2019

AEROSPACE

FEATURING THE BEST
AEROSPACE COMPONENT
MACHINING SOLUTIONS
FROM WIDIA™

WIDIA™

MACHINING **BRILLIANCE**

WIDIA™ is pleased to present this book of solutions, meant to provide inspiration. Unlike most aerospace solutions tooling books, we have brought forward not only tooling, but some of our finest machining strategies, or proven solutions as we call them, presented through real-life customer examples (WIDIA Shining Moments).

The combination of the WIDIA tooling technology, machining strategy, and experience helps our customers create what we call Machining Brilliance. The WIDIA team sees this as our mission, to collaborate and innovate hand-in-hand with our customers.

WIDIA™

MACHINING **BRILLIANCE**

AEROSPACE

BENEFITS OF THIS BROCHURE

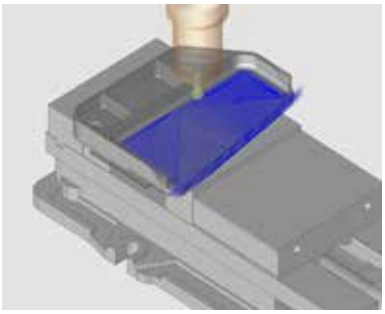
Advanced milling methods (i.e., high-speed, trochoidal, etc.) were used, which enabled the use of higher feeds and speeds beyond traditional methods published by WIDIA™. Use of tooling in advanced-application parameters is highly dependent on proper application of machining programming methods. Users may want to also want to consult their CAM system supplier on programming techniques for advanced milling.

ILLUSTRATED PROCESS STEPS

For each component, see actual strategies and tooling technologies specifically designed for aerospace.

1

	ROUGHING HIGH MACHINING (ROUGH BIG POCKET)	
Tool Dimensions	12 x 12 x 26 x 83 x R-3.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	3,052	3,052
F_z	0,1mm	0.0039"
F	2,136 mm/min	84 IPM
Ap	24mm	0.094"
Ae	0,6mm	0.0236"



WIDIA SHINING MOMENTS

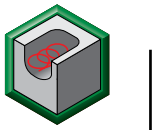
Each component includes a real-life customer case where WIDIA tooling technology and machining strategy came together to increase productivity and reduce cost!

WIDIA™ SHINING MOMENT

	COMPETITOR	WIDIA
	Roughing AIRFOIL	
Specifications	**16x16x15x83xR-1 6 Flutes**	**Based on 77NE 7 Flutes**
Workpiece Material	Titanium	
Width	230mm	
Length of Blade	420mm	
Total Milling Cycle Time	93 Minutes	62 Minutes

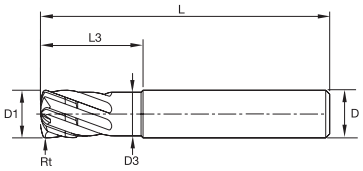
APPLICATION PARAMETERS

This cutting data shows real-life application parameters.



	ROUGHING HIGH MACHINING (ROUGH BIG POCKET)	
Tool Dimensions	12 x 12 x 26 x 83 x R-3.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	3,052	3,052
F_z	0,1mm	0.0039"
F	2,136 mm/min	84 IPM
Ap	24mm	0.094"
Ae	0,6mm	0.0236"

D1	=	12
D	=	12
Ap1 max	=	26
L	=	83
Rt	=	3.0



S (RPM)	=	Spindle Speed
Fz [IPT]	=	Feed per Tooth
F	=	Feed
Ap	=	Axial Depth of Cut
Ae	=	Radial Width of Cut
D1	=	Outer Diameter Tool
Rt	=	Radius
L	=	Length

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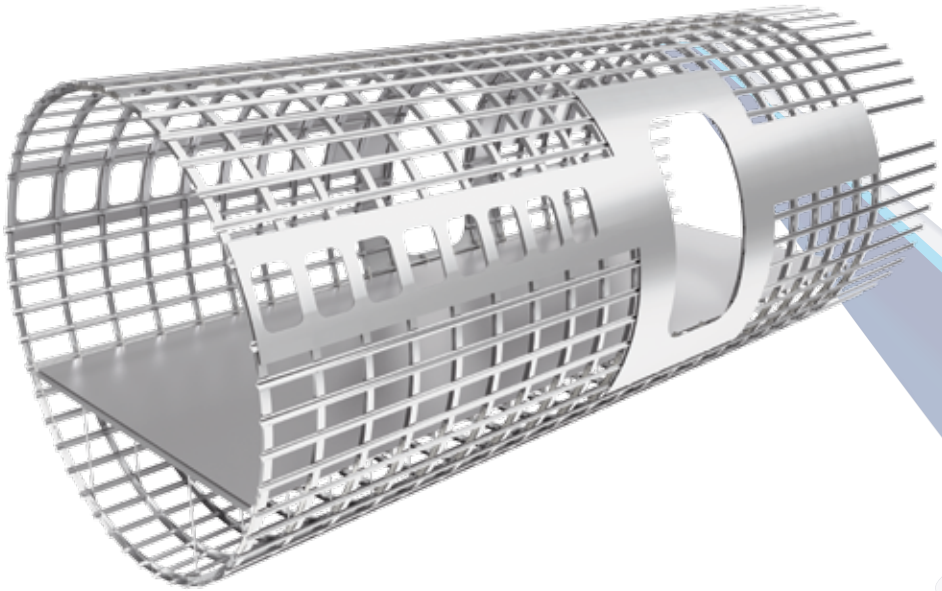
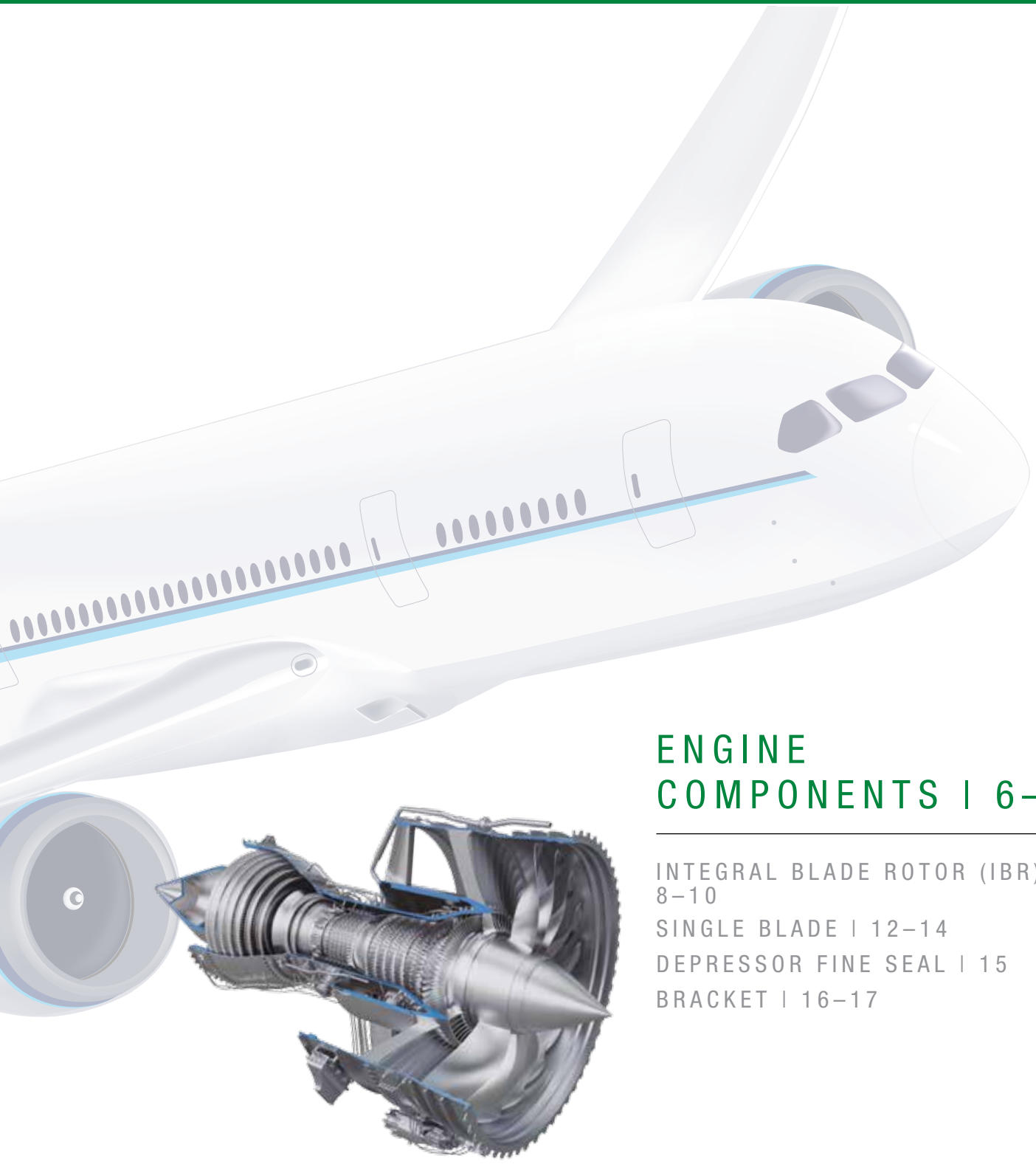
WIDIA™ Offers Machining Strategies and Innovative Tooling Technology that Reduce Cycle Time and Increase Cost Savings.



