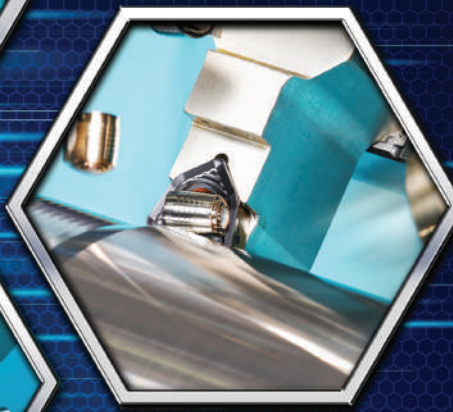
HIGH FEED TURNING



TaeguTec
Member IMC Group

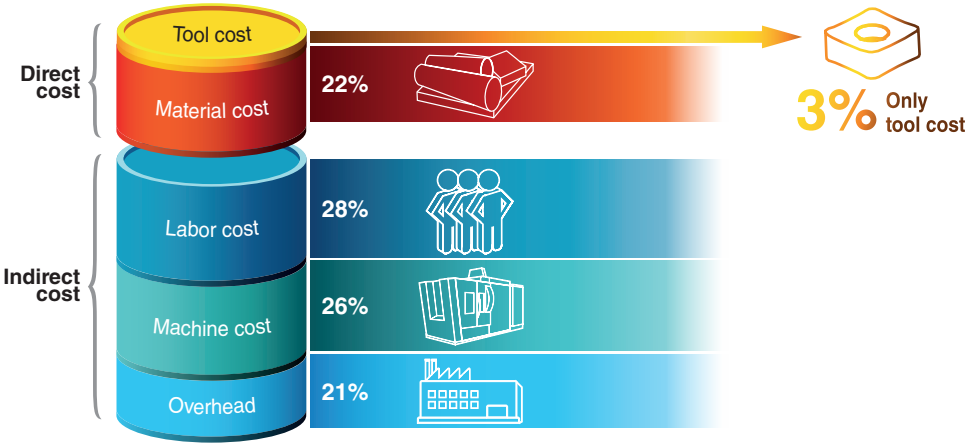
HIGH FEED TURNING

Contents

Cost reduction solution through productivity improvement

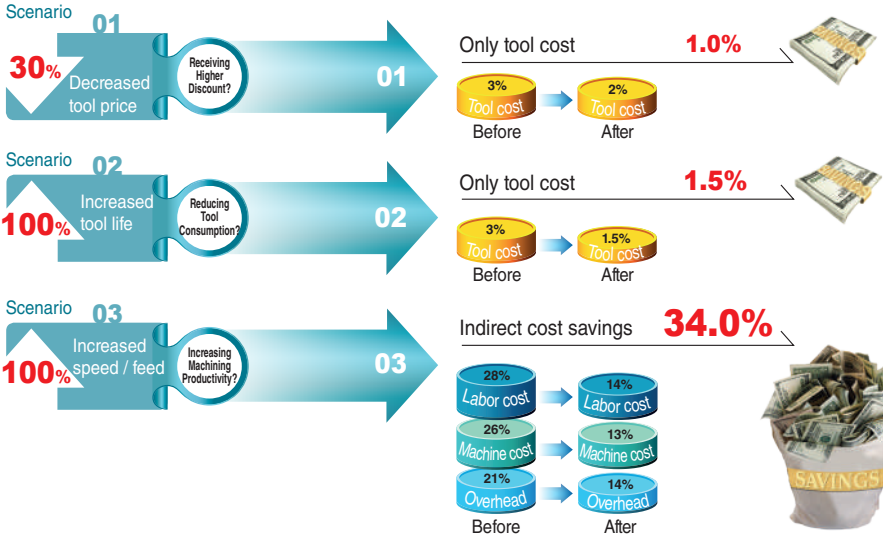
Productivity improvement by reducing machining time

In the recent manufacturing industry, reducing production costs has become a top priority for companies' profitability due to the increasing costs of raw materials and labor. One effective way to reduce production costs is to improve productivity by reducing machining time. While the tool cost represents only about 3% of the overall production cost structure for machining, reducing overhead costs through productivity improvement can be the most effective approach. With the use of TaeguTec high-feed turning products, we propose an optimal solution for improving productivity by reducing machining time.



Cost structure in a typical manufacturing company

What's the best way to cut costs?



