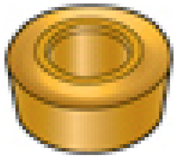
Application success factors
Round inserts and CoroCut RO

- Due to the component shape there are a lot of profiling and pocketing operations.

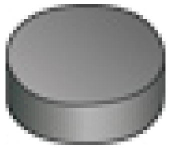
- Insert styles used:-
  - RCMT carbide
  - RNGN and RCGX/RPGX ceramic
  - CoroCut RO

- Programming into corners is often a problem area due to vibrations.

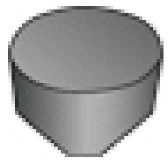
- There is a big opportunity to optimise the process to increase productivity and security



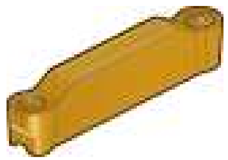
•RCMT



•RNGN

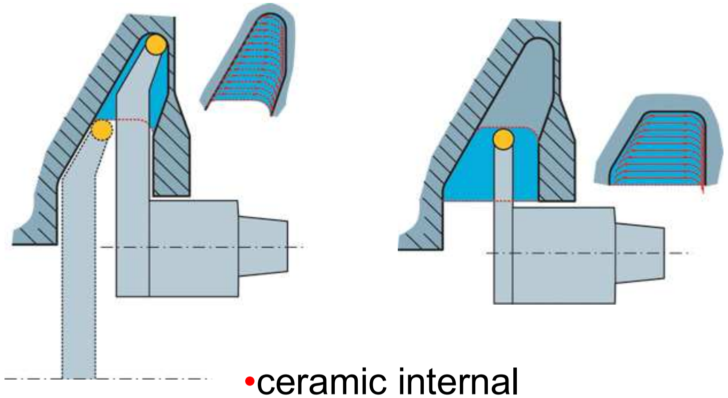


•RCGX/ RPGX

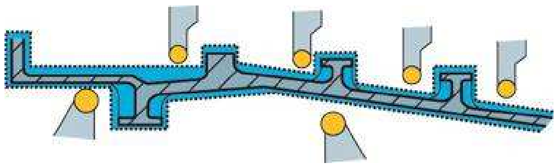


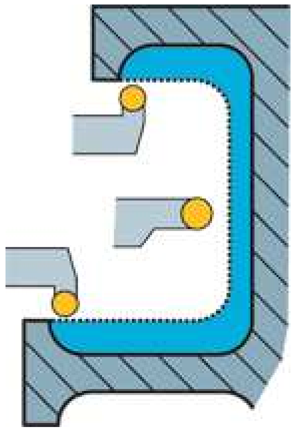