STRUCTURE | 18–26

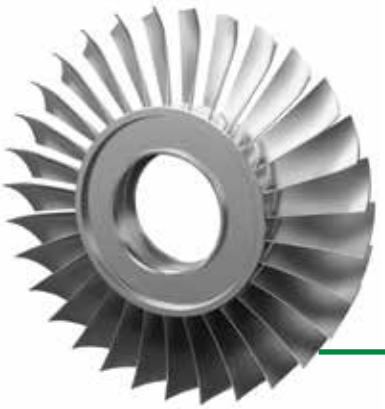


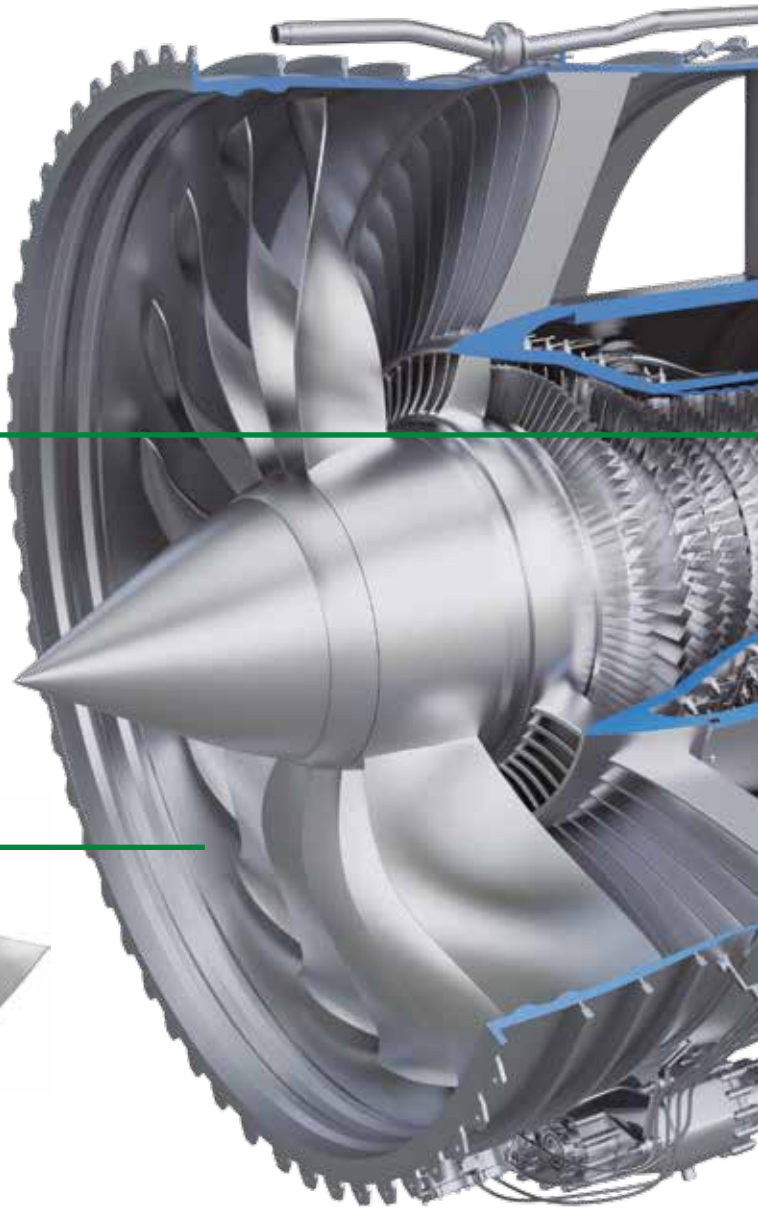
ENGINE COMPONENTS | 6–17

Engine Components

AEROSPACE

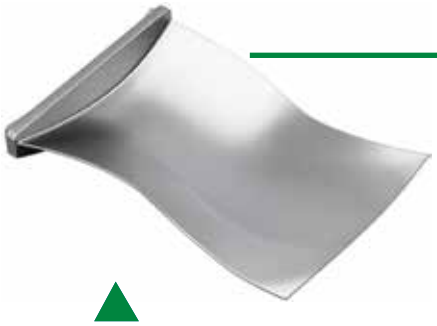
WIDIA™ Offers Machining Strategies and Innovative Tooling Technology that Reduce Cycle Time and Increase Cost Savings.





INTEGRAL BLADE ROTOR (IBR)

PAGES 8–10



SINGLE BLADE

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DEPRESSOR FINE SEAL

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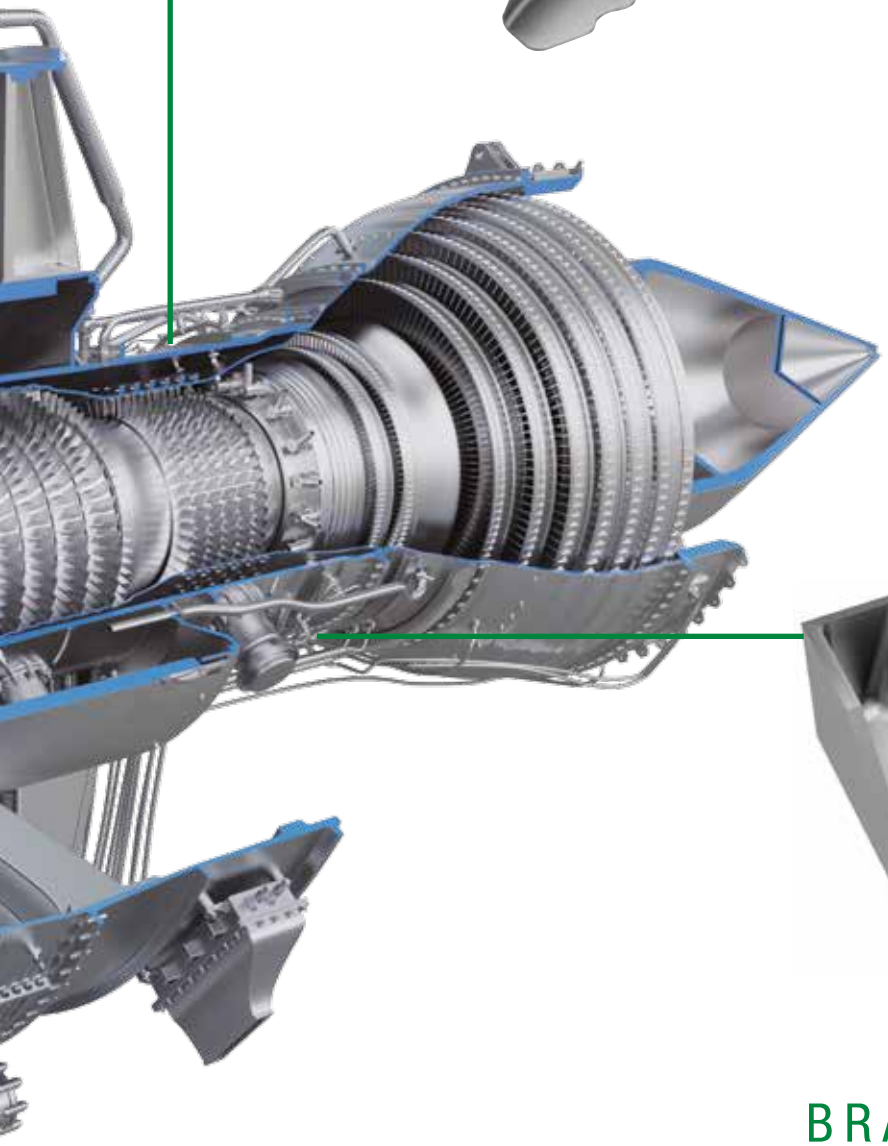

BRACKET

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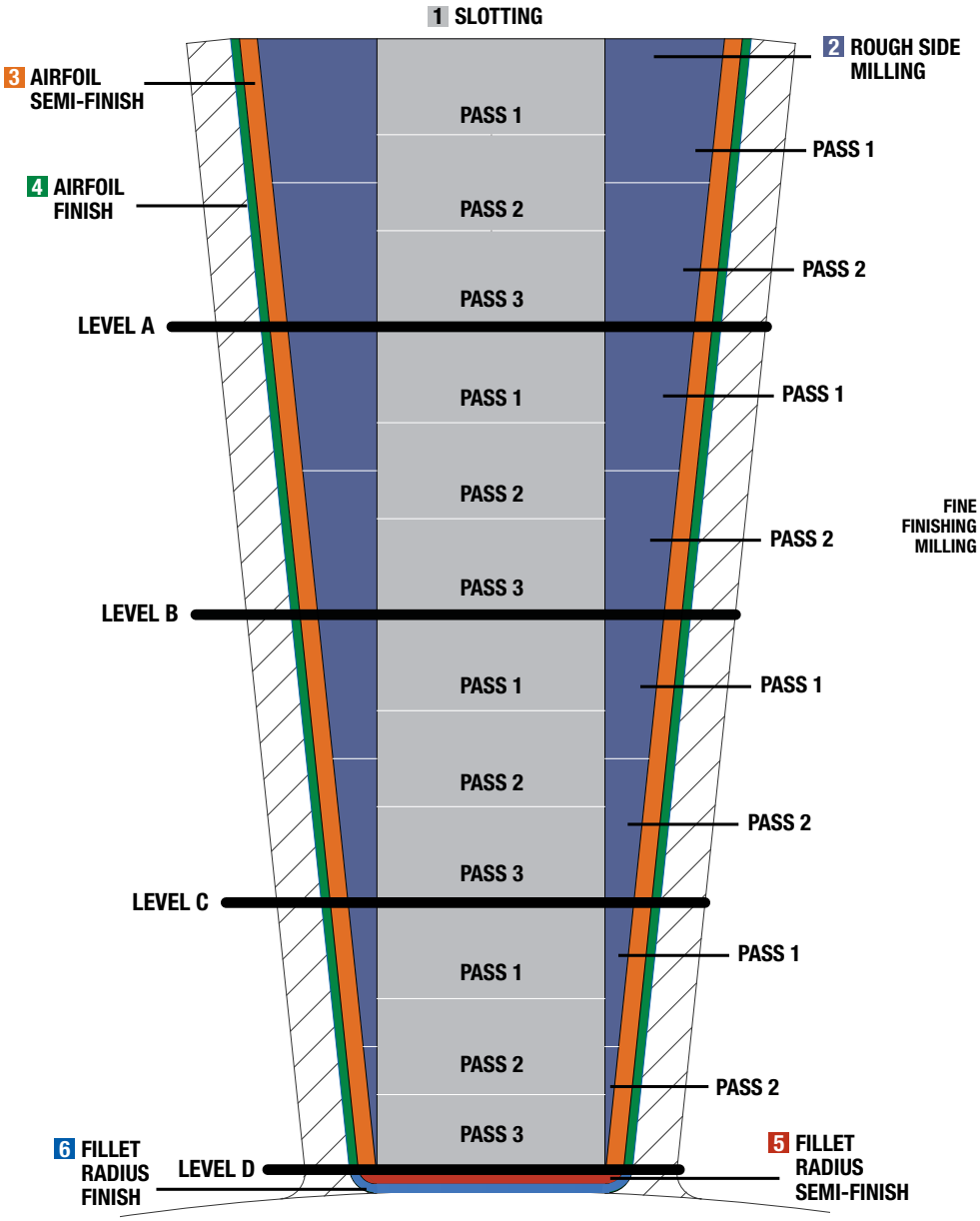
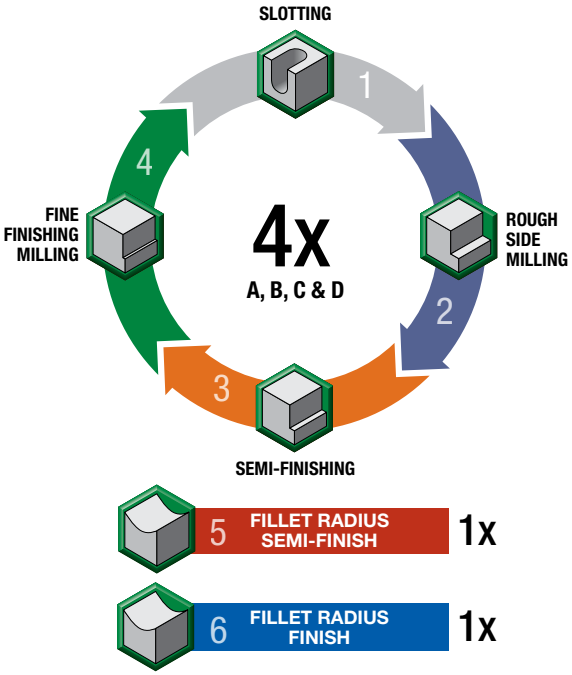
Integral Blade Rotor (IBR)