ISO turning Vs. High-feed turning

2 Times productivity

High-feed

ISO insert

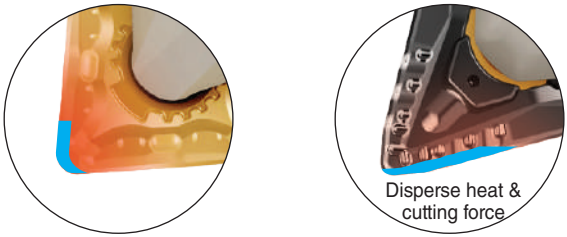
High-feed insert **2X Productivity**

2x productivity with 2x faster feed than ISO turning inserts

2 Times tool life

TOOL LIFE

Longer tool life



ISO insert

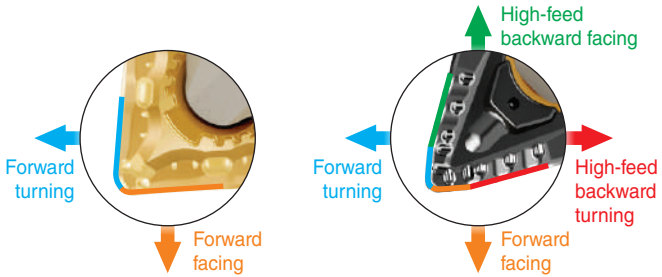
High-feed Insert

Compared to ISO inserts, tool life is doubled by dispersing heat and cutting force by using a larger area of the cutting edge

2 Rough & Finish in one tool

in 1

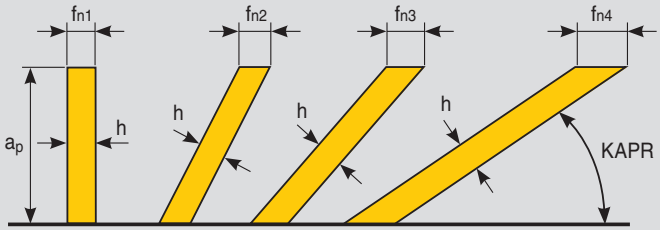
All-directional turning



All-directional turning, multiple roughing tools combined into one or roughing and finishing processes can be integrated into one

High-feed turning principle

This insert harnesses the principle of reducing the entering angle, while keeping the same chip thickness, allows a higher feed rate.



Entering angle (KAPR) and feed rate at the same chip thickness

*** f_n = h/sin (KAPR)**

- f_n: Feed rate
- h: Chip thickness
- KAPR: Lead angle

*** Chip removal ratio = f_n x a_p x v**

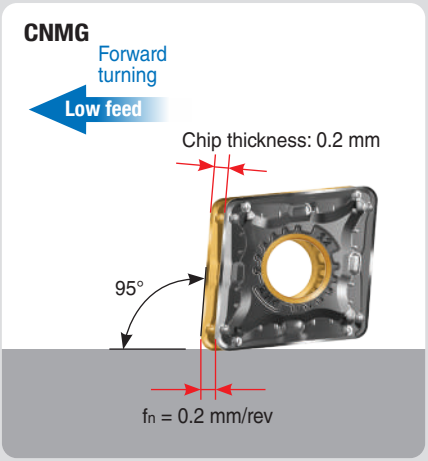
- a_p: Depth of cut
- v: Cutting speed

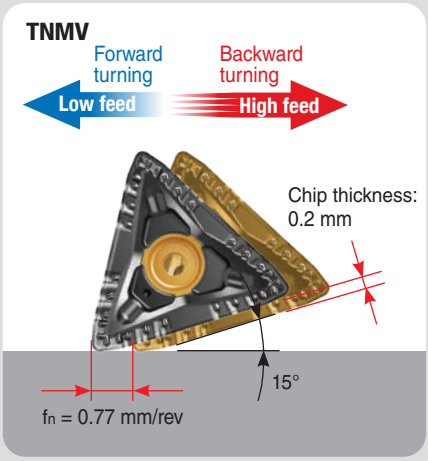
TaeguTec high-feed turning line

Product lines / Cutting conditions	WinTurn — TNMV 21-BM		PossTurn — ZNMV 14-BM	
Processing direction				
f_n Max. (mm/rev)	1.2	0.6	1.0	0.6
a_p Max. (mm)	2.0	3.5	2.5	2.0
KAPR (°)	15	95	23	95

Chip thickness comparison by feed-rate

The figure below illustrates that a high-feed tool with a smaller entering angle requires higher feed to achieve the same chip thickness as conventional ISO inserts. This can significantly increase machining efficiency and result in a drastic reduction in machining time.





