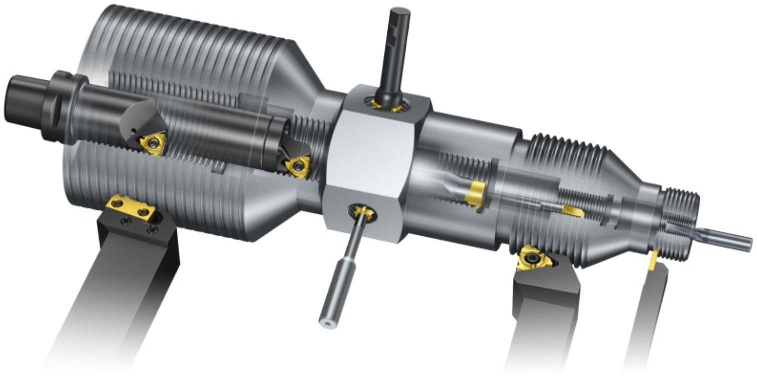
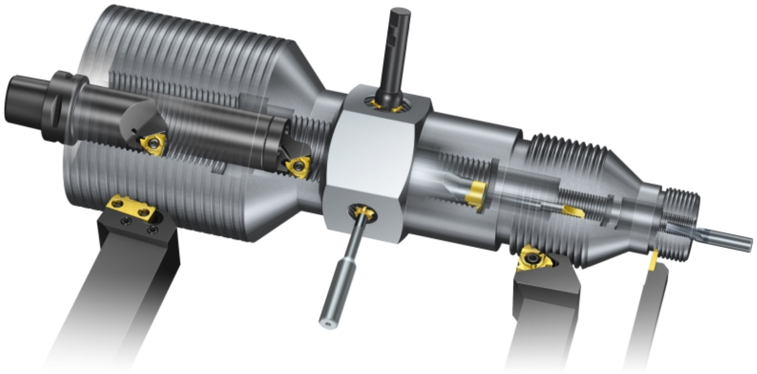


Pitch Perfect Threading



Pitch Perfect Threading

Process considerations

Threading methods

- Existing
  - Is the process stable today
  - Is the productivity maximized
  - Is chip control acceptable
  - Is the quality of the thread acceptable

Always ask:
"Should this component be thread turned or thread milled"

- New
- Is the component
  - symetric/ asymetric
  - stable/vibration sensitive

What are the requirements

- Finish
- Tolerances

–Will I have clearance behind the thread or is it against a shoulder/blind hole

–Is this material easy or difficult from a chip control point of view

–Is the material work hardening

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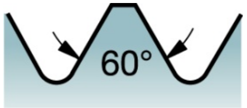
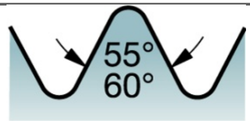
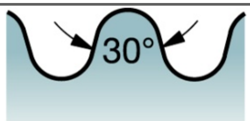
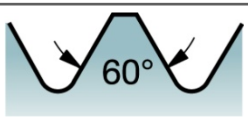
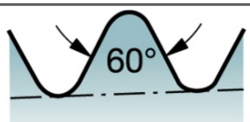
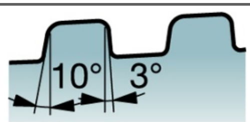
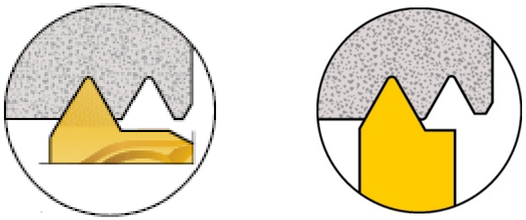
Basics in threads

Our standard profiles

Application	Insert	Thread form	Thread type	Code
General threads			ISO metric American UN	MM UN
Pipe threads			Whitworth British Standard (BSPT) American National Pipe Threads NPT NPTF	WH, NT PT, NF
Food and fire			Round DIN 405	RN
Aerospace			MJ UNJ	MJ NJ
Oil and gas			API Rounded API ”V” form 60°	RD V38, 40, 50
			API Buttress VAM	BU
Motion threads			Trapezoidal/DIN 103 ACME Stub ACME	TR AC SA

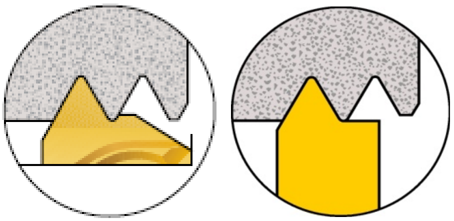
Insert types
V - profile

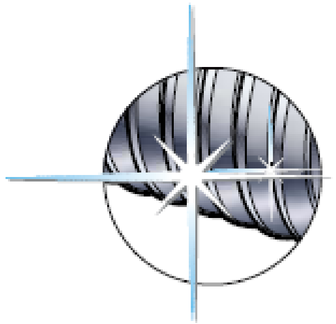


- Advantages
  - Flexibility – one insert can be used for several pitches.
  - Reduce or eliminate vibrations due to reduction in cutting pressure
  - Minimum tool inventory