Titanium Airfoil Milling





The WIDIA-Hanita™ end mills IBR machining tools are specifically designed to match a multi-level machining process for the airfoils, followed by the fillet feature, which works for roughing and finishing operations. In this machining strategy, the opening is machined on 4 levels, simultaneously creating the opening and finishing the sides of the airfoil at the desired surface finish requirements.

WIDIA™
MACHINING BRILLIANCE

For more information, please contact your local Authorized Distributor or visit widia.com.

Integral Blade Rotor (IBR)

Titanium Airfoil Milling

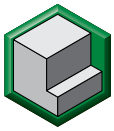
WIDIA HANITA

1

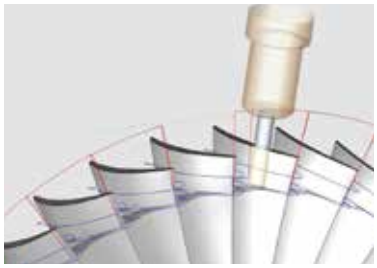
	SLOTTING level A to D 3 passes per level	
Tool Dimensions	16mm — 6 Flutes	
Description	Special Rougher End Mill	
Series	Based on 4U80	
Vc	55 m/min	180 SFM
S (RPM)	1,095	
F_z	0,04–0,05mm	0.0016–0.002"
F	260–330 mm/min	10.3–12.9 IPM
Ap	11,5mm	0.453"
Ae	16mm	0.630"

See page 28 for product details.

2

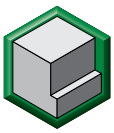


	ROUGH SIDE MILLING level A to D 2 passes per level	
Tool Dimensions	16mm — 6 Flutes	
Description	Special Rougher End Mill	
Series	Based on 4U80	
Vc	55 m/min	180 SFM
S (RPM)	1,095	
F_z	0,04–0,05mm	0.0016–0.002"
F	260–330 mm/min	10.3–12.9 IPM
Ap	17,25mm	0.679"
Ae	2–4mm	0.079–0.157"

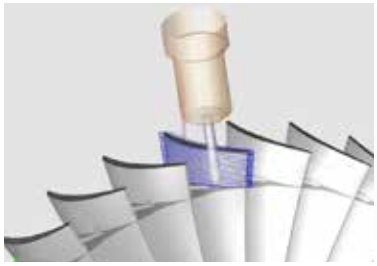


See page 28 for product details.

3

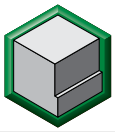


	SEMI-FINISHING level A to D 18 passes per level	
Tool Dimensions	10mm — 4 Flutes	
Description	Standard and Special End Mill	
Series	Based on 4969	
Vc	80 m/min	262 SFM
S (RPM)	2,548	
F_z	0,12mm	0.005"
F	1,200 mm/min	48 IPM
Ap	2mm	0.079"
Ae	1mm	0.039"

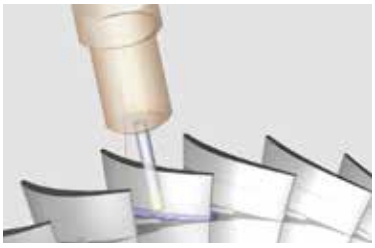


See page 28 for product details.

4



	FINISH AIRFOIL level A to D 44 passes per level	
Tool Dimensions	10mm — 4 Flutes	
Description	Special End Mill	
Series	Based on 47N0	
Vc	80 m/min	262 SFM
S (RPM)	2,548	
F_z	0,1mm	0.0040"
F	1,020 mm/min	40 IPM
Ap	0,8mm	0.0315"
Ae	0,5mm	0.020"



Integral Blade Rotor (IBR) continued

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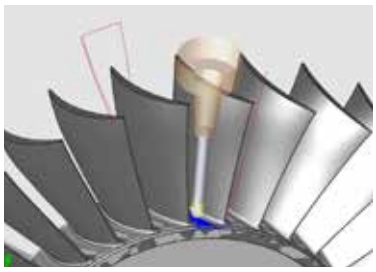
Integral Blade Rotor (IBR)

Titanium Airfoil Milling

WIDIA HANITA

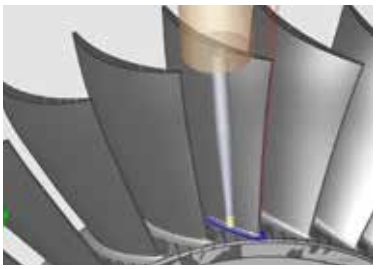
5

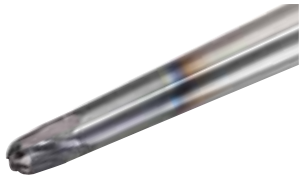
FILLET RADIUS SEMI-FINISH		
Tool Dimensions	8mm — 3 Flutes	
Description	Special Ball Nose End Mill	
Vc	80 m/min	262 SFM
S (RPM)	3,185	
F_z	0,1mm	0.004"
F	950 mm/min	37.6 IPM
Ap	0,8–1,5mm	0.0315–0.059"
Ae	0,5–1mm	0.020–0.039"



6

FILLET RADIUS FINISH		
Tool Dimensions	6mm — 4 Flutes	
Description	Special Ball Nose End Mill	
Vc	80 m/min	262 SFM
S (RPM)	4,246	
F_z	0,06mm	0.0024"
F	1,020 mm/min	40 IPM
Ap	0,5mm	0.020"
Ae	0,3mm	0.012"





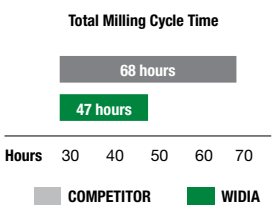
WIDIA™ SHINING MOMENT

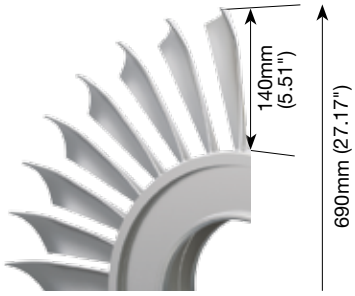
CYCLE TIME REDUCTION! 47 HOURS VS 68 HOURS AND 25% TOOL COST SAVINGS!

Titanium

IBR- Stage I

Specifications	COMPETITOR	WIDIA
	IBR- Stage I	
Workpiece Material	Titanium	
Diameter	690mm	
Length of Blade	140mm	
Number of Blades	32	
Total Milling Cycle Time	68 Hours	47 Hours





WIDIA MACHINING BRILLIANCE

For more information, please contact your local Authorized Distributor or visit widia.com.

Designed to Make Your Workplace More Productive

WIDIA™ X-Feed™ For High-Temp Alloys

WIDIA-branded X-Feed tooling was created as an application-specific portfolio to remove as much material as possible in the shortest amount of time, using a shallow depth of cut to achieve higher MRR and boost productivity.

FEED → HIGH-FEED MILLING → BOOST PRODUCTIVITY

Victory™ X-Feed For Machining Stainless Steel and Titanium

AEROSPACE

7FNS Series *(Metric — 70NS)*

Designed for circular plunging and ramping, 3D machining, face milling, and pocketing applications.

Victory X-Feed To Speed Up High-Feed Machining

Use with WS40PM, our latest grade for Titanium, Inconel®, and other high-temp materials for aerospace.

VXF™-12 Series

VXF is a high-feed productivity booster designed to establish new industry standards with market-leading milling grades like WS40PM.

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WIDIA™

Single Blade

Titanium Forged Blade Machining

WIDIA HANITA

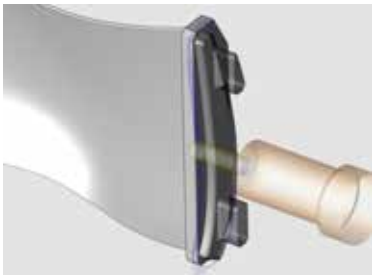
OVERSIZED FORGED BLADE

MACHINING

FINISHED BLADE

1

PREPARATION FOR CLAMPING		
Tool Dimensions	16 x 16 x 32 x 92 x R-0.5	
Description	Standard End Mill	
Series	4U80 — 6 Flutes	
Vc	54 m/min	177 SFM
S (RPM)	1,075	
F_z	0,04mm	0.0016"
F	258 mm/min	10.1 IPM
Ap	28mm	1.1"
Ae	2mm	0.08"



See page 28 for product details.