•CoroCut RO

Round inserts and CoroCut RO
Typical operations

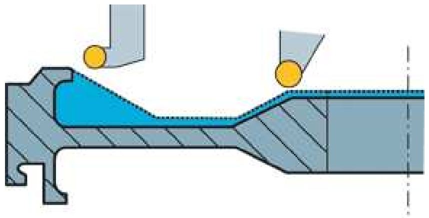


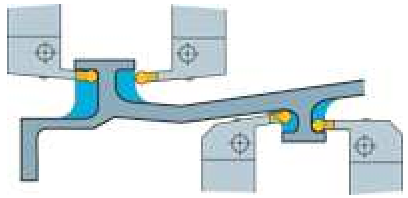
•ceramic internal profiling



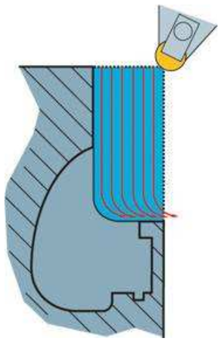


•carbide pocketing

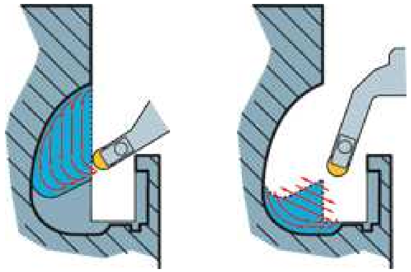




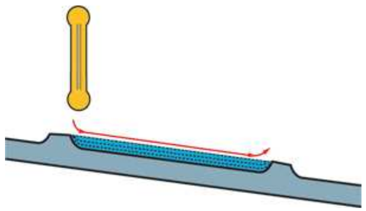
•CoroCut pocketing



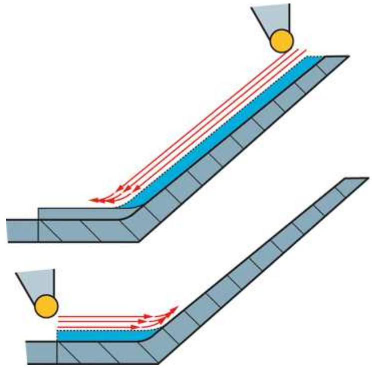
•ceramic machining into a corner



•ceramic pocketing



•CoroCut profiling

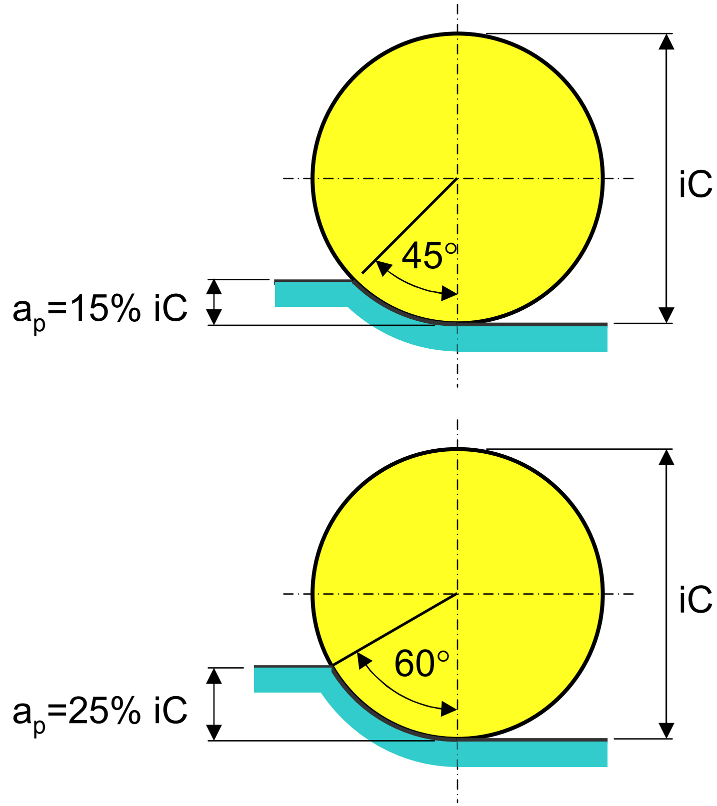


•Carbide profiling

Round inserts
Depth of cut/entry angle and arc of engagement

- Depth of cut when turning with round inserts in HRSA is recommended to max 15% of insert diameter due to notch wear.

