| <b>HQMCM</b> | 052R-22-3-SQ14 |       | 52  | 3    | 22      | 47   | 50 | 10.4 | 2    |
|              | 052R-22-4-SQ14 | ●     | 52  | 4    | 22      | 47   | 50 | 10.4 | 2    |
|              | 052R-22-5-SQ14 | ●     | 52  | 5    | 22      | 47   | 50 | 10.4 | 2    |
|              | 063R-22-4-SQ14 |       | 63  | 4    | 22      | 58   | 50 | 10.4 | 2    |
|              | 063R-22-5-SQ14 | ●     | 63  | 5    | 22      | 58   | 50 | 10.4 | 2    |
|              | 063R-22-6-SQ14 | ●     | 63  | 6    | 22      | 58   | 50 | 10.4 | 2    |
|              | 066R-27-5-SQ14 | ●     | 66  | 5    | 27      | 58   | 50 | 10.4 | 2    |
|              | 066R-27-6-SQ14 |       | 66  | 6    | 27      | 58   | 50 | 10.4 | 2    |
|              | 080R-27-5-SQ14 | ●     | 80  | 5    | 27      | 70   | 60 | 12.4 | 2    |
|              | 080R-27-6-SQ14 | ●     | 80  | 6    | 27      | 70   | 60 | 12.4 | 2    |
|              | 100R-32-6-SQ14 | ●     | 100 | 6    | 32      | 78   | 70 | 14.4 | 2    |
|              | 100R-32-8-SQ14 | ●     | 100 | 8    | 32      | 78   | 70 | 14.4 | 2    |

●: Stock item

## Available inserts



SQMT-ML



SQMT-MF



SQMT-MM



SQMW

| Designation | Coated     |        |        |        |        |        |        |
|-------------|------------|--------|--------|--------|--------|--------|--------|
|             | PC2510     | PC3700 | PC6100 | PC9540 | PC5300 | UNC840 | UPC845 |
| <b>SQMT</b> | 140520R-ML |        |        |        | ●      | ●      | ●      |
|             | 140520R-MF | ●      | ●      | ●      | ●      | ●      | ●      |
|             | 140520R-MM |        | ●      |        | ●      |        |        |
| <b>SQMW</b> | 140520     | ●      |        |        | ●      |        |        |

●: Stock item

## Available arbors

| Designation    | DCON-MS | Available arbors |
|----------------|---------|------------------|
| <b>HQMCM</b>   |         |                  |
| 050R-22-□-SQ12 | 22      | BT□□-FMC22-□□    |
| 052R-22-□-SQ12 |         |                  |
| 063R-22-□-SQ12 |         |                  |
| 066R-22-□-SQ12 |         |                  |

| Designation    | DCON-MS | Available arbors |
|----------------|---------|------------------|
| <b>HQMCM</b>   |         |                  |
| 066R-27-□-SQ12 | 27      | BT□□-FMC27-□□    |
| 080R-27-□-SQ12 |         |                  |
| 100R-32-□-SQ12 | 32      | BT□□-FMC32-□□    |

## Parts

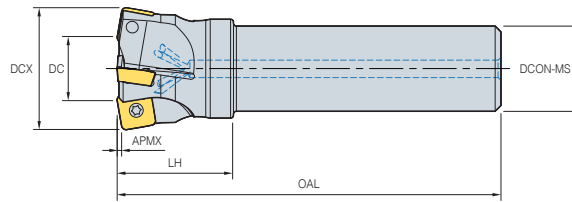
| Specification | Screw      | Wrench   |
|---------------|------------|----------|
| Ø52 ~ Ø100    | FTGA0510-P | TW20-100 |

# HQMS-SQ12



KAPR  
10°

• AR: 2°  
• RR: -28° ~ -6°



(mm)

|             | Designation        | Stock | DCX | CICT | DCON-MS | OAL | LH | APMX |
|-------------|--------------------|-------|-----|------|---------|-----|----|------|
| <b>HQMS</b> | 032R-2W32-150-SQ12 |       | 32  | 2    | 32      | 150 | 50 | 1.5  |
|             | 032R-3W32-150-SQ12 | ●     | 32  | 3    | 32      | 150 | 50 | 1.5  |
|             | 040R-3W32-150-SQ12 |       | 40  | 3    | 32      | 150 | 50 | 1.5  |
|             | 040R-4W32-150-SQ12 | ●     | 40  | 4    | 32      | 150 | 50 | 1.5  |