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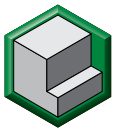
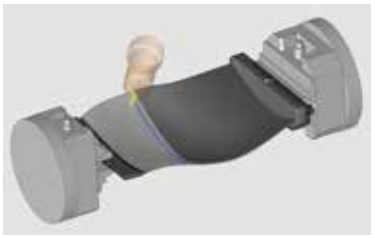


ROUGHING AIRFOIL		
Tool Dimensions	16 x 16 x 15 x 83 x R-2	
Description	Special Rougher End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	100 m/min	328 SFM
S (RPM)	1,990	
F_z	0,135mm	0.0053"
F	1,880 mm/min	74.0 IPM
Ap	1,5mm	0.059"
Ae	2mm	0.08"



See page 28 for product details.

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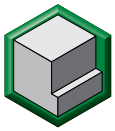
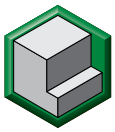


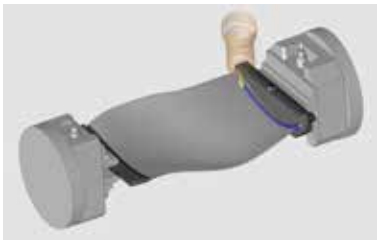
FINISH AIRFOIL		
Tool Dimensions	16 x 16 x 15 x 83 x R-2	
Description	Special Rougher End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	110 m/min	361 SFM
S (RPM)	2,189	
F_z	0,06mm	0.0024"
F	919 mm/min	36.2 IPM
Ap	0,7mm	0.028"
Ae	1mm	0.039"

See page 28 for product details.

4



ROUGHING AIRFOIL FILLET RADIUS		
Tool Dimensions	12 x 12 x 26 x 83	
Description	Standard Rougher End Mill	
Series	4969 — 4 Flutes	
Vc	95 m/min	311 SFM
S (RPM)	2,521	
F_z	0,12mm	0.0026"
F	1210 mm/min	47.6 IPM
Ap	3mm	0.118"
Ae	1mm	0.039"



See page 28 for product details.

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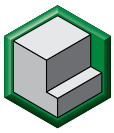
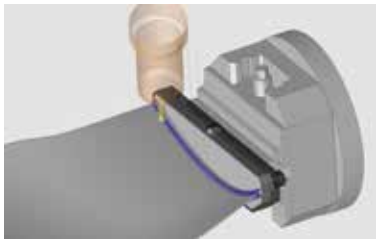


FINISH AIRFOIL FILLET RADIUS		
Tool Dimensions	9.5 x 10 x 15 x 83	
Description	Special Ball Nose End Mill	
Series	Based on 47N0 — 4 Flutes	
Vc	80 m/min	262 SFM
S (RPM)	2,682	
F_z	0,1mm	0.0039"
F	1,072 mm/min	42.2 IPM
Ap	0,5mm	0.02"
Ae	0,5mm	0.02"



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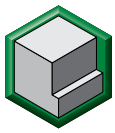
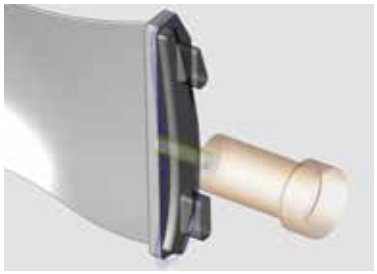


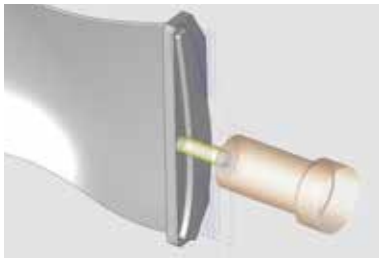
ROUGH ROOT MACHINING		
Tool Dimensions	16 x 16 x 32 x 92 x R-0.5	
Description	Standard End Mill	
Series	4U80 — 6 Flutes	
Vc	54 m/min	177 SFM
S (RPM)	1,075	
F_z	0,08mm	0.0031"
F	516 mm/min	20.3 IPM
Ap	25mm	0.984"
Ae	3mm	0.118"



See page 28 for product details.

7

FINISH ROOT MACHINING		
Tool Dimensions	16 x 16 x 32-48 x 100 x R-0.5	
Description	Standard End Mill — 5 Flutes	
Series	57N8	5V0T
Vc	54 m/min	177 SFM
S (RPM)	1,075	
F_z	0,05mm	0.0031"
F	269 mm/min	10.6 IPM
Ap	25mm	0.984"
Ae	0,5mm	0.02"



See page 28 for product details.

Single Blade continued

Single Blade

Titanium Forged Blade Machining

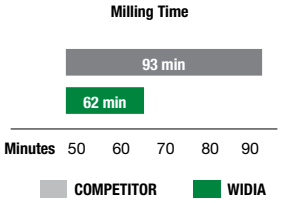
Single Blade continued

WIDIA™ SHINING MOMENT

Roughing Titanium Airfoil

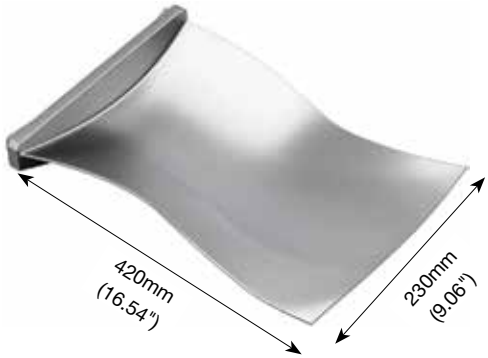
62 MINUTES VS 93 MINUTES *See Operation 2*

	COMPETITOR	WIDIA
	Roughing AIRFOIL	
Specifications	**16x16x15x83xR-1 6 Flutes**	**Based on 77NE 7 Flutes**
Workpiece Material	Titanium	
Width	230mm	
Length of Blade	420mm	
Total Milling Cycle Time	93 Minutes	62 Minutes



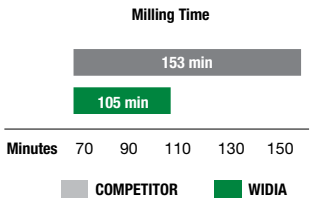
MILLING CYCLE TIME

62 minutes for 1 WIDIA™ tool!
vs
93 minutes for 2 competitor tools



Finishing Titanium Airfoil *See Operation 3*

	COMPETITOR	WIDIA
	Finish AIRFOIL	
Specifications	**Special Tool 6 Flutes**	**Based on 77NE 7 Flutes**
Workpiece Material	Titanium	
Width	230mm	
Length of Blade	420mm	
Total Milling Cycle Time	153 Minutes	105 Minutes



Reduced Polish Cycle Time and Improved Surface Quality.
Less Processing Required to Achieve Desired Surface Quality.

ADDED VALUE

MILLING CYCLE TIME

105 minutes with WIDIA tool!
vs
153 minutes with competitor tool

POLISHING PROCESS TIME

10 minutes after WIDIA milling!
vs
30 minutes after competitor milling

WIDIA MACHINING BRILLIANCE

For more information, please contact your local Authorized Distributor or visit widia.com.

Depressor Fine Seal

Inconel® Metal Sheet Trimming

WIDIA HANITA

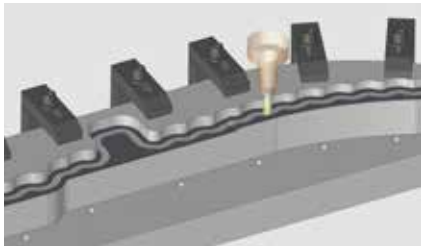
MACHINING

BEFORE TRIMMING

AFTER TRIMMING

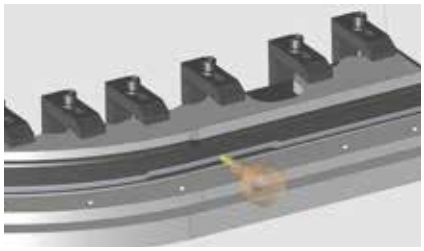
1

ROUGHING OPERATION (CLAMP 1)		
Tool Dimensions	1/2 x 1/2 x 1-1/4 x 3 x R.015	
Description	Standard VariMill II™ End Mill	
Series	5777 5 Flutes	5V0S 5 Flutes
Vc	35 m/min	115 SFM
S (RPM)	878	
F_z	0,035mm	0.00137"
F	154 mm/min	6 IPM
Ap	1,65mm	0.065"
Ae	12,7mm	0.5"



2

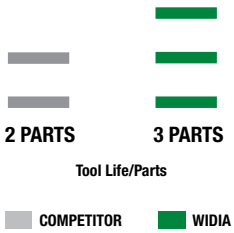
ROUGHING OPERATION (CLAMP 2)		
Tool Dimensions	1/2 x 1/2 x 1-1/4 x 3 x R.015	
Description	Standard VariMill II™ End Mill	
Series	5777 5 Flutes	5V0S 5 Flutes
Vc	35 m/min	115 SFM
S (RPM)	878	
F_z	0,035mm	0.00137"
F	154 mm/min	6 IPM
Ap	1,65mm	0.065"
Ae	12,7mm	0.5"



WIDIA™ SHINING MOMENT

INCREASED TOOL LIFE AND REDUCED COST!