- Disadvantages
  - Needs a preform diameter
  - Burr formation
  - The nose radii is designed to offer the smallest pitch, which reduces tool life

Insert types
Full profile



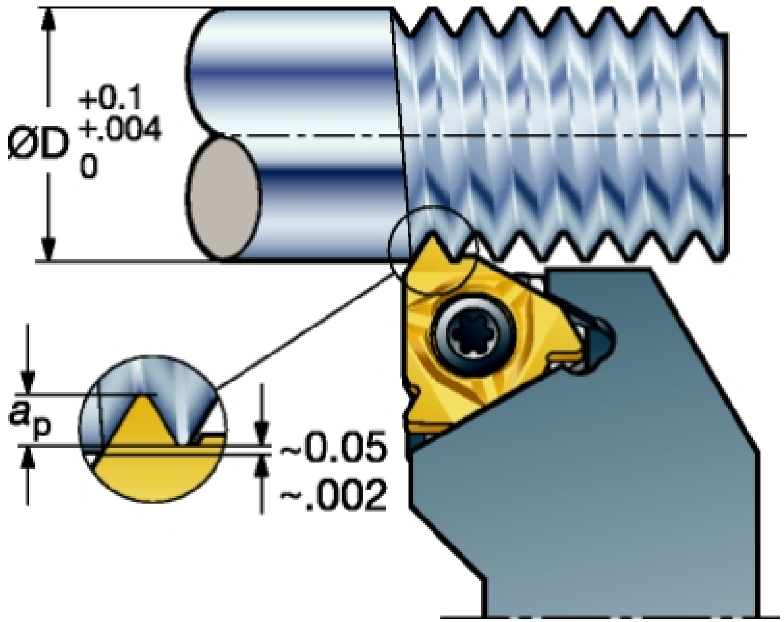


- Advantages
  - Forms a complete thread profile, including the correct depth, bottom and top radii for a strong thread
  - High productivity due to elimination of subsequent operations.
  - In general this insert makes a cleaner thread which requires less deburring

- Disadvantages
  – Different inserts for every pitch and profile
  – As the insert is generating both the root and crest, the tool pressure can increase, putting more requirements on the setup

Insert types

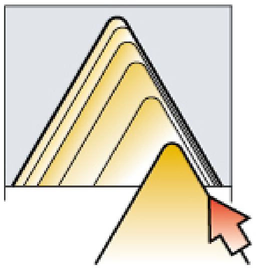
Use extra stock/material for topping the thread



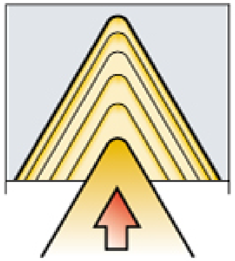
- When a full profile insert is used the blank should not be turned to exact diameter prior to the threading
- Add extra stock/material on the workpiece for topping the finish diameter of the thread
- Extra stock/material should be 0.03-0.07 mm (.001-.003 inch)

Infeed

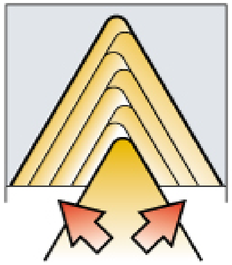
Three different types of infeed



Modified Flank infeed



Radial infeed

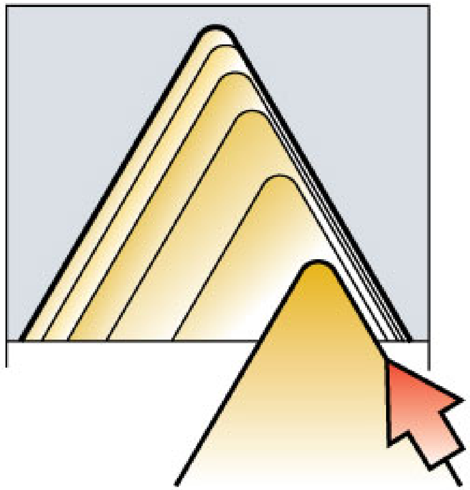


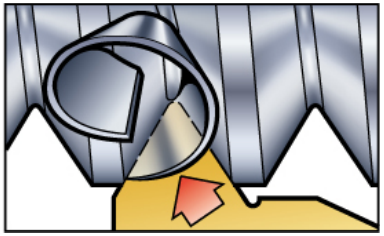
Alternating infeed

- The infeed method can have a significant impact on the thread machining process. It influences
  - Chip Control
  - Insert Wear
  - Thread Quality
  - Tool Life
- In practice, the machine tool, insert geometry, workpiece material and thread pitch influence the choice of infeed method