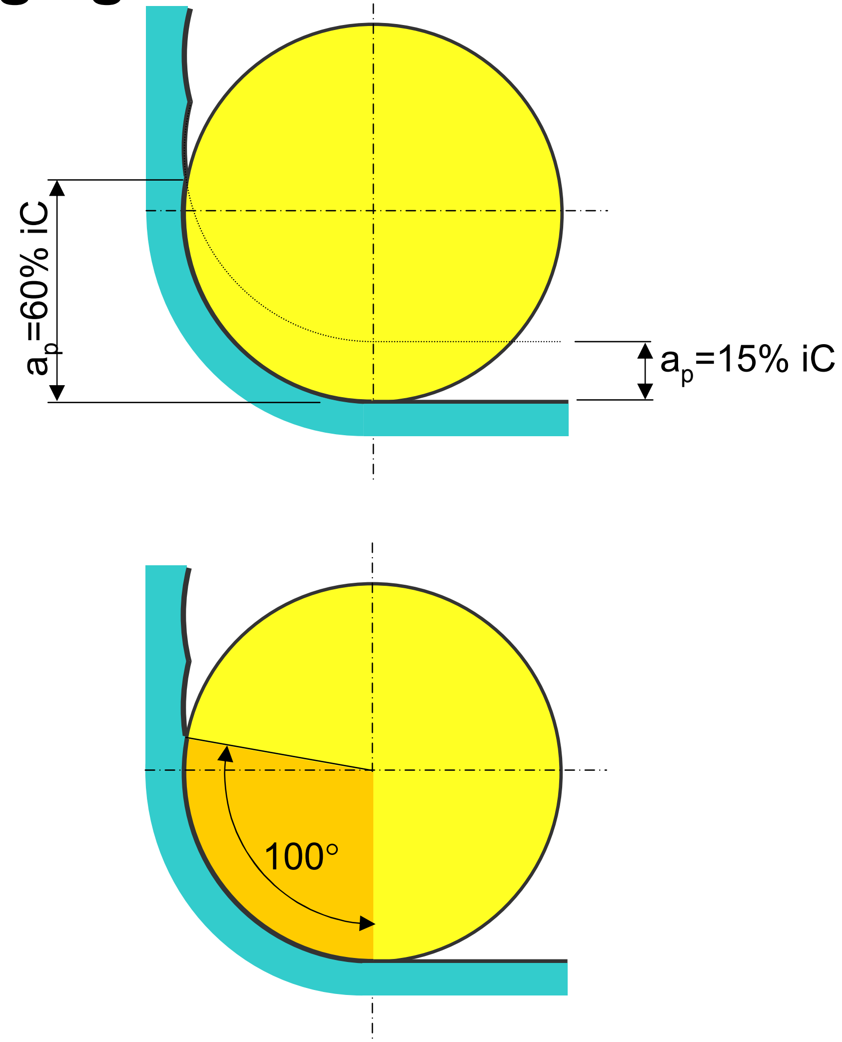
- Entry angle and arc of engagement of the insert is 45°
- Greater than 60° would create excessive cutting forces and ‘wrap around’
  - vibration
  - unpredictable performance



a_p/iC	Depth of cut for insert size						
	3	4	5	6	8	10	12
15%	0.45	0.6	0.75	0.9	1.2	1.5	1.8

Round inserts
Machining against a wall

- Machining against a wall increases the angular engagement creating vibration leading to:-
  - insert breakage
  - excessive insert wear
  - reduced number of edges