Low feed → High feed

POSSTURN		TURNSFEED
XNMV 11-BM		FCMX 10-HFG
		
0.8	0.4	3.0
1.8	3.5	2.0
16.4	93	15

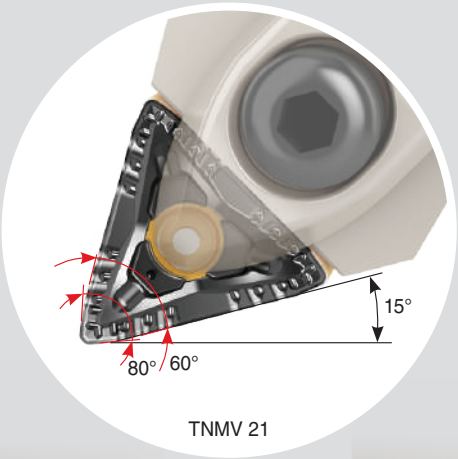
WINTURN ADVANCED MACHINING

6 Cutting edges insert for all-directional & high-feed back turning

Machining Video

Serrated cutting edge
Perfect chip evacuation

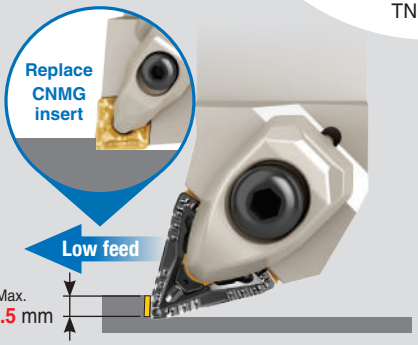
6 corners

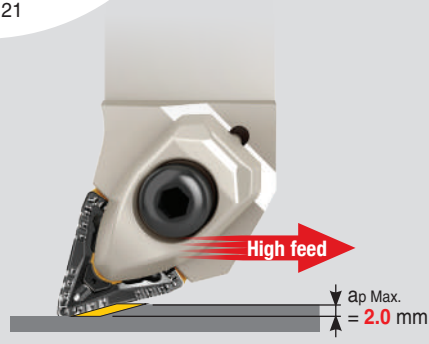


TNMV 21

All-directional turning

High-feed backward turning
Maximize productivity





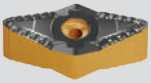
POSSTURN
DOUBLE SIDED POSITIVE TURNING

Machining Video

4 Cutting edges insert for all-directional & high-feed back turning

Serrated cutting edge
Perfect chip evacuation

4 corners



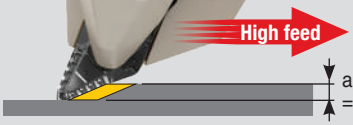
ZNMV 14

All-directional turning

High-feed backward turning
Maximize productivity

a_p Max. = **2.0** mm

f_n Max. = 0.6 mm/rev



a_p Max. = **2.5** mm

f_n Max. = **1.0** mm/rev

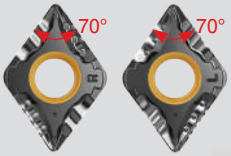
POSSTURN
DOUBLE SIDED POSITIVE TURNING

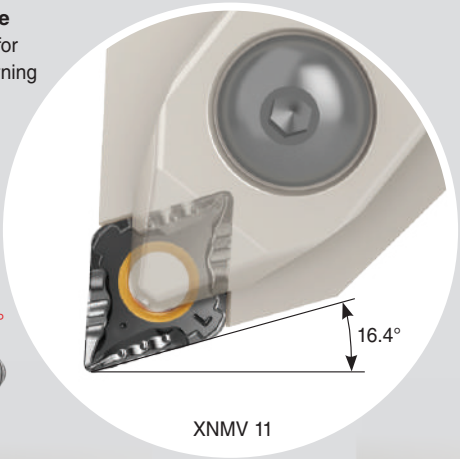
Machining Video

70° Corners insert for all-directional & high-feed back turning

Optimized cutting edge
Optimized cutting edges for forward and backward turning

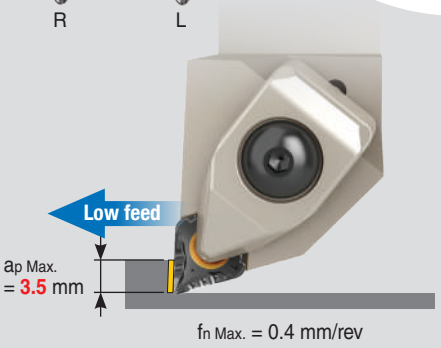
4-corner negative
Right hand & left hand insert