Infeed

Modified flank infeed





- Chip is similar to that in conventional turning - easier to form and guide
- Chip is thicker, but has contact with only one side of the insert
- Insert wear dominant on one flank
- Less heat is transferred to the insert
- First choice for most threading operations

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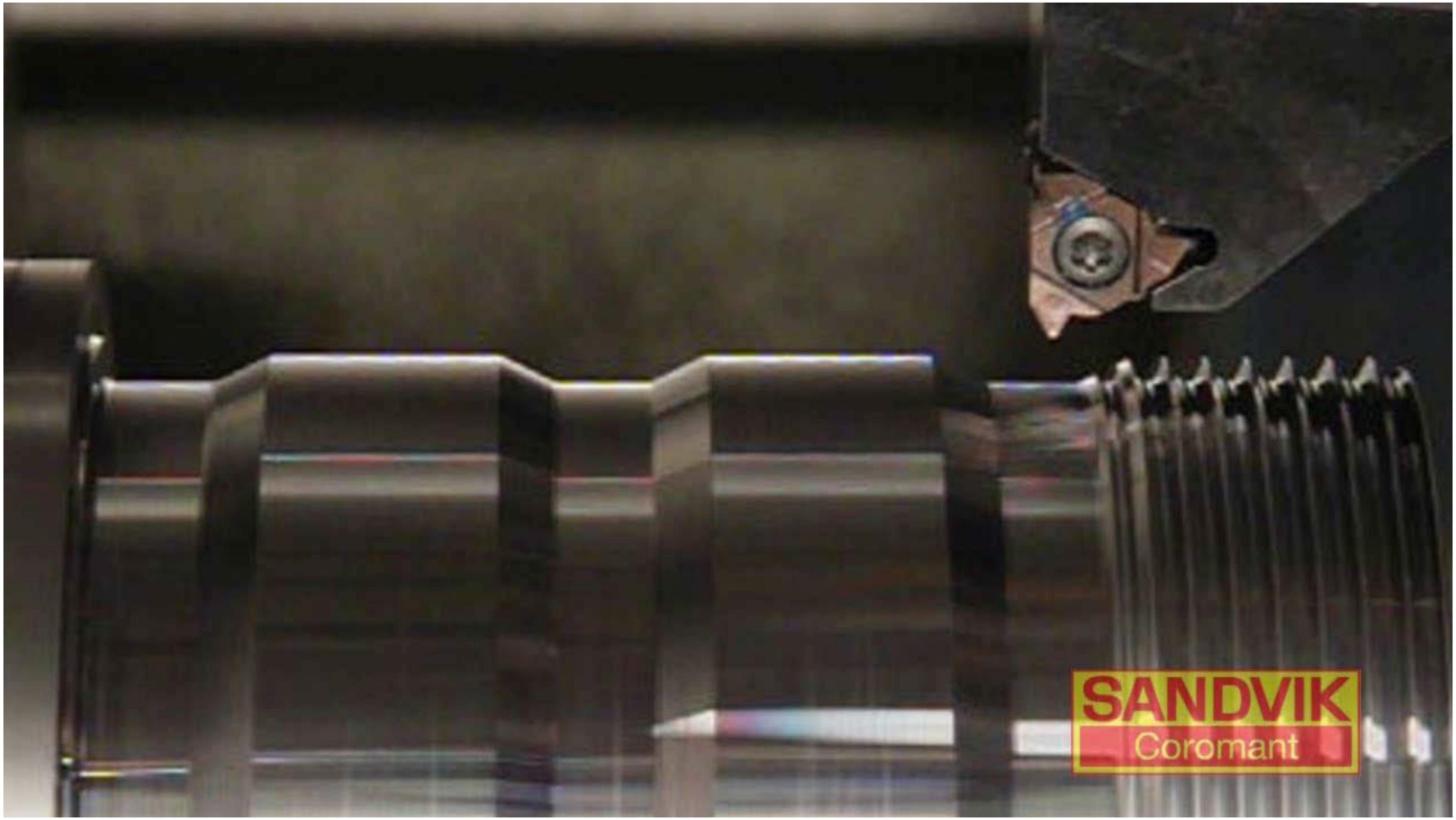
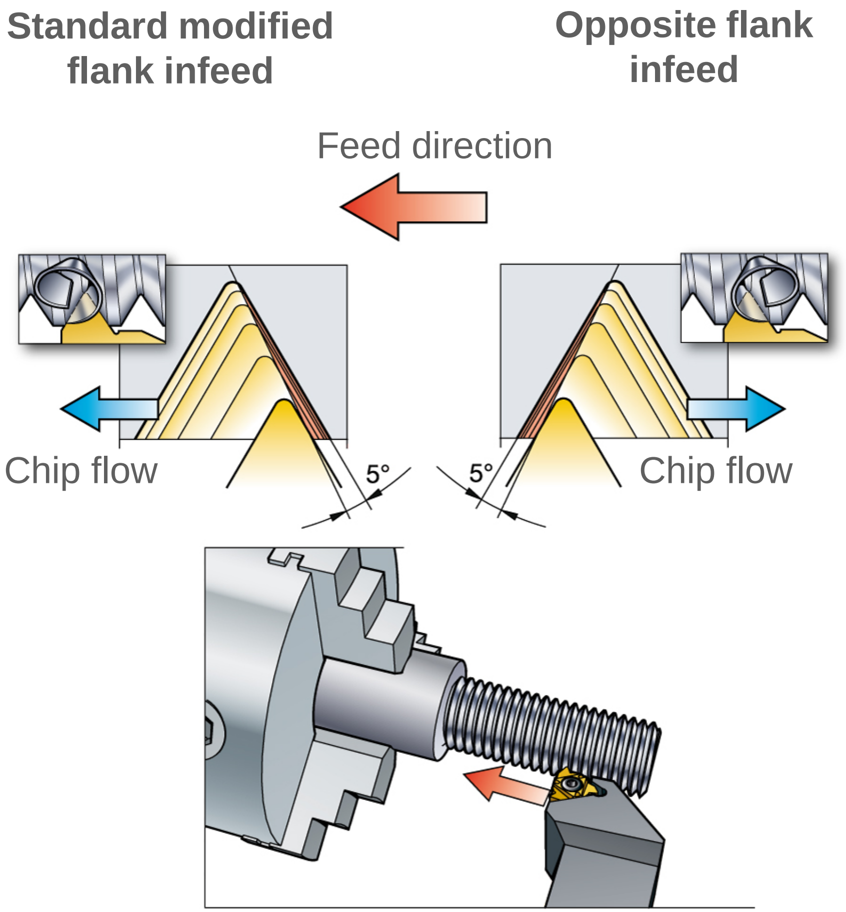
Modified flank infeed