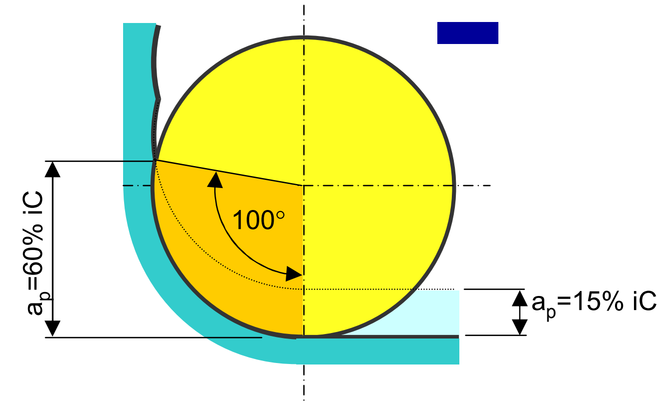
Round inserts

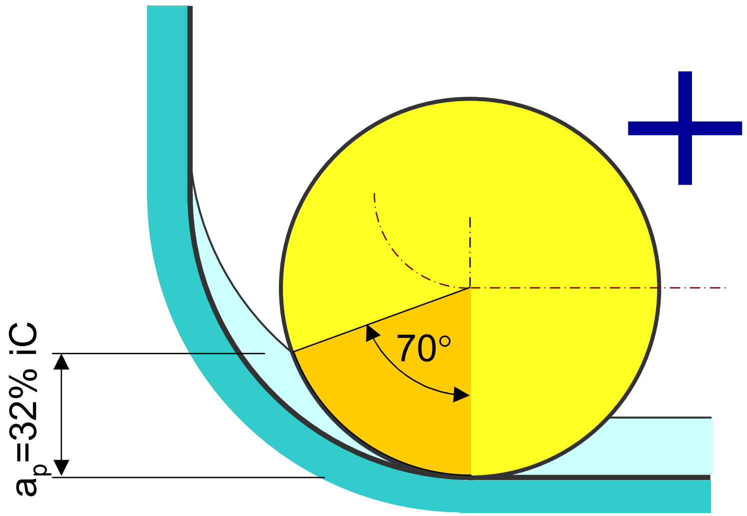
Machining against a wall - optimised

SHANGHAI YITING

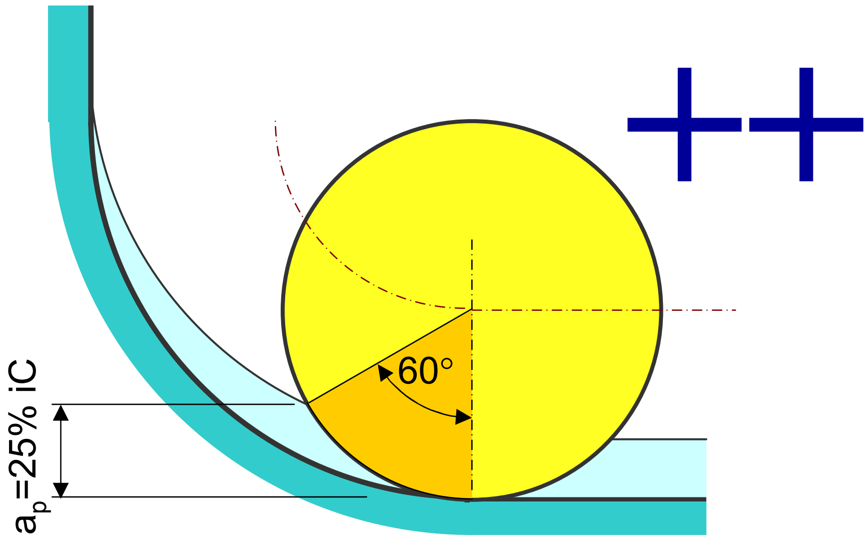
- Roll out of cut with reduced feed
- Minimum programmed radius =
  - Component radius = 75% of insert dia
  - Programmed radius = 25% of insert dia

