INDEXABLE MILLING TOOL SELECTION

This infographic shows some of the different characteristics of the indexable milling bodies and inserts and discusses the effect it has on the operation.

By combining the characteristics and matching the effect to your operation, you should be able to select the right cutter body for the job.

Insert Clearance

Positive

Characteristics

If the clearance is built into the insert, it is considered a positive basic shape.

Advantages

- Less cutting pressure
- Produces less heat
- Better Chip Control
- Allows for ramping

Challenges

- Weaker insert
- Can only use one side of the insert

Negative

Characteristics

If the insert does not have clearance built-in, it is considered a negative basic shape insert.

Advantages

- Stronger insert
- Possibly more cutting edges

Challenges

- Produces more heat
- Produces more cutting pressure
- No ramping

Mounting Configuration

Conventional

Characteristics

If the mounting screw is in the face of the insert, it is considered conventional mount.

Advantages

- Simple insert design
- Less expensive insert

Challenges

- Limits number of teeth
- Thinner inserts could be weaker

Tangential

Characteristics

Tangentially mounted inserts have the mounting screw coming from the OD.

Advantages

- Stronger insert/cutter body
- Allows for more inserts in a given diameter

Challenges

- More expensive insert
- Higher cutting pressure

Insert Shape

The shape of the insert can affect the number of cutting edges per insert which can greatly affect its economical efficiency. The shape can also affect the DOC capability.

Lead Angle

90 degrees

Characteristics

The sidewall produced by the cutter can be 90 degrees.

Advantages

- A 90-degree shoulder is produced
- Allows tall walls to be produced by taking multiple steps

Challenges

- 100% of cutting forces are pushing the cutter sideways
- No axial chip thinning is produced

Less than 90 degrees

Characteristics

The sidewall produced by the cutter can be less than 90 degrees.

Advantages

- Axial chip thinning allows for higher feed rates
- More of the cutting forces are in line with the spindle reducing chatter

Challenges

- Mostly considered a roughing tool

Insert Shape

Low

Characteristics

These characteristics determine the tool's MRR capability:

- Depth of cut
- Advance per tooth (feed rate)
- Number of teeth

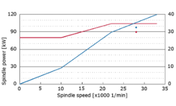
High

Characteristics

These characteristics determine the tool's MRR capability:

- Depth of cut
- Advance per tooth (feed rate)
- Number of teeth

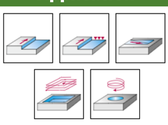
HP Requirements



HP requirements are proportional to MRR, but these other characteristics can also affect the HP draw:

- Lead Angle
- Basic insert shape (more positive, less HP)
- Insert sharpness (sharper, less HP)

Application



Not all milling bodies can do the same things. The following capabilities need to be checked if required from the cutter body:

- Is ramping or pocketing required?
- Is a wiper needed to produce a good surface finish?
- Does a 90-degree shoulder need to be produced?

Infographic designed by

PRACTICAL MACHINIST