Infeed

Opposite flank infeed



- Insert can cut using both flanks – the chip can be steered in both directions
- Better chip control
- Helps to ensure continuous, trouble-free machining, free from unplanned stoppages

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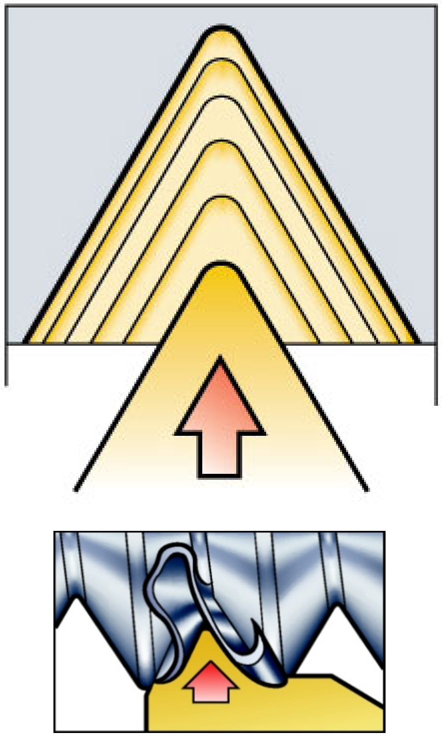
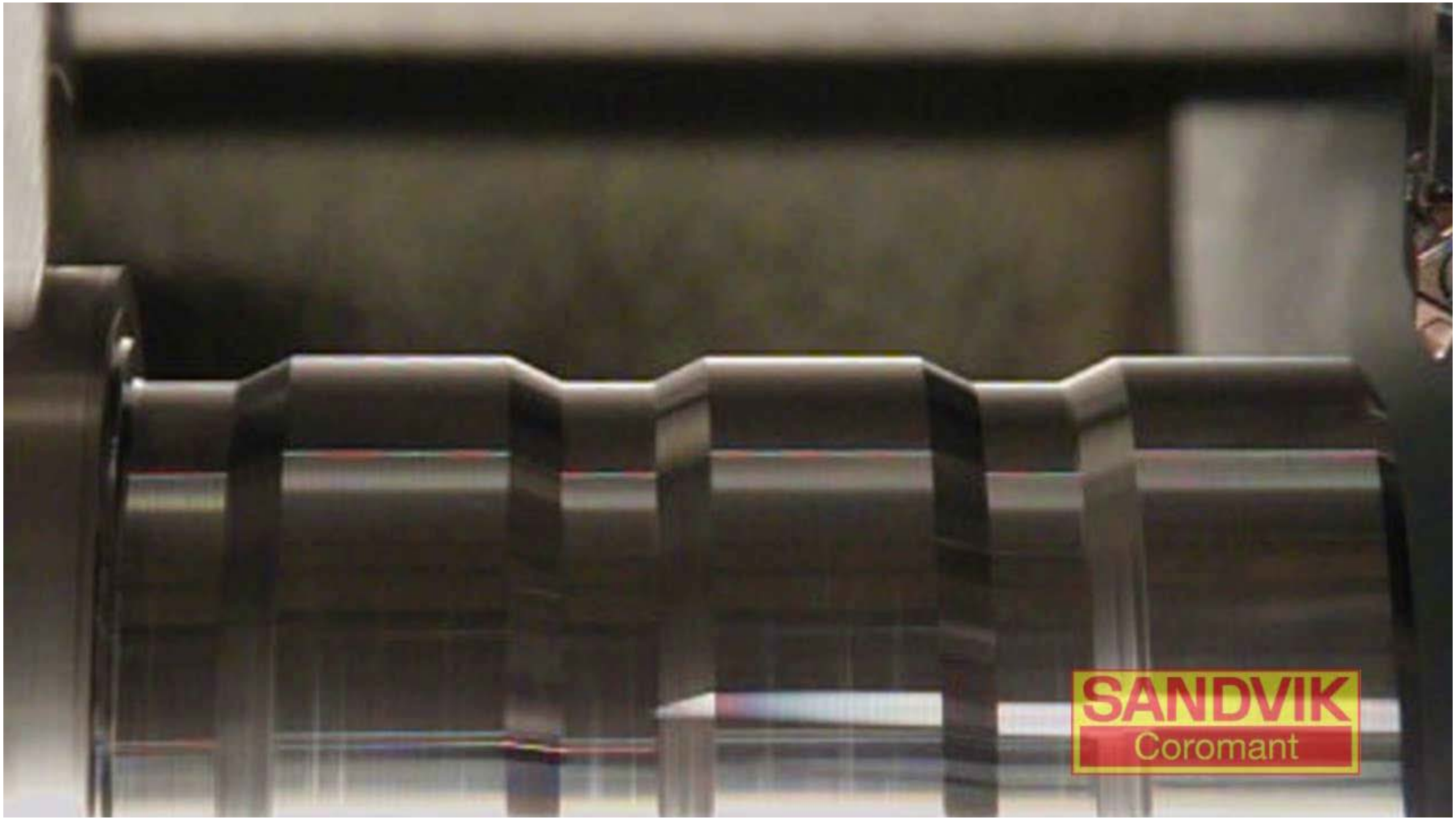
Infeed

Radial infeed



- Most commonly used method
- Makes a stiff “V” chip
- Even insert wear
- Insert tip exposed to high temperatures, which restricts depth of infeed
- Suitable for fine pitches
- Vibration possible and poor chip control in coarse pitches