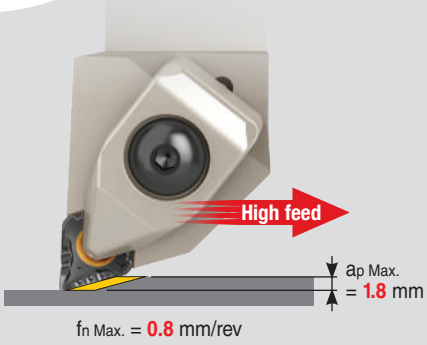




High-feed backward turning
Maximize productivity

Serrated cutting edge
Perfect chip evacuation





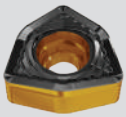
TURNSFEED
HIGH FEED TURNING

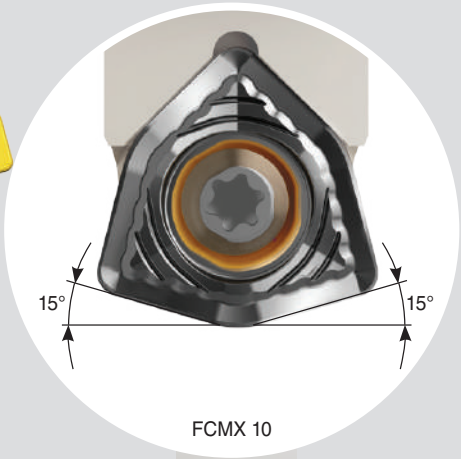
Machining Video

High-feed turning for left and right bi-directional machining

Robust and stable fastening structure

6-corner single-sided
3 index

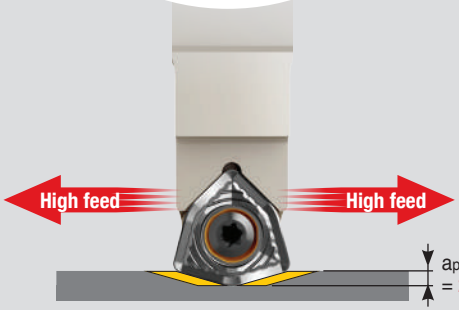




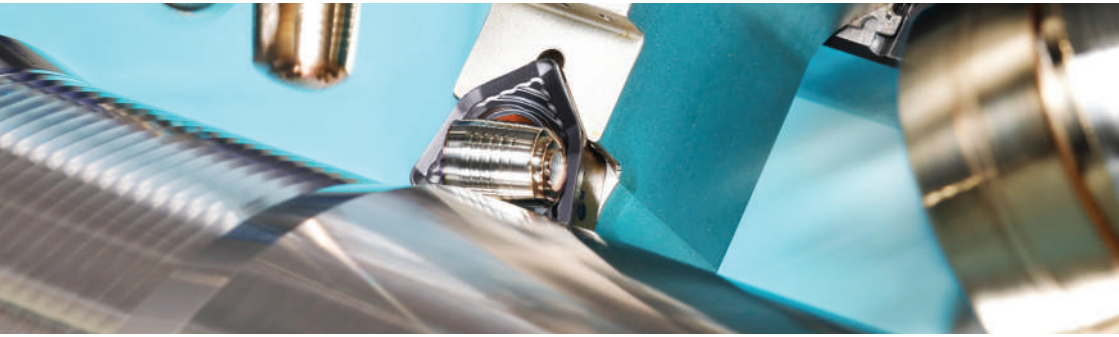
FCMX 10

Excellent chip control

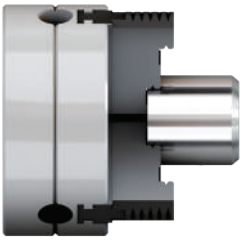
High-feed backward turning
Maximize productivity