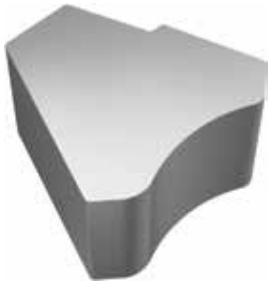
Specifications	COMPETITOR	WIDIA
	Depressor fine seal	
Workpiece Material	Inconel 625	
Application	Trimming	
Tool Life/Parts	2	3



Bracket

Inconel® Advanced Milling

WIDIA HANITA



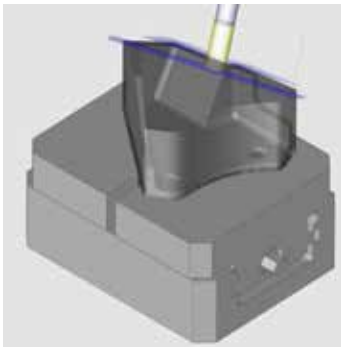
INCONEL® AFTER WATER JET

MACHINING

FINISHED BRACKET

1

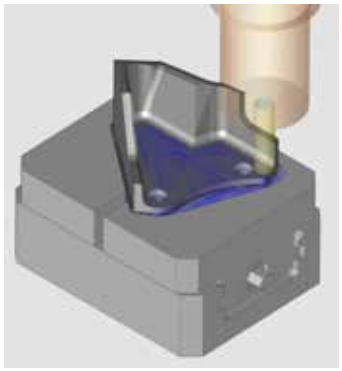
ROUGH PREPARATION		
Tool Dimensions	12 x 12 x 26-36 x 83 x R-0.5	
Description	Standard VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	50 m/min	164 SFM
S (RPM)	1,326	
F_z	0,07mm	0.0028"
F	650 mm/min	25.6 IPM
Ap	17mm	0.67"
Ae	0,6mm	0.0236"



See page 28 for product details.

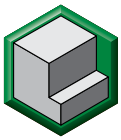
2

ROUGH BIG POCKET		
Tool Dimensions	12 x 12 x 48 x 100 x R-5.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	50 m/min	164 SFM
S (RPM)	1,326	
F_z	0,07mm	0.0028"
F	650 mm/min	25.6 IPM
Ap	48mm	1.89"
Ae	0,5mm	0.0196"

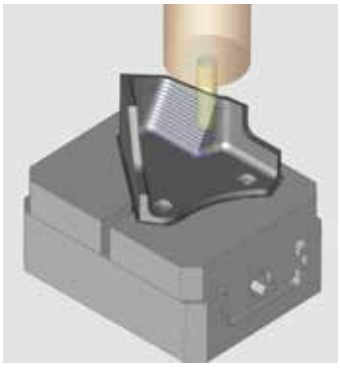


See page 28 for product details.

3



ROUGH ANGLED WALL		
Tool Dimensions	12 x 12 x 26 x 83 x R-3.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	50 m/min	164 SFM
S (RPM)	1,326	
F_z	0,07mm	0.0028"
F	650 mm/min	25.6 IPM
Ap	2,5mm	0.098"
Ae	0,6mm	0.0236"



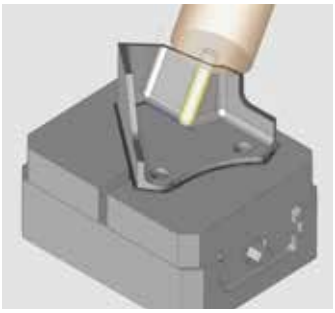
See page 28 for product details.

Bracket

Inconel® Advanced Milling

4

	FINISH BIG POCKET	
Tool Dimensions	12 x 12 x 48 x 100 x R-5.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	46 m/min	151 SFM
S (RPM)	1,220	
F_z	0,07mm	0.0028"
F	600 mm/min	23.6 IPM
Ap	48mm	1.89"
Ae	0,5mm	0.002"



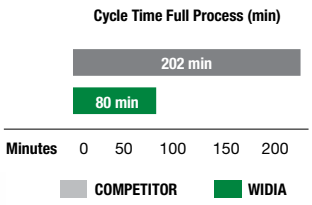
See page 28 for product details.

WIDIA™ SHINING MOMENT

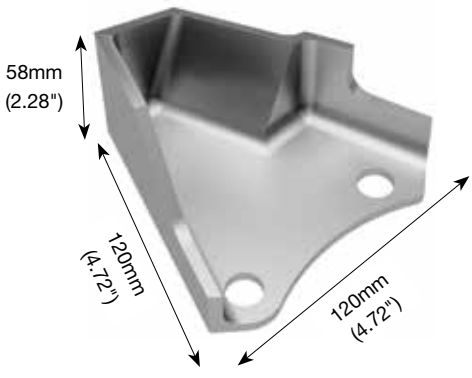
60% COST REDUCTION. REDUCED CYCLE TIME AND REDUCED TOOL COST PER PART!

These four operations represent the majority of the solution

	COMPETITOR	WIDIA
Cycle Time Full Process (min)	202	80



- 3 hours and 22 minutes cycle time with competitor tool.
- With the improved process, WIDIA tools reduce cycle time to 1 hour and 2 minutes.



AEROSPACE

Structure

AEROSPACE

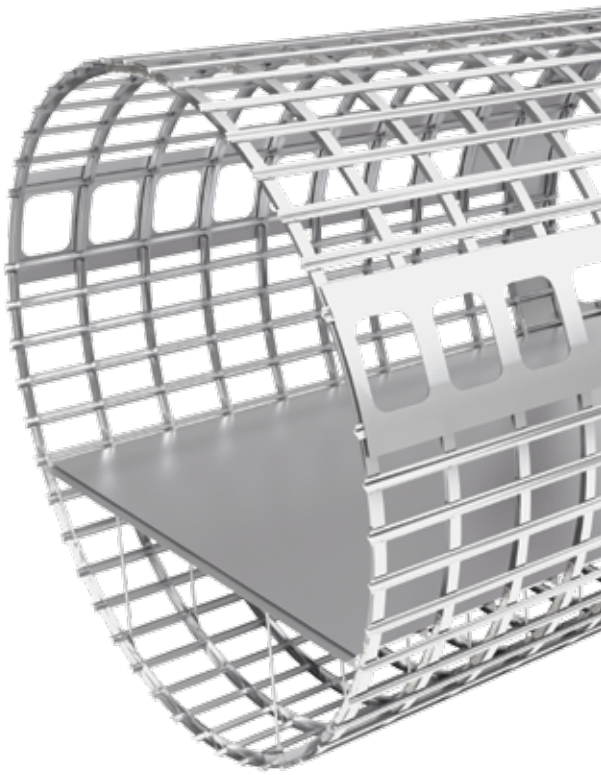
WIDIA™ Offers Machining Strategies and Innovative Tooling Technology that Reduce Cycle Time and Increase Cost Savings.