    e.g. for 12mm rad
    – corner radius = 9mm
    – programmed radius = 3mm





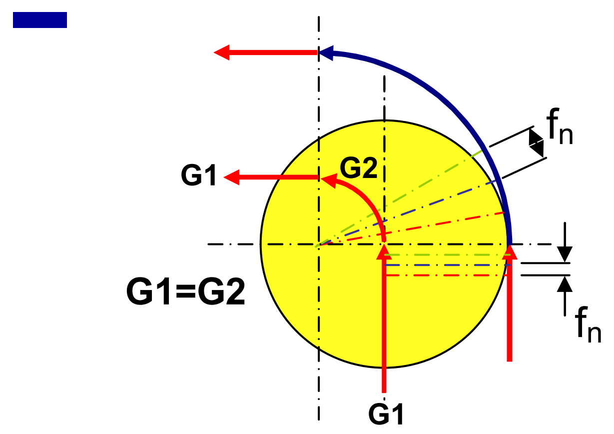
programmed radius = 25% iC



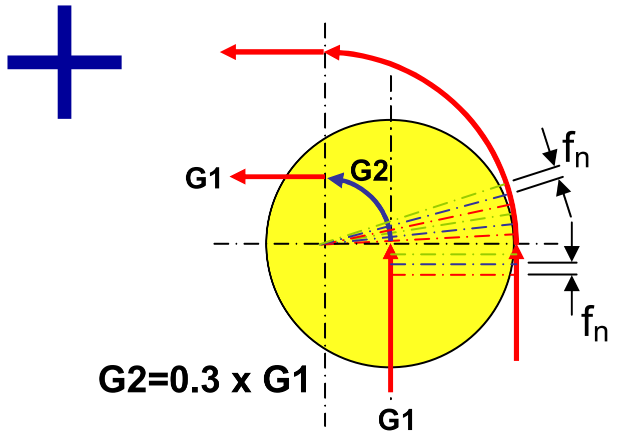
programmed radius = 50% iC

Feed reduction around radii
Tool centre feed

- Feed per revolution is for the programmed radius and not for the component radius
- If G2 = G1 - the periphery feed increases around the radius

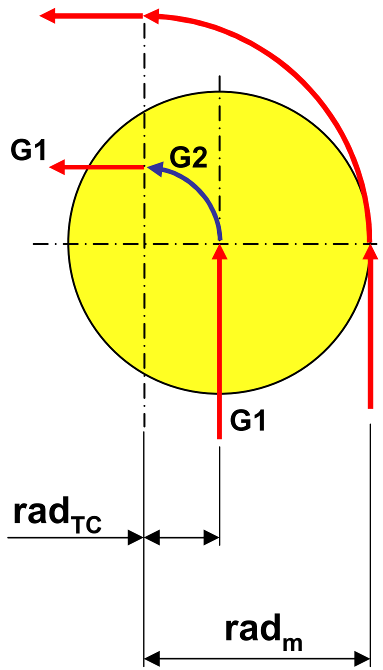


- G2 needs to be reduced to maintain same periphery feed



Feed reduction around radii
Tool centre feed

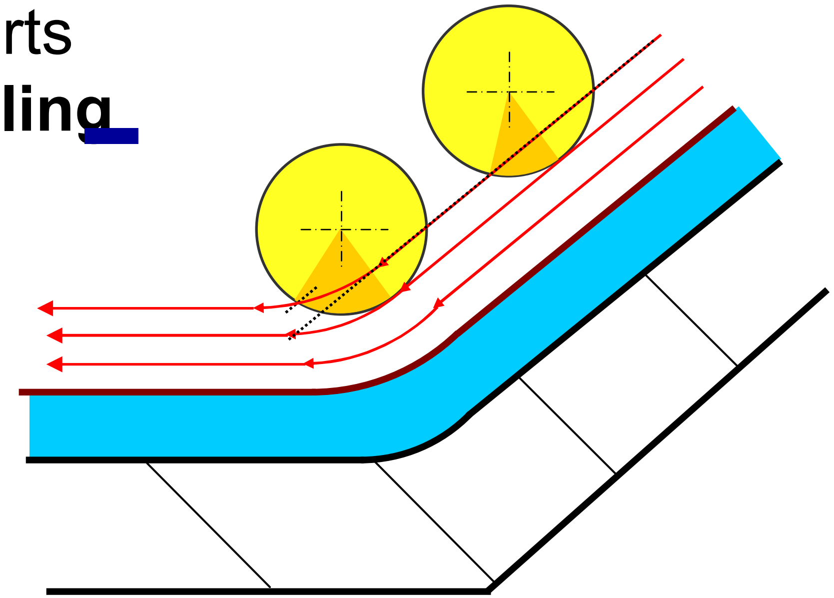
- Tool centre radius = rad_{TC}
- Component radius = rad_m