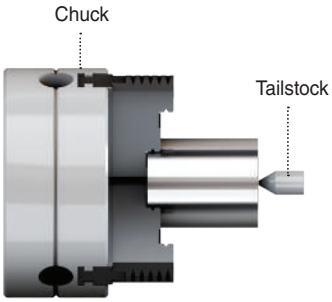
fn Max. = **3.0** mm/rev



Various applications



Short parts

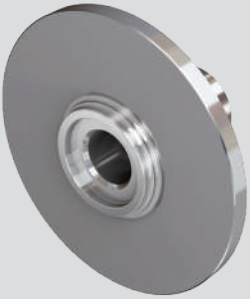


Short part + Tailstock

Examples

Bearing hub

Tripod joint



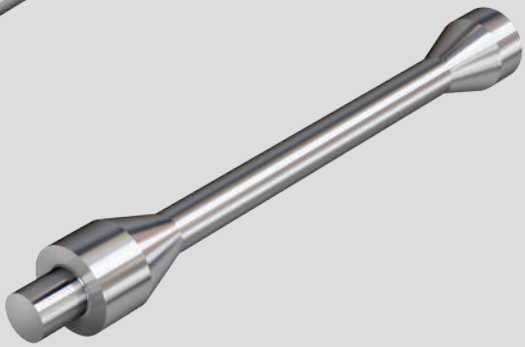
Input flange

Ball joint

Long part + Tailstock

Electric motor shaft

Sun gear shaft

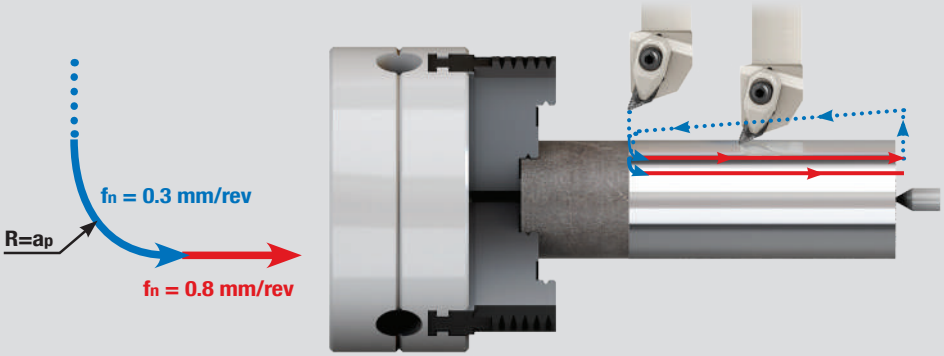


Input, output shaft

Recommended program method

Radial entry tool path

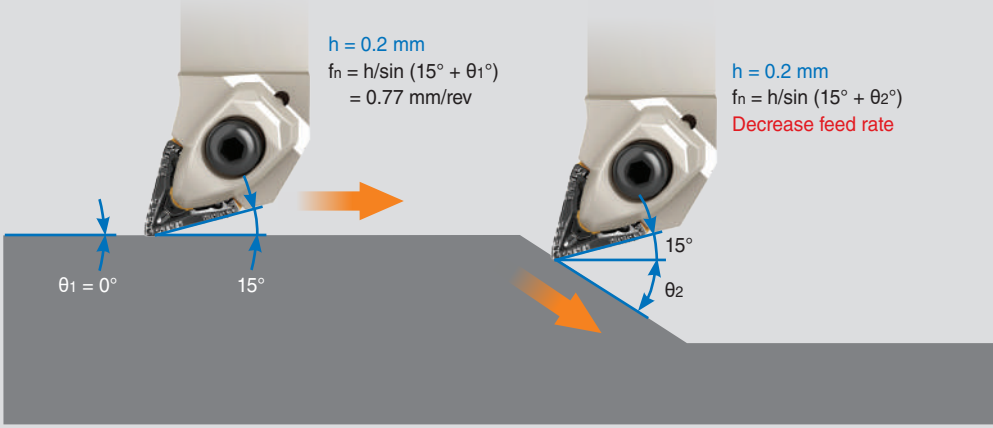
When using a circular interpolation tool path with a radius of 0.3 mm/rev feed rate, it is recommended to increase the feed rate for backward high-feed turning. It is important to note that the circular interpolation tool path radius should be equal to the depth of cut at a feed rate of 0.3 mm/rev. This is because circular interpolation helps prevent sudden load changes, insert chipping, and tool damage. Additionally, maintaining a constant cutting depth ensures better chip control during the turning process.



Profile machining

Lower the feed rate when the lead angle increases, higher the feed rate when the lead angle decreases

- When machining a profile, the chip thickness and lead angle both change depending on the direction. If machining with the same feed, the chip thickness and the cutting load increases as the lead angle

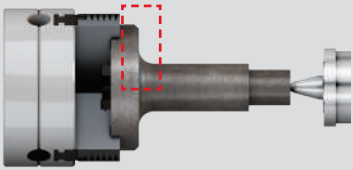


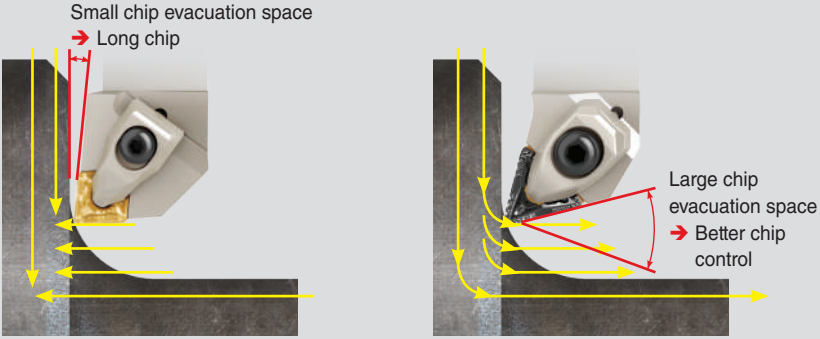
- f_n: Feed rate / a_p: Depth of cut / h: Chip thickness

Machining corner parts of forged products

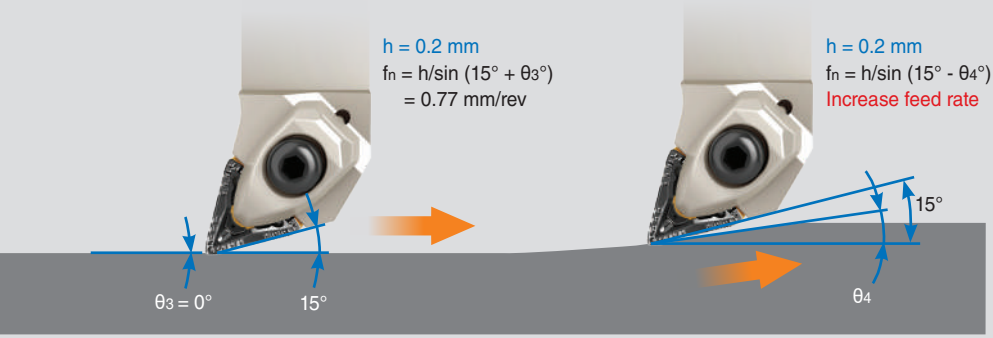
3-4 passes of “Circular interpolation” + "Backward high-feed turning"

- Forged products often have additional mill scales on the corners that require extra tool passes to remove. However, traditional programming techniques may have limited chip evacuation space, resulting in the formation of long chips. To prevent poor surface roughness and machine downtime caused by long chips, backward high-feed turning is recommended as it creates sufficient chip evacuation space.