CORD

PAGE 24

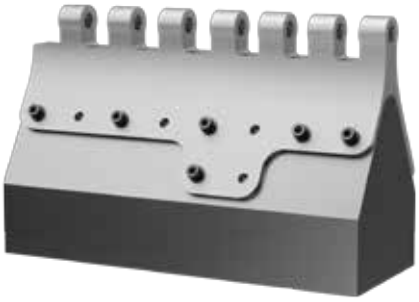
NOSE SECTION FUSELAGE

PAGE 26



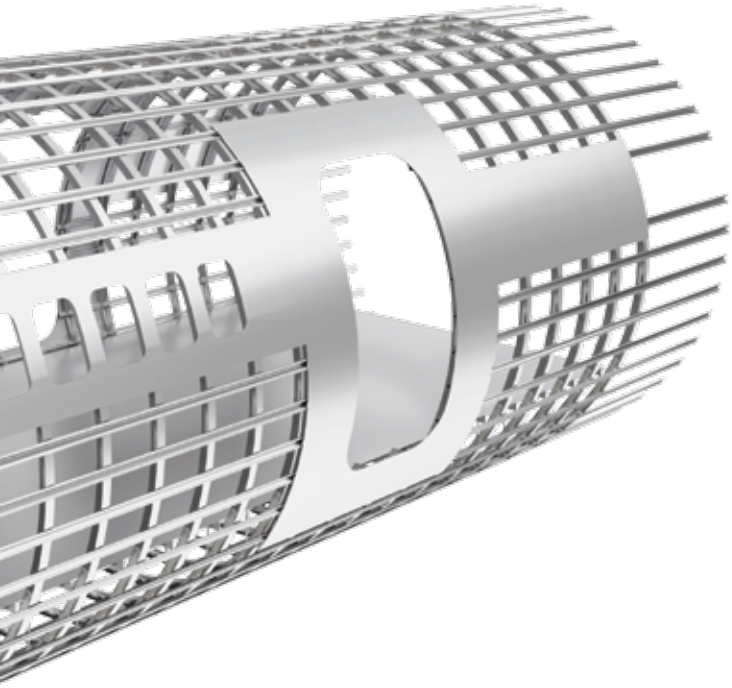
FLOOR BE
FITTING

PAGE 20



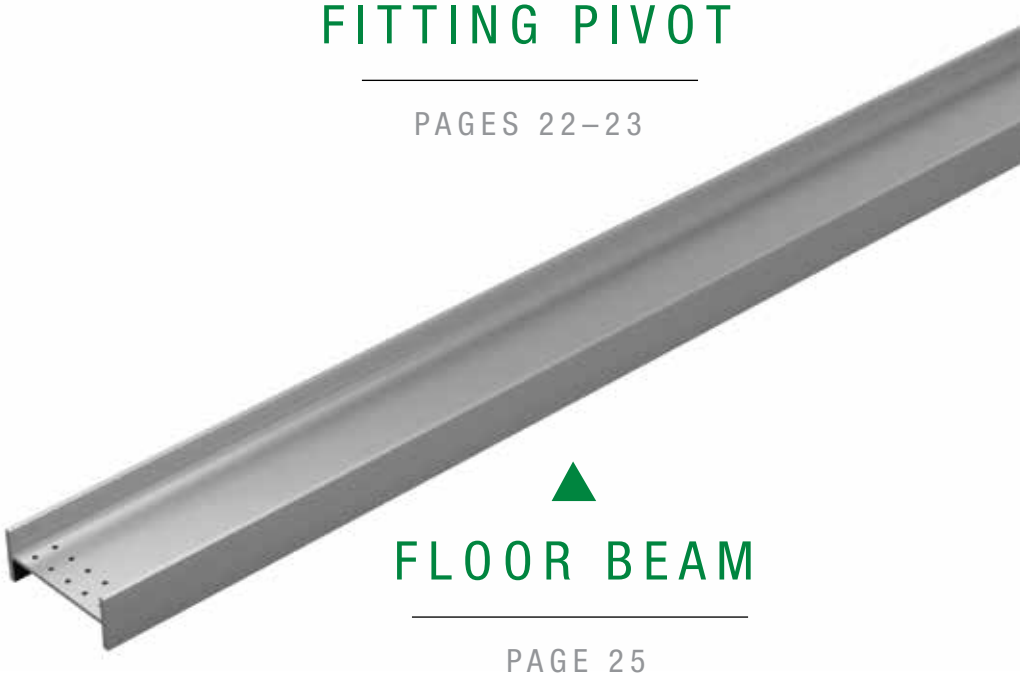
HINGE

PAGE 21



FITTING PIVOT

PAGES 22–23



FLOOR BEAM

PAGE 25

AM

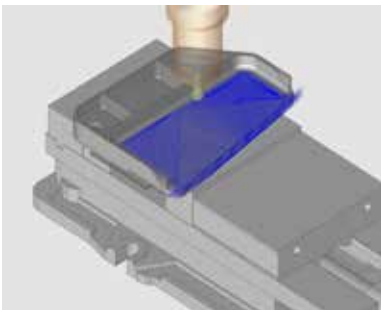
Floor Beam Fitting

Titanium Advanced Milling

WIDIA HANITA

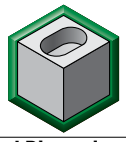
1

ROUGH HIGH MACHINING (ROUGH BIG POCKET)		
Tool Dimensions	12 x 12 x 26 x 83 x R-3.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	3,052	3,052
F_z	0,1mm	0.0039"
F	2,136 mm/min	84 IPM
Ap	24mm	0.094"
Ae	0,6mm	0.0236"

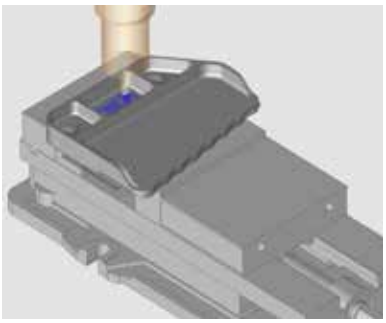


See page 28 for product details.

2

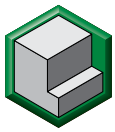


ROUGH HIGH MACHINING (ROUGH SMALL POCKET)		
Tool Dimensions	12 x 12 x 26 x 83 x R-3.0	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	3,052	3,052
F_z	0,1mm	0.0039"
F	2,136 mm/min	84 IPM
Ap	24mm	0.094"
Ae	0,6mm	0.0236"

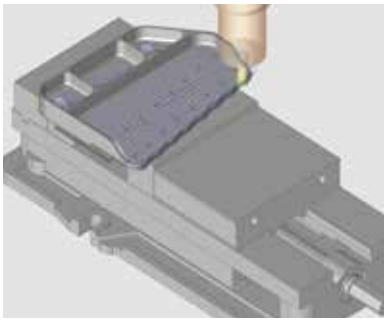


See page 28 for product details.

3



FINISH OPERATION (BIG POCKET FLOOR)		
Tool Dimensions	12 x 12 x 26-36 x 83 x R-0.5	
Description	Standard VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	3,052	3,052
F_z	0,06mm	0.0023"
F	1,282 mm/min	50.5 IPM
Ap	0,5mm	0.02"
Ae	70% x D	



See page 28 for product details.

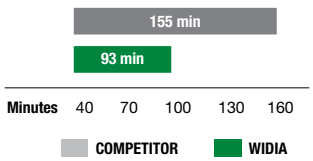
WIDIA™ SHINING MOMENT

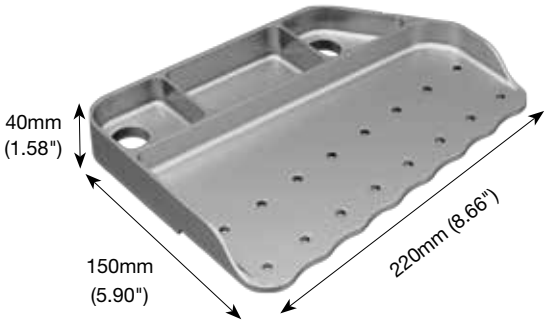
WIDIA SOLUTION TO REDUCE CYCLE TIME BY 40%

These three operations represent the majority of the solution

MILLING CYCLE TIME

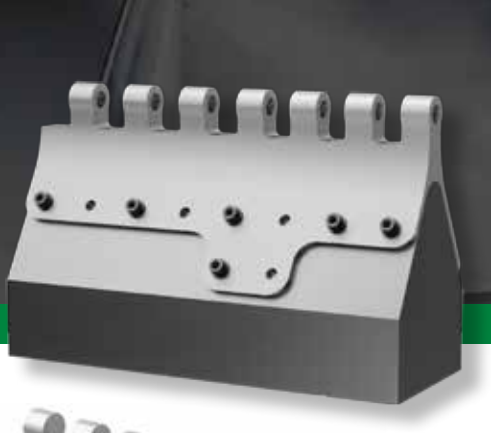
93 minutes with WIDIA™ milling!
vs
155 minutes with competitor milling

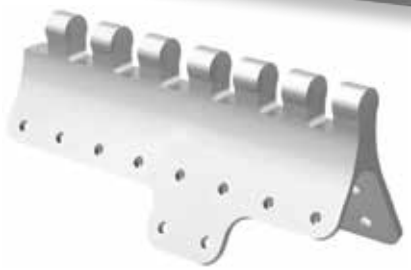




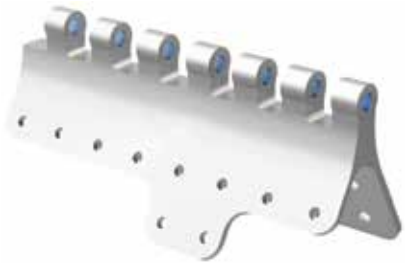
Hinge

17-4 PH Deep-Hole Drilling





MACHINING

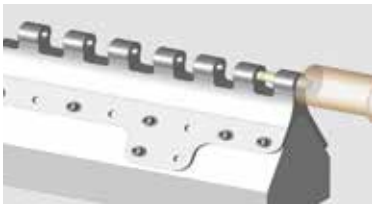


BEFORE DEEP-HOLE DRILLING

AFTER DEEP-HOLE DRILLING

1

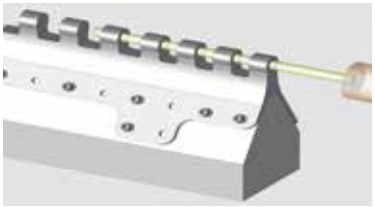
PILOT DRILLING (TDS DRILLING PREPARATION)		
Tool Dimensions	9 x 10 x 49 x 103	
Description	TDS402A09000	
Series	TDS 402A Solid Carbide Drill + Coolant Hole	
Vc	17 m/min	56 SFM
S (RPM)	601	
F_z	0,12mm	0.0047"
F	72 mm/min	2.83 IPM
Ap	38mm	1.5"
Ae	—	



See page 29 for product details.

2

TDD INTERRUPTED DEEP-HOLE DRILLING		
Tool Dimensions	9 x 9 x 225 x 290	
Description	TDD107Z09000	
Series	TDD 107Z + Coolant Hole	
Vc	60 m/min	198 SFM
S (RPM)	2,123	
F_z	0,14mm	0.0055"
F	297 mm/min	11.7 IPM
Ap	220mm	2.95"
Ae	—	



See page 29 for product details.

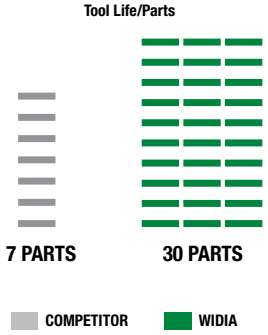
WIDIA™ SHINING MOMENT

LONGER TOOL LIFE AND GREATER ACCURACY!

See Operation 2

Deep-Hole Drilling 17-4 PH Stainless

Shaft house	COMPETITOR	WIDIA
Workpiece Material	17-4 PH	
Application	Interrupted Deep-Hole Drilling	
Accuracy Straightness	0,04mm	0,02mm
Tool Life/Parts	7	30



Fitting Pivot

Titanium Milling

WIDIA HANITA

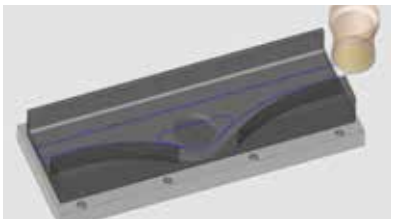
BEFORE MILLING

MACHINING

AFTER MILLING

1

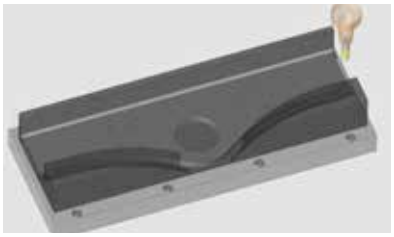
	ROUGHING OPERATION	
Tool Dimensions	***Body — M1200HF080Z06HN09 Insert — HNPJ090543ANSNHD***	
Description	M1200™ High-feed D-80	
Series	Face Mill D-80	
Vc	54 m/min	177 SFM
S (RPM)	215	
F_z	0,5mm	0.02"
F	645 mm/min	25.4 IPM
Ap	1,8mm	0.03"
Ae	70% x D	



See page 29 for product details.