Radial Infeed



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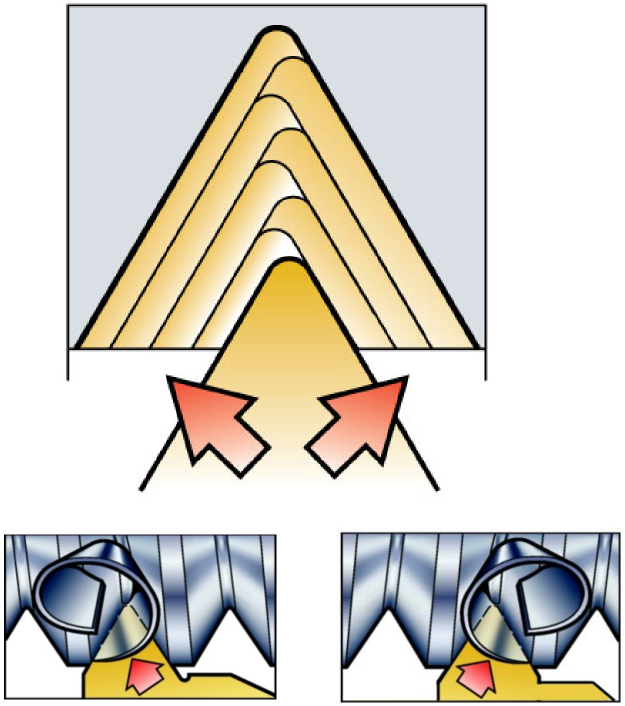
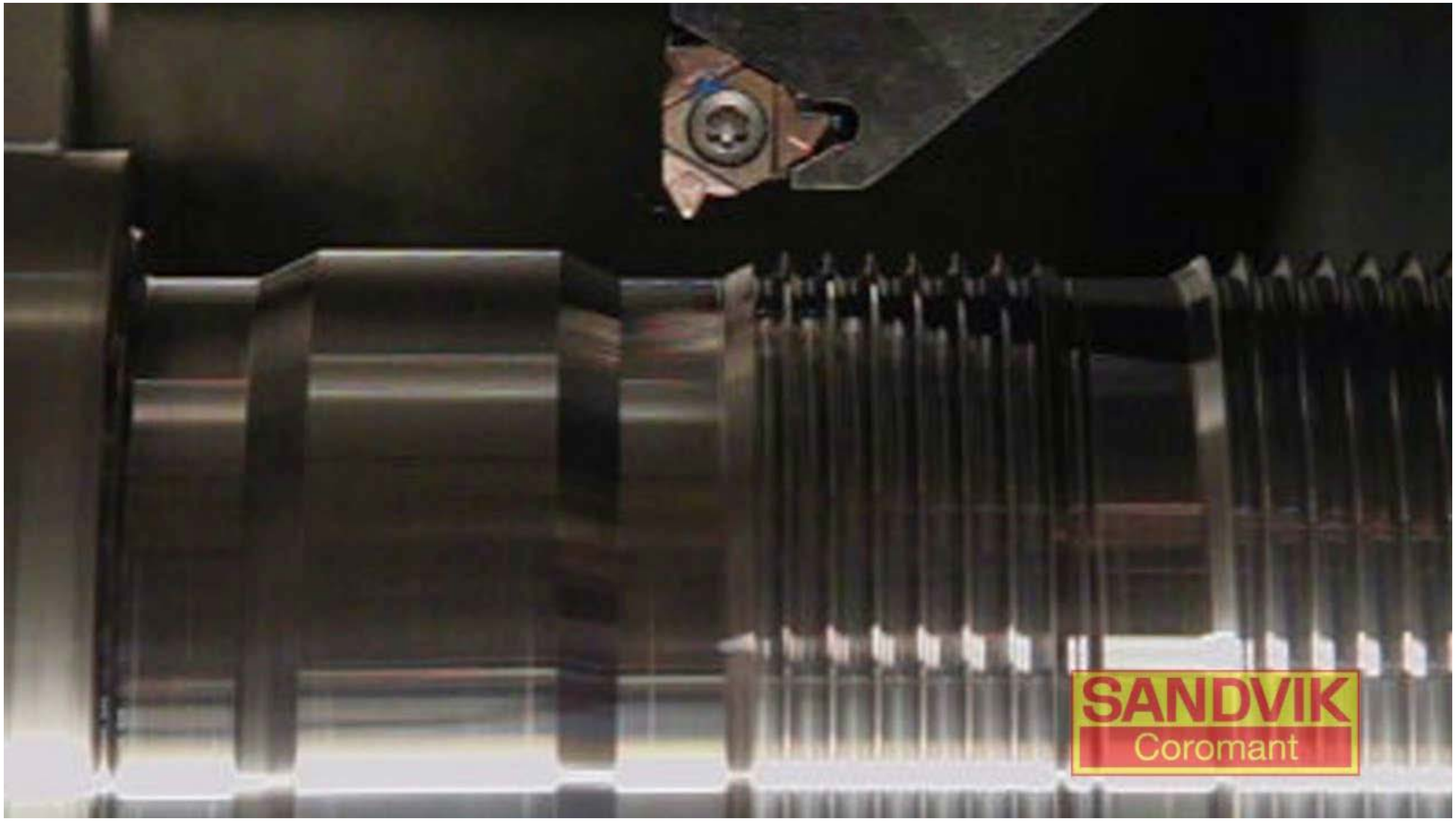
Application
Alternating infeed



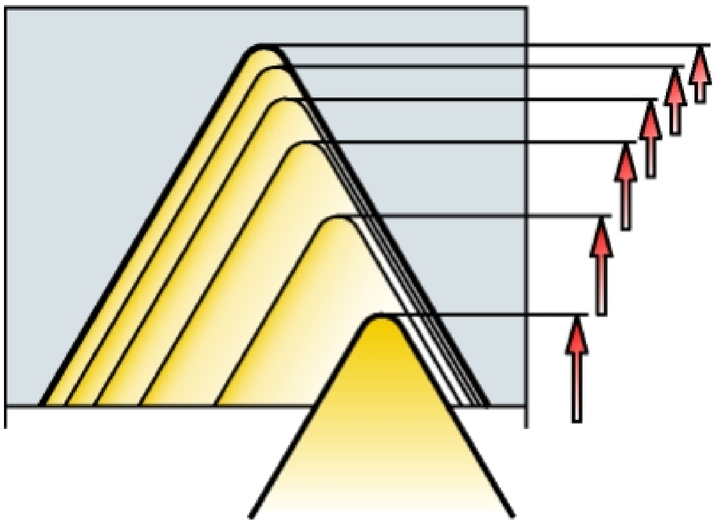
- First choice for larger thread profiles
- Recommended for pitches larger than 5 mm (5 t.p.i)
- Special CNC machine program is required
- Chips are directed both ways, making control difficult
- Even insert wear and longest tool life in very coarse threads