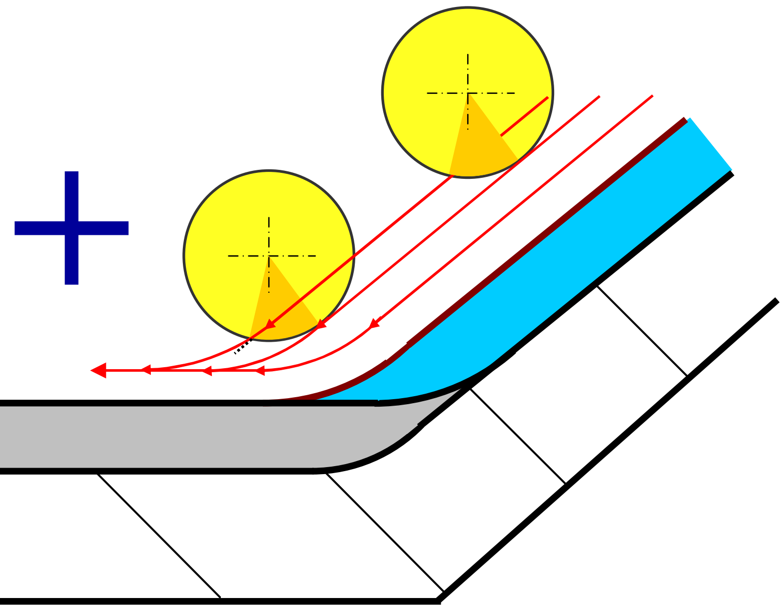
feed reduction factor = $\frac{rad_{TC}}{rad_m}$

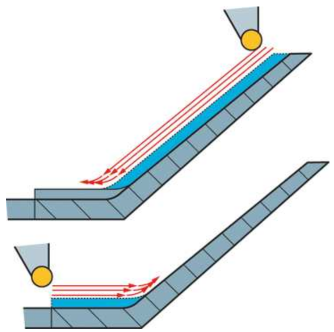
rad_{TC}	rad_m	G2 feed relative to G1
25% iC	75%iC	30%
50% iC	100%iC	50%

Round inserts
Rough profiling



- Machine only face or diameter and roll out of cut to maintain arc of engagement in corner
  - no vibration ⇒ high feed
- Minimum radius
  - Programmed radius = 25% of insert dia
  - Component radius = 75% of insert dia
- Reduce feed in radius