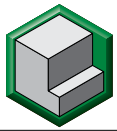
2

	FULL SLOT OPERATION	
Tool Dimensions	16 x 16 x 32-48 x 100 x R-0.5	
Description	Standard VariMill II™ End Mill	
Series	57N8 5 Flutes	5V0T 5 Flutes
Vc	55 m/min	181.5 SFM
S (RPM)	1,094	
F_z	0,05mm	0.002"
F	274 mm/min	10.8 IPM
Ap	12mm	0.47"
Ae	16mm	0.63"

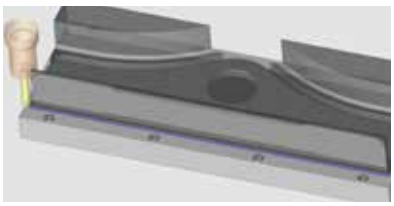


See page 28 for product details.

3



	ROUGHING & FINISHING PEEL MILLING (EXTERNAL & INTERNAL CONTOURED WALLS)	
Tool Dimensions	16 x 16 x 83 x 141 x R-3 mm	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	2,289	
F_z	0,1mm	0.0039"
F	1,602 mm/min	63 IPM
Ap	78mm	3.07"
Ae	0,5mm	0.02"



See page 28 for product details.

Fitting Pivot

Titanium Milling

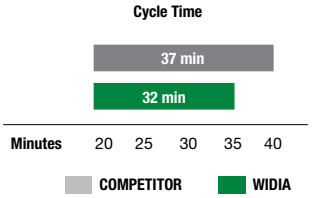
WIDIA™ SHINING MOMENT

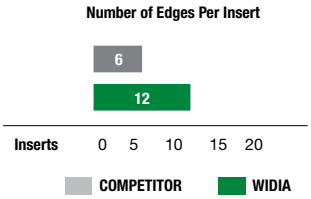
REDUCES CYCLE TIME AND INSERT EDGE COST! *See Operation 1*

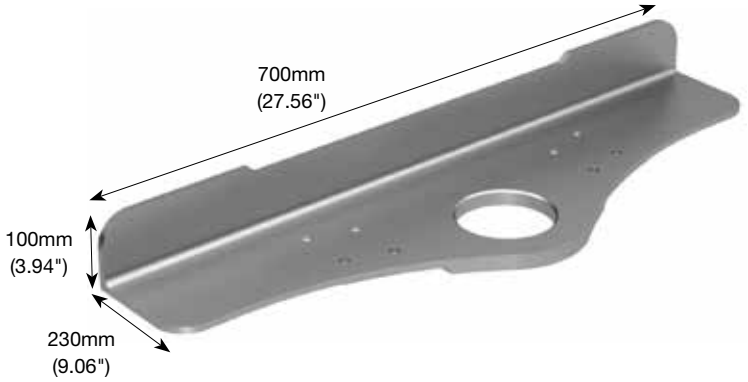
Titanium Fitting Pivot Roughing

These three operations represent the majority of the solution

Fitting Pivot	COMPETITOR	WIDIA
Workpiece Material	Titanium 6AL4V	
Application	Rougher — M1200 HF	
Cycle Time	37 min	32 min
Number of Edges Per Insert	6	12



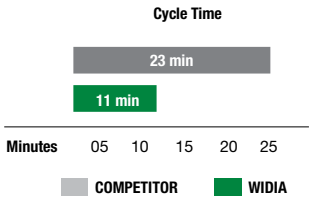




REDUCES CYCLE TIME AND IMPROVES SURFACE QUALITY! *See Operation 3*

Peel Milling Titanium Fitting Pivot

Fitting Pivot	COMPETITOR	WIDIA
Workpiece Material	Titanium 6AL4V	
Application	Roughing and Finishing Peel Milling	
Number of Flutes	5	7
Cycle Time	23 min	11 min
Surface Quality	Good	Excellent



AEROSPACE

Cord

Titanium Milling

BEFORE MILLING

MACHINING

AFTER MILLING

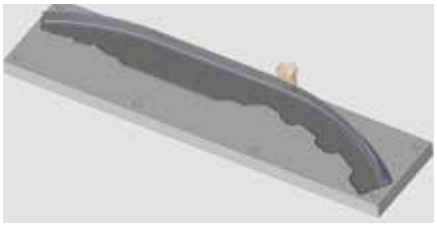
1

ROUGHING OPERATION		
Tool Dimensions	***Body: M1200HF080Z06HN09 Insert: HNPJ090543ANSNHD***	
Description	M1200 High feed 12 edges per 1 Insert	
Series	6 Flutes	
Vc	54 m/min	177 SFM
S (RPM)	215	
F_z	0,5mm	0.02"
F	645 mm/min	25.4 IPM
Ap	1,8mm	0.03"
Ae	70% x D	70% x D

See page 29 for product details.

2

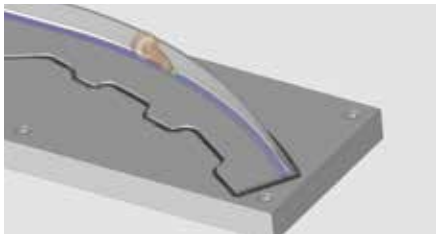
PEEL MILLING WALLS (SIDE 1)		
Tool Dimensions	16 x 16 x 80 x 141 x R-0.5	
Description	Standard VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	2,289	
F_z	0,1mm	0.0039"
F	1602 mm/min	63 IPM
Ap	75mm	2.95"
Ae	0,5mm	0.02"



See page 28 for product details.

3

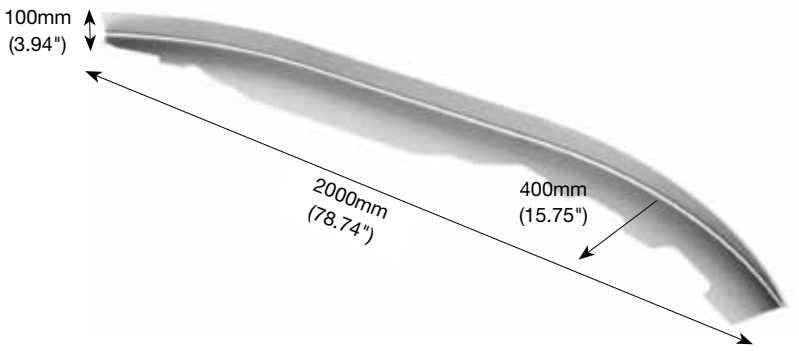
PROFILING		
Tool Dimensions	16 x 16 x 32-48 x 100 x R-3	
Description	Special VariMill III™ End Mill	
Series	77NE 7 Flutes	7VNX 7 Flutes
Vc	115 m/min	378 SFM
S (RPM)	2,289	
F_z	0,13mm	0.0039"
F	2,083 mm/min	82 IPM
Ap	3mm	0.118"
Ae	0,5mm	0.02"



See page 28 for product details.

WIDIA™ Tools:

- Reduce cycle time.
- Reduce tools cost.
- Improve wall surface quality.

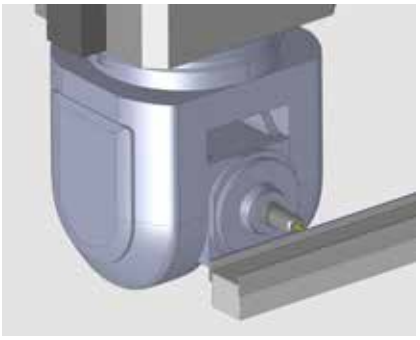


Floor Beam

Carbon Fiber Reinforced Plastics (CFRP) Trimming & Drilling

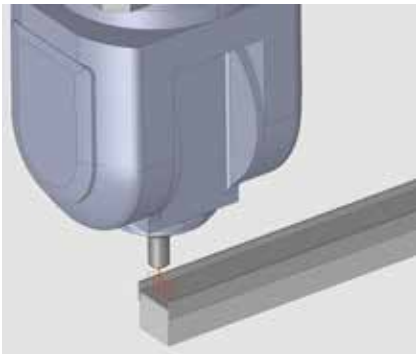
1

	TRIMMING	
Tool Dimensions	3/8 x 3/8 x 1.25 x 3	
Description	Special Tool	
Series	12 Flutes	
Vc	350 m/min	1152 SFM
S (RPM)	11,702	
F_z	0,007mm	0.000276"
F	1,000 mm/min	39.37 IPM
Ap	8mm	0.315"
Ae	2,5mm	0.098"



2

	DRILLING	
Tool Dimensions	4.88 x 6 x 10 x 73	
Description	Special Drill	
Series	2 Flutes	
Vc	100 m/min	328 SFM
S (RPM)	6,526	
F_z	0,031mm	0.0012"
F	400 mm/min	15.75 IPM
Ap	4,5–7mm	0.177–0.2755"
Ae	—	

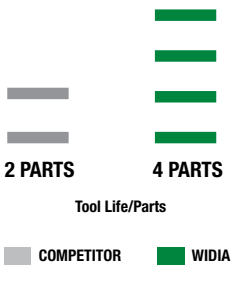


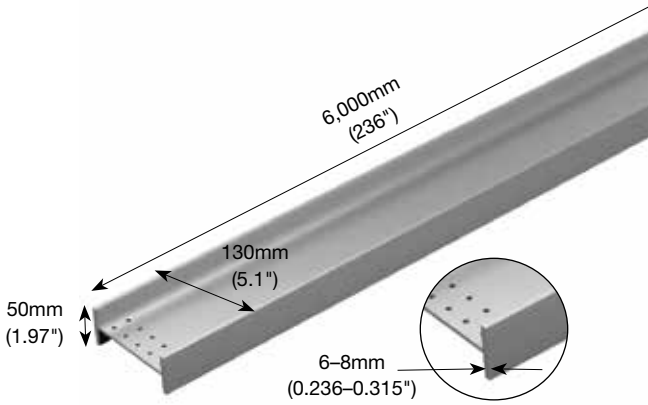
WIDIA™ tooling for composite machining utilizes PCD and diamond coatings specifically made for the machining of aerospace CFRP (Carbon Fiber Reinforced Plastics). As demonstrated here, these coatings enable longer tool life at much higher machining speeds. The combination of coating with optimized tool geometry and machining strategy, which is needed to achieve the required finish, allows machining Aerospace CFRP without delamination of the composite fibers. This is also important from a safety perspective.