Alternating flank infeed



Infeed Application

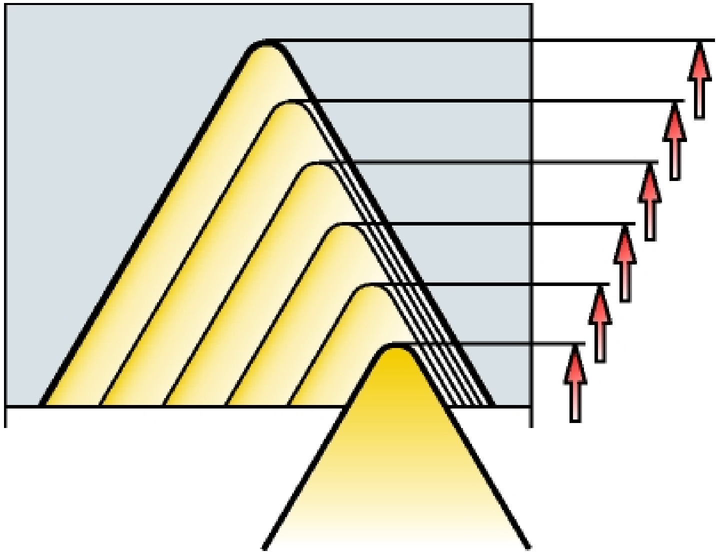
Decreasing depth per pass (constant chip area)



- First choice in all threading operations
- Most commonly used method to improve the machining result
- The first pass is the deepest
- Follows recommendation on infeed tables in catalog/calculator
- More “balanced” chip area
- Even load on insert
- Last pass around 0.07 mm (.003 inch)

Infeed Application

Constant depth per pass



- Each pass is of equal depth, regardless of number of passes
- More demanding on the insert
- Can offer better chip control
- Increases the required number of passes
- Should not be used for pitches larger than 1.5 mm or 16 t.p.i.
- A less-productive method

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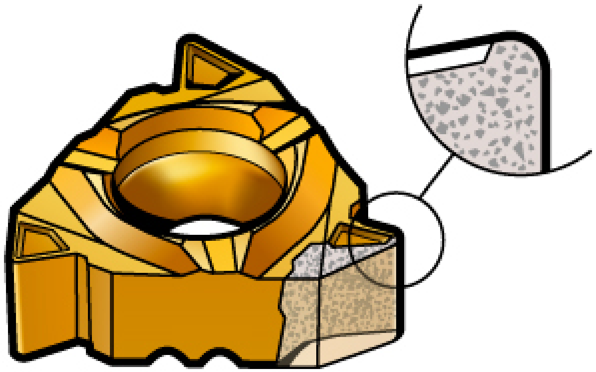
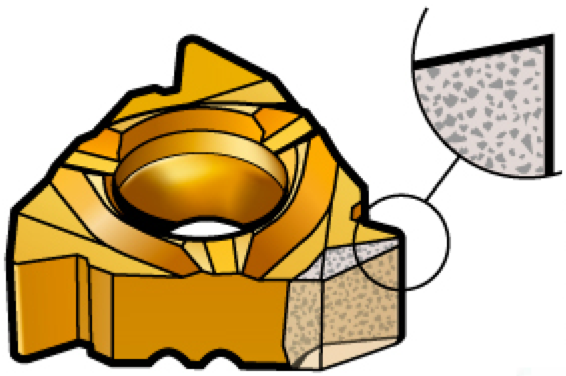
Three different geometries

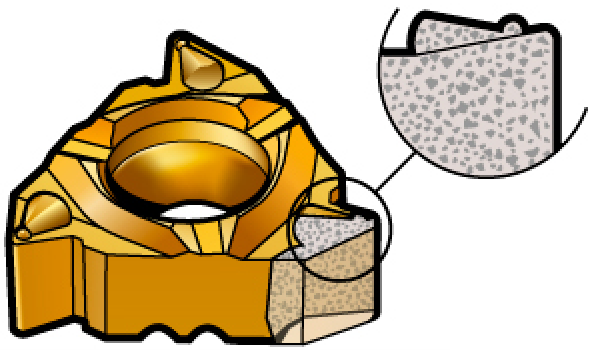
All-around geometry
First choice in most operations

F-geometry
Sharp geometry

C-geometry
Chip breaking geometry







- **C-Geometry**
- For best chip control use with modified flank infeed of about 1º

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Geometry

Radial infeed C - Chip breaking geometry

Insert:
266RG-16UN01C180M 1125

Pitch: 18 t.p.i.