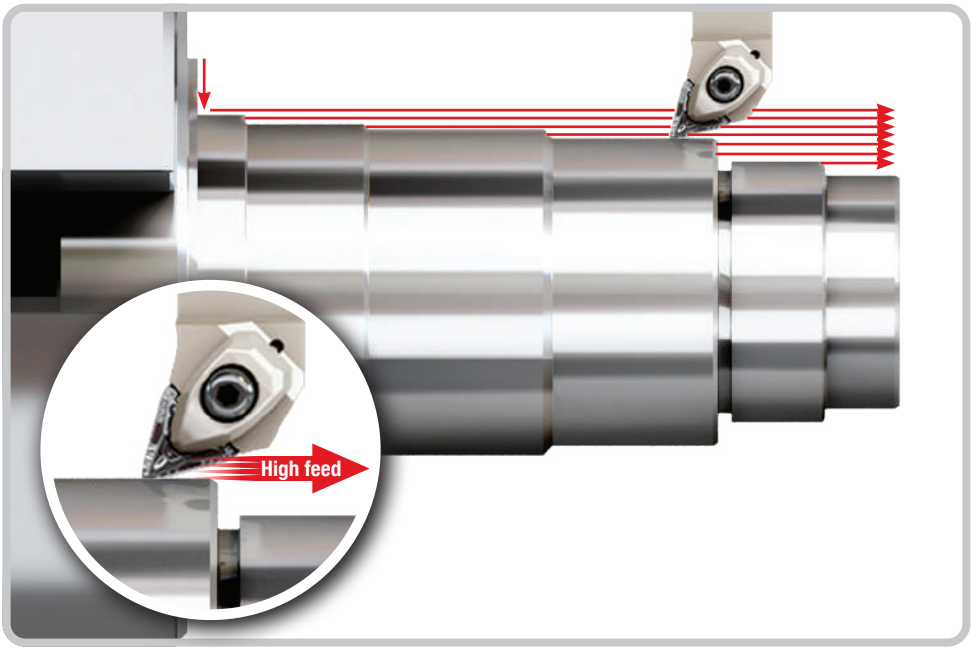


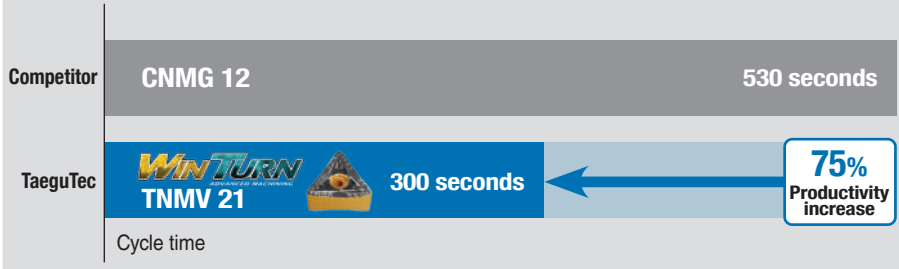


increases or the chip thickness decreases, making it difficult to control chipping as the lead angle decreases. Changing the feed to have the same chip thickness as the lead angle changes can prevent rapid cutting load changes and keep chip control constant.



