MITSUBISHI MATERIALS

ALIMASTER

HIGHLY EFFICIENT, MULTI-FUNCTIONAL MACHINING OF ALUMINUM ALLOYS





TOOL NEWS **B264A**

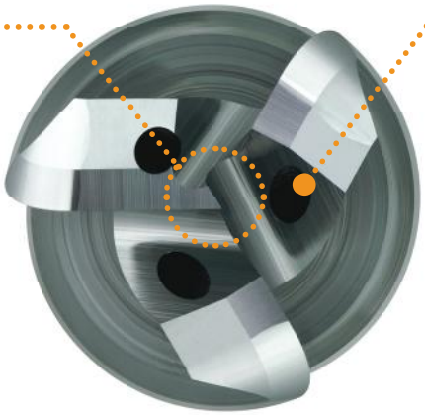
High Efficiency Machining of Aluminum Alloys

New Alimaster NEW

Helical internal thru-coolant holes combined with an optimized cutting edge geometry enables highly efficient machining.

Strengthened Center Cutting Edges

Optimized center cutting edges provide strength and reliability even when plunging.



Helical Coolant Holes

Chip discharge during plunging, ramping and grooving have been significantly improved, for stable, high efficiency cutting.
Helical holes maintain a stable coolant supply even after re-grinding.

Ideal Flute Geometry

The cross sectional geometry of the flutes is perfect for efficient chip discharge and prevents chip jamming commonly associated with high feed machining of aluminum.

Square End Mill, 3 Flute

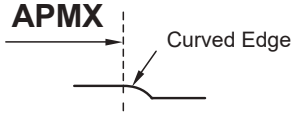
A3SA



Irregular Helix and Curved Flute Exit Geometry

Suppresses chatter to enable excellent surface finishes.

Radius Flute Exit Geometry



Radius End Mill, 3 Flute

A3SARB



High Efficiency & Economy

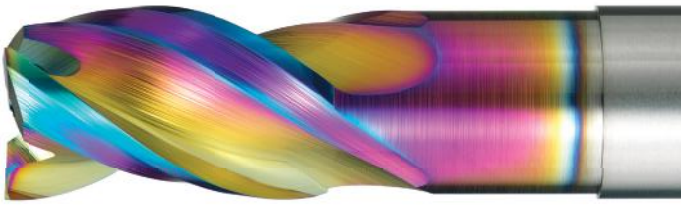
DLC Coating NEW

By adopting a unique DLC coating with excellent adhesion and weld-resistance, cutting friction is reduced thereby providing extra stability and efficiency. Additionally, wet or dry cutting is possible for slot milling and contouring.

Square End Mill, 3 Flute

DLC3SA

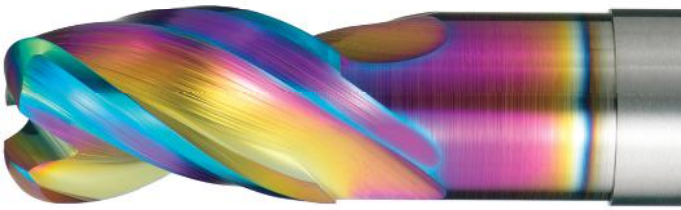




Radius End Mill, 3 Flute

DLC3SARB

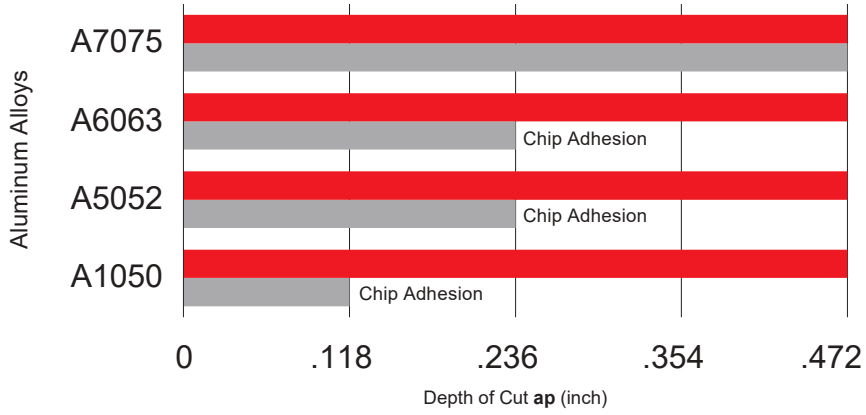




DLC coatings may differ naturally in color. This has no effect on quality or performance.

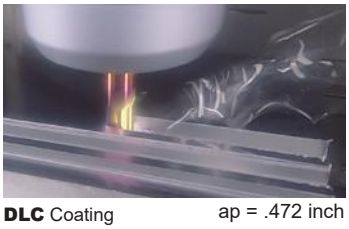
Dry Slot Milling - Comparison when Machining Different Materials

Superior weld-resistance combined with