WIDIA™ SHINING MOMENT

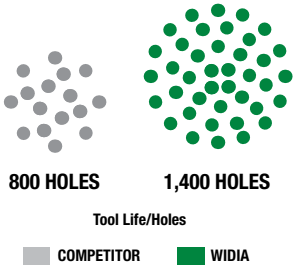
REDUCES COST OF TOOLS AND INCREASES TOOL LIFE! *See Operations 1 & 2*

Trimming CFRP Floor Beam	COMPETITOR	WIDIA™
Workpiece Material	CFRP	
Application	Trimming	
Tool Life/Parts	2	4





Drilling CFRP Floor Beam	COMPETITOR	WIDIA
Workpiece Material	CFRP	
Application	Drilling	
Tool Life/Holes	800	1,400



Nose Section Fuselage

CFRP Window Trimming

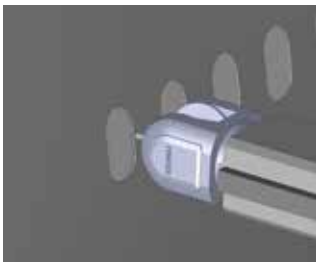
BEFORE TRIMMING

MACHINING

AFTER TRIMMING

1

	CFRP — WINDOW TRIMMING	
Tool Dimensions	1/2 x 1/2 x 5/8 x 3-1/2	
Description	EM PCD Left End CB	
Series	Special PCD Router 4 Flutes	
Vc	287 m/min	917 SFM
S (RPM)	6,971	
F_z	0,087mm	0.0034"
F	2,4626 mm/min	95.5 IPM
Ap	10,4mm	0.409"
Ae	12,7mm	0.500"



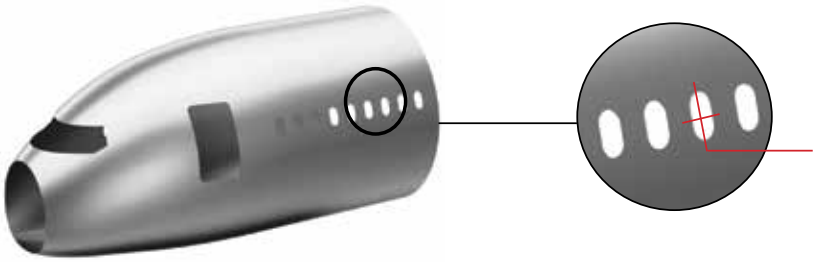
WIDIA™ SHINING MOMENT

REDUCES TOOL COST

End mill ran 100 meters in material with no delamination to the satisfaction of the customer.

SPECIAL PCD ROUTER

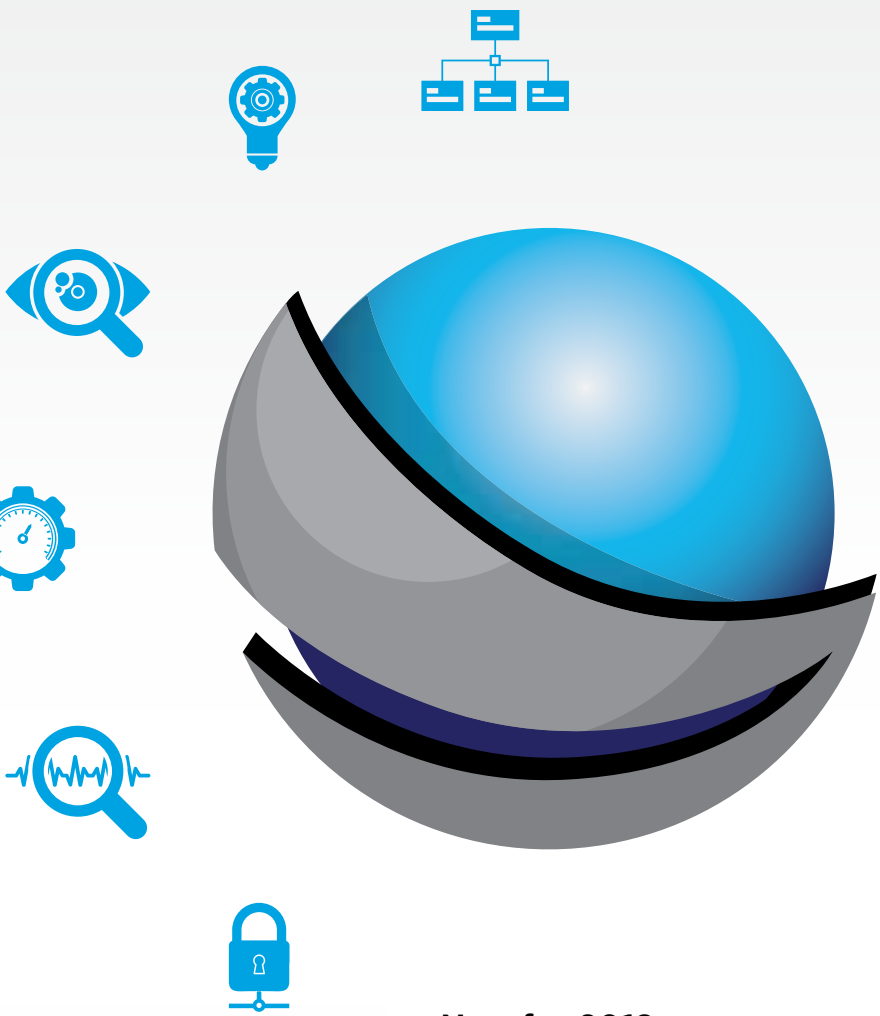
WIDIA PCD Solution reduced cost per part by 50% vs competitor



467mm x 272mm
(18.4" x 10.7")

The NOVO™ Application Provides the Digital Power

To Get Information Quicker Than Ever Before.



New for 2018 —
Export Compatibility to Mastercam®

Select tools, save into “job lists”.

Interactive feed & speed calculators.

Find inventory availability.

Download 2-D and 3-D models.

Easy interface with many CAM and tool management data systems.

NOVO™

WIDIA.COM/NOVO

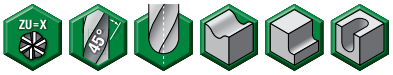
Aerospace Product Details

High-Performance Roughers

- Shallow pitch rougher.
- 4–6 flutes with variable spacing.
- Regular length of cut.
- Stainless steel and high-temp alloys.
- Center cutting.

	Series	Grade	(ZU) Flutes	(D1) Diameter Range
Inch	4U80	ALTIN-MT	4	5/16–1"
			6	5/8–1"
Metric			4	6–12mm
			6	16–25mm

High-Performance Solid Carbide End Mills • Roughing



- Center cutting.
- Flat shallow profile.
- Standard items listed. Additional styles and coatings made-to-order.
- Roughing profile also on radii portion of end mill.

	Series	Grade	(ZU) Flutes	(D1) Diameter Range
Inch	4969	WP15PE	4	.3937–.9843"
Metric				10–25mm

High-Performance Solid Carbide End Mills • VariMill™

- Unequal flute spacing.
- Center cutting.
- Ramping angle 3°.
- Optimized for difficult-to-machine workpiece materials.
- Semi-finishing to finishing applications.
- High-speed machining capability.
- Standard items listed. Additional styles and coatings made-to-order.

	Series	Grade	(ZU) Flutes	(D1) Diameter Range
Inch	7VNX	WS15PE	7	3/8–1"
Metric	77NE			10–25mm

High-Performance Solid Carbide End Mills • VariMill

- Shallow pitch rougher.
- 4–6 flutes with variable spacing.
- Regular length of cut.
- Stainless steel and high-temp alloys.
- Center cutting.

	Series	Grade	(ZU) Flutes	(D1) Diameter Range
Inch	5V0T	ALTIN-MT	5	1/4–3/4"
Metric	57N8			6–25mm

WIDIA™
MACHINING BRILLIANCE

For more information, please contact your local Authorized Distributor or visit widia.com.

X-Feed™

- Designed for high-feed rates.
- 6 flutes and 3 x D diameter neck reach.
- Designed for circular plunging and ramping, 3D machining, face milling, and pocketing applications.
- Stainless steel and high-temp alloys.
- Improved tool life due to reduced radial forces.

	Series	Grade	(ZU) Flutes	(D1) Diameter Range
Inch	**7FNS**	ALTIN-MT	6	1/4–1"
Metric	**70NS**			6–25mm

New Advances products launching January 1, 2019

Solid Carbide Drills

- Low thrust.
- Excellent centering capabilities.
- Easy to regrind.
- Reduces risk of chip jamming and catastrophic failure.
- Improves hole straightness.
- Improves hole alignment when drilling through cross holes and inclined exits.

Series	Grade	L:D	(D1) Inch Diameter	(D1) Metric Diameter
TDD105Z	WU20PD	15xD	.1181–.5118"	3–13mm
TDD106Z		20xD		
TDD107Z		25xD		
TDD108Z		30xD		

All-Star items (not all diameters are included in the program.)

Solid Carbide Drills

- Excellent chip flow due to flute design and finish.
- New coating enables higher cutting speeds.
- Higher feed rates on stainless steels and duplex.
- Available for custom solutions, as well as step-drilling.
- Real 8 x D drill lengths.
- Cylindrical shank h6 for perfect runout.
- Double-margin design for critical operations.

Series	Grade	L:D	(D1) Inch Diameter	(D1) Metric Diameter
TDS	WK15PD	3xD	.1181–.7874"	3–20mm
		5xD		
		8xD		

All-Star items (not all diameters are included in the program.)

Face Mills • Victory™ M1200 Series

- Twelve cutting edges.
- High feed rates for rough face milling.
- Use standard M1200 inserts.
- Do not load wiper inserts.

Series	Cutting Edges	(ZU) Flutes	(D1) Inch Diameter	(D1) Metric Diameter	All-Star
M1200™ Shell Mill	12	4	2"	50,8mm	NO
		5	2.5"	63,5mm	NO
		6	3"	76,2mm	YES
		8	4"	101,6mm	YES
		9	5"	127mm	NO

AEROSPACE

Notes

Notes

2019

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