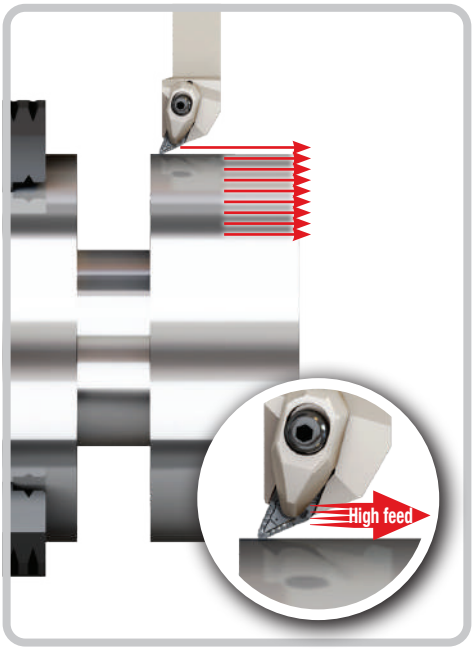
High-feed backward turning roughing



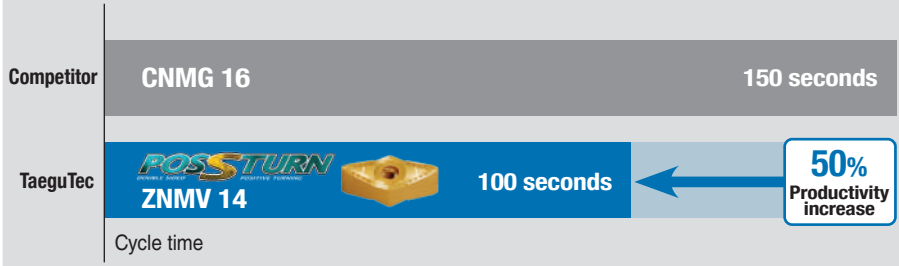


		Competitor	TaeguTec WINTURN
Insert		CNMG 12 (ISO type)	TNMV 210908-BM TT8125B
Holder		TCLNL 3232 P12	TTQNL 2525 M2109
Speed	V (m/min)	210	210
Feed rate	f_n (mm/rev)	0.25	0.8
Depth of cut	a_p (mm)	2.0	1.5
Cycle time		**530 seconds**	**300 seconds**

High-feed backward turning roughing

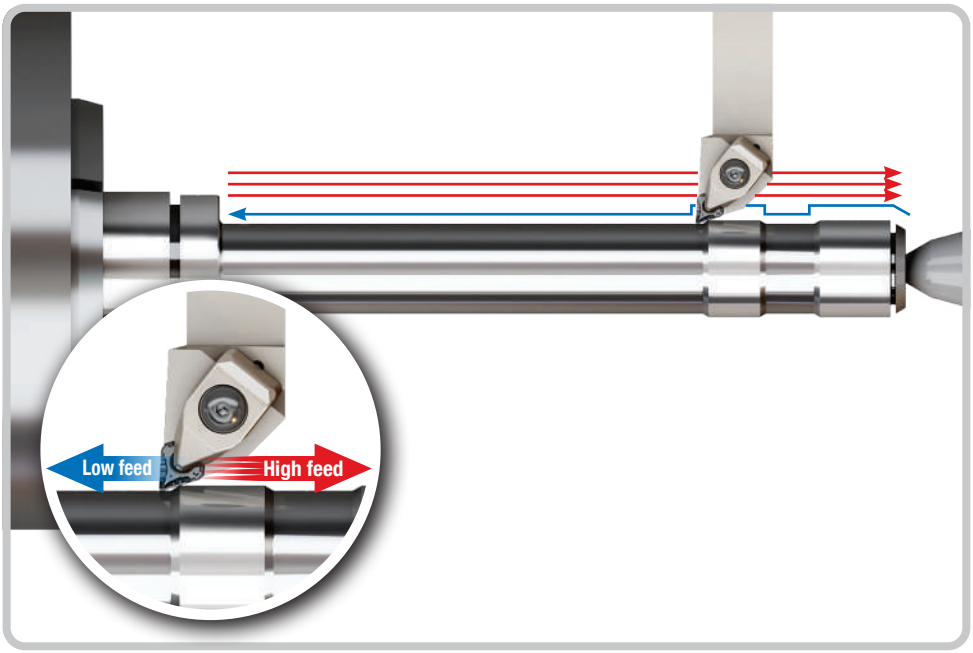


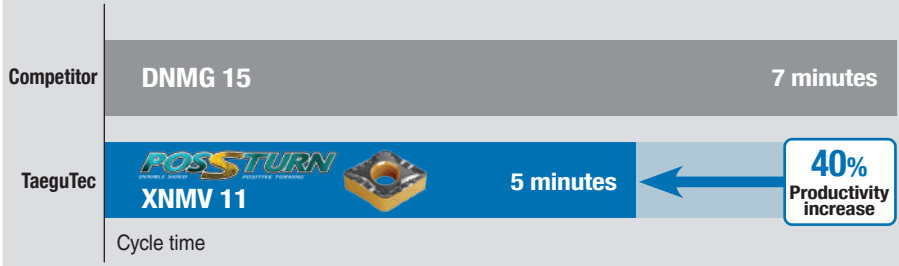
Forward turning finishing



		Competitor	TaeguTec POSSTURN
Insert		CNMG 16 (ISO type)	ZNMV 141008-BS TT3020
Holder		TCLNL 2525 M16	TZQNR 2525 M1410
Speed	V (m/min)	35	35
Feed rate	f_n (mm/rev)	0.3	0.8
Depth of cut	a_p (mm)	2.5	1.5
Cycle time		**150 seconds**	**100 seconds**