●: Stock item

## Available inserts



SQMT-ML



SQMT-MF



SQMT-MM



SQMW

| Designation |            | Coated |        |        |        |        |        |
|-------------|------------|--------|--------|--------|--------|--------|--------|
|             |            | PC2510 | PC3700 | PC6100 | PC9540 | PC5300 | UNC840 |
| <b>SQMT</b> | 120516R-ML |        |        |        |        | ●      | ●      |
|             | 120516R-MF |        | ●      | ●      | ●      | ●      | ●      |
|             | 120516R-MM |        | ●      | ●      |        | ●      |        |
| <b>SQMW</b> | 120516     | ●      |        |        |        | ●      |        |

●: Stock item

## Parts

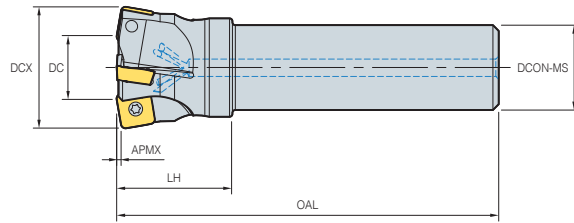
| Specification | Screw    | Wrench |
|---------------|----------|--------|
| Ø32 ~ Ø40     | FTKA0408 | TW15S  |

# HQMS-SQ14



KAPR  
10°

• AR: 2°  
• RR: -20° ~ -7°



(mm)

|      | Designation        | Stock | DCX | CICT | DCON-MS | OAL | LH | APMX |
|------|--------------------|-------|-----|------|---------|-----|----|------|
| HQMS | 032R-2W32-150-SQ14 | ●     | 32  | 2    | 32      | 150 | 50 | 2    |
|      | 040R-2W32-150-SQ14 |       | 40  | 2    | 32      | 150 | 50 | 2    |
|      | 040R-3W32-150-SQ14 | ●     | 40  | 3    | 32      | 150 | 50 | 2    |

●: Stock item

## Available inserts



SQMT-ML



SQMT-MF



SQMT-MM



SQMW

| Designation |            | Coated |        |        |        |        |        |        |
|-------------|------------|--------|--------|--------|--------|--------|--------|--------|
|             |            | PC2510 | PC3700 | PC6100 | PC9540 | PC5300 | UNC840 | UPC845 |
| SQMT        | 140520R-ML |        |        |        |        | ●      | ●      | ●      |
|             | 140520R-MF |        | ●      | ●      | ●      | ●      | ●      | ●      |
|             | 140520R-MM |        | ●      | ●      |        | ●      |        |        |
| SQMW        | 140520     | ●      |        |        |        | ●      |        |        |

●: Stock item

## Parts

| Specification | Screw    | Wrench |
|---------------|----------|--------|
| Ø32 ~ Ø40     | FTKA0408 | TW15S  |

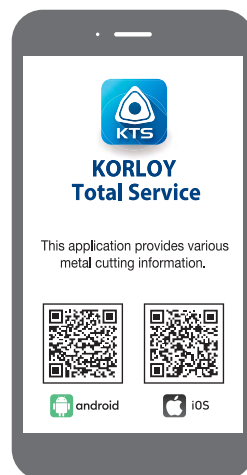
### For the safe metalcutting

- Use safety supplies such as protective gloves to prevent possible injury while touching the edge of tools.
- Use safety glasses or safety cover to hedge possible dangers. Inappropriate usage or excessive cutting condition may lead tool's breakage or even the fragment's scattering.
- Clamp the workpiece tightly enough to prevent its movement while its machining.
- Properly manage the tool change phase because the inordinately used tool can be easily broken under the excessive cutting load or severe wear, and it may threat the operator's safety.
- Use safety cover because chips evacuated during cutting are hot and sharp and may cause burns and cuts. To remove chips safely, stop machining, put on protective gloves, and use a hook or other tools.
- Prepare for fire prevention measures as the use of the non-water soluble cutting oil may cause fire.
- Use safety cover and other safety supplies because the spare parts or the inserts can be pulled out due to centrifugal force while high speed machining.



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