V_c: 500 sfm

NAP: 6

Infeed: Radial

Geometry

Modified flank C - Chip breaking geometry

Insert:
266RG-16UN01C180M 1125

Pitch: 18 t.p.i.

V_c: 500 sfm

NAP: 6

Infeed: Modified flank

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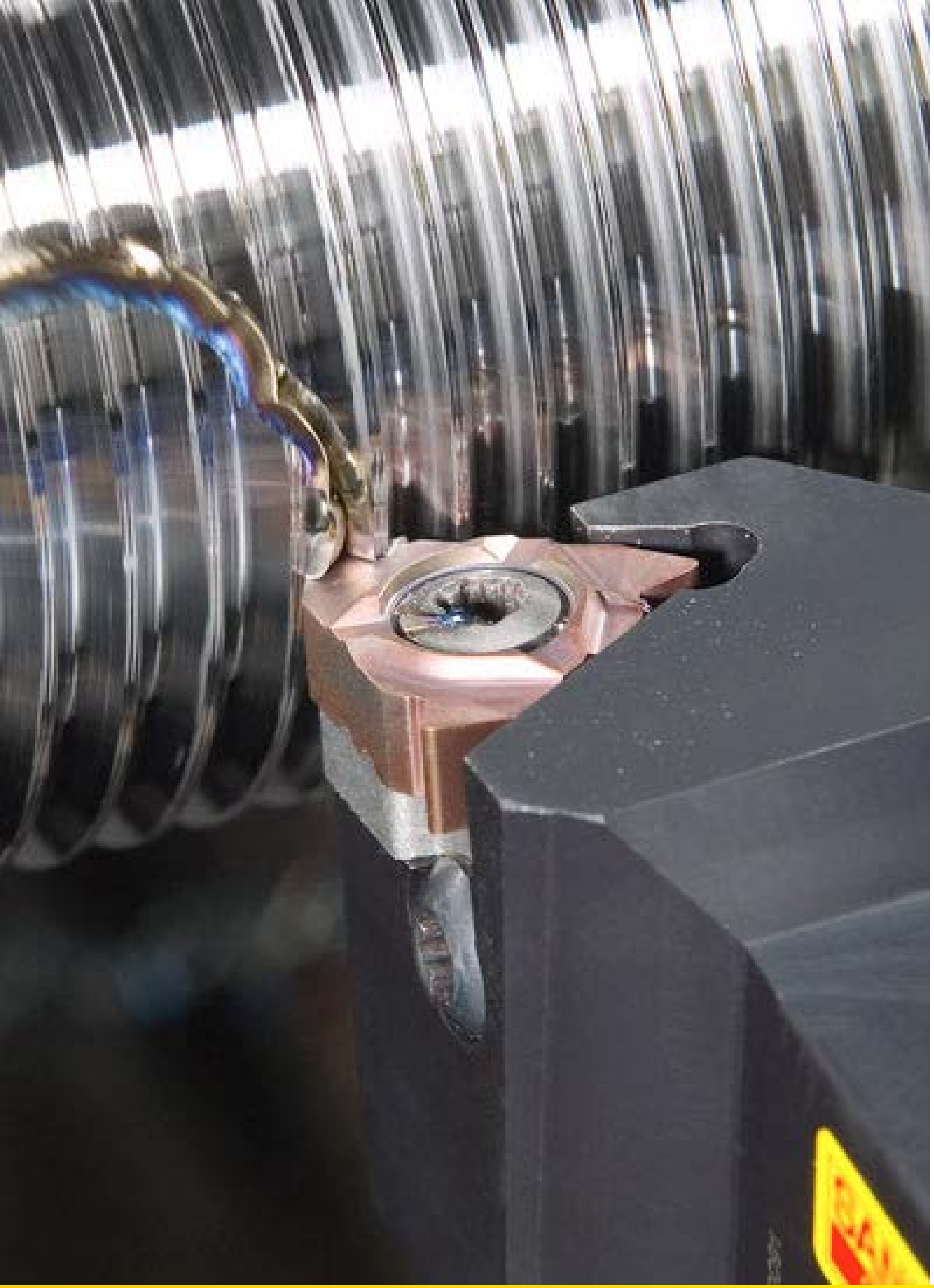

Your success in focus