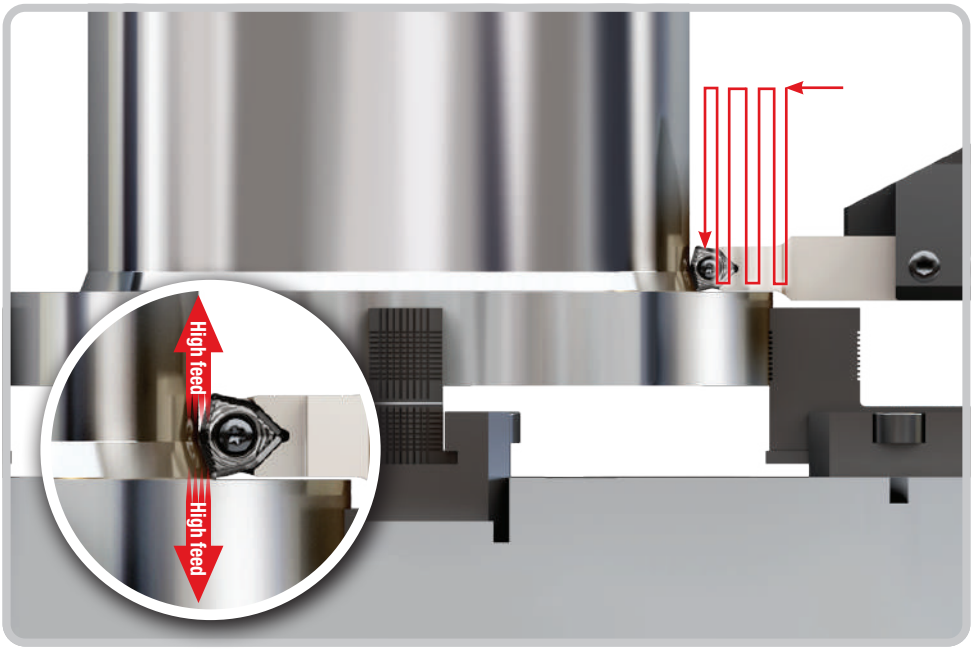
High-feed backward turning roughing / forward turning finishing

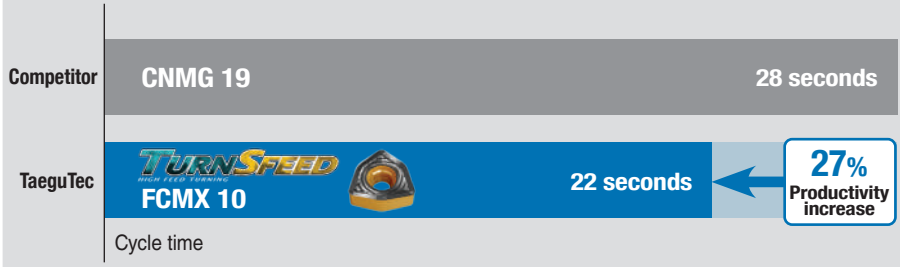




		Competitor	TaeguTec POSSTURN
Insert		DNMG 15 (ISO type)	XNMV 110508R-BM TT8115B
Holder		TDJNR 2525 M10	TXJNR 2525 M1105
Speed	V (m/min)	150	180
Feed rate	f_n (mm/rev)	0.3	0.7
Depth of cut	a_p (mm)	0.75	0.75
Cycle time		**7 minutes**	**5 minutes**

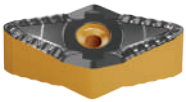
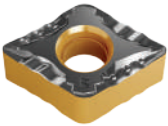
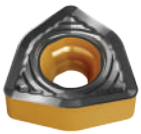
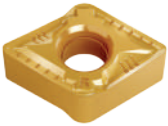
High-feed bi-directional roughing





		Competitor	TaeguTec TURNSFEED
Insert		CNMG 19 (ISO type)	FCMX 100616 HFG TT8125B
Holder		C6-PCLNR (Capto)	SFXCN 2525 P1006 / C6 ASHR 25-1
Speed	V (m/min)	200	200
Feed rate	f_n (mm/rev)	0.4	2.5
Depth of cut	a_p (mm)	8.0	1.5
Cycle time		**28 seconds**	**22 seconds**

Insert selection by workpiece material

ISO	WinTurn TNMV 21	PosSturn ZNMV 14	PosSturn XNMV 11	TurnSpeed FCMX 10
P	 BM 1st TT8125B 2nd TT8115B	 BM 1st TT8125B 2nd TT8115B	 BM 1st TT8125B 2nd TT8115B	 HFG 1st TT8125B 2nd TT8115B
P		 Y-BF 1st TT8125B 2nd TT8115B		
M	 BS 1st TT9225 2nd TT9080			 HFP TT9225
S		 BS 1st TT3020 2nd TT3010	 BS 1st TT3020 2nd TT3010	

Tool CutZZ

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