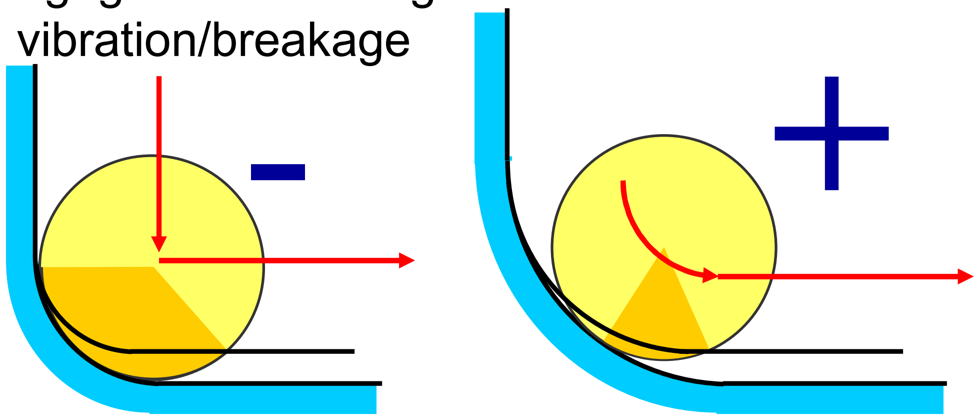


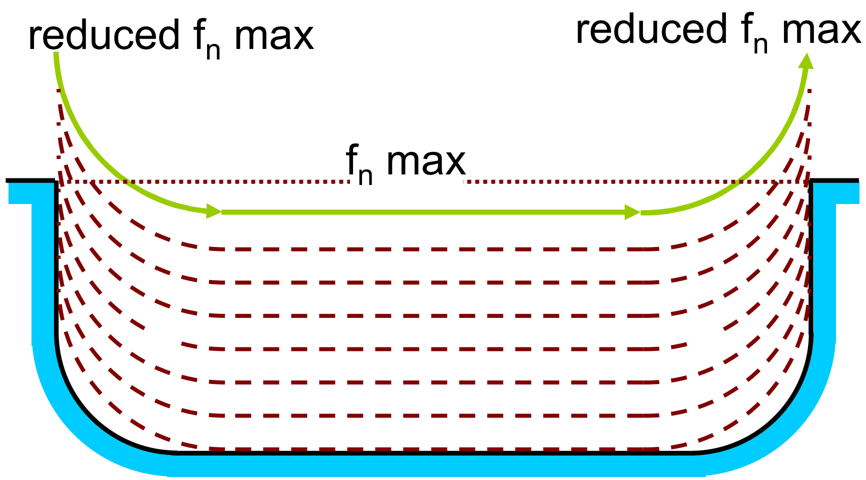


Higher feed and depth of cut capability

Round inserts
Profiling/pocketing - ‘Trochoidal turning’

Large arc of engagement causing vibration/breakage

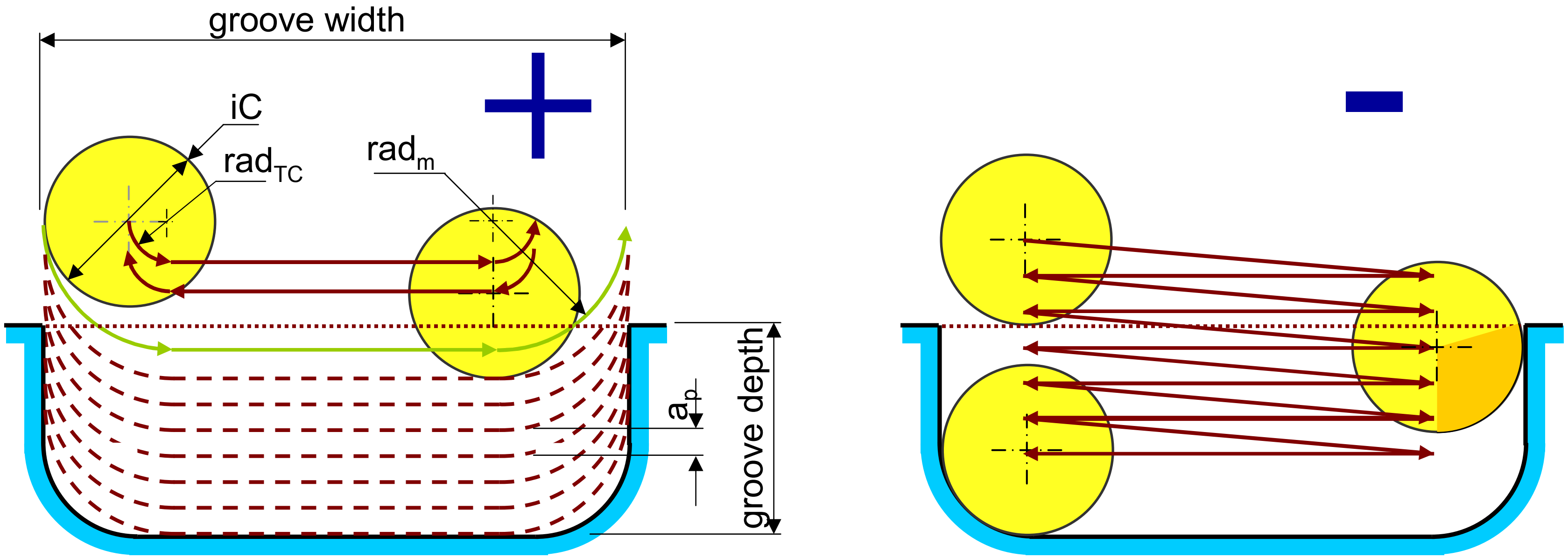




- Roll into cut with reduced feed
- Increase feed to max f_n for linear cuts
- Roll out of cut with reduced feed
- Alternate cutting direction for RCGX ceramic or Corocut RO to maximise insert edges

Round inserts

Profiling/pocketing - ‘Trochoidal turning’



- Minimum programmed radius :- e.g. for Ø12 insert
  - component radius (rad_m) = 75% of iC = 9mm
  - programmed radius (rad_{TC}) = 25% of iC = 3mm
- After last pass - take component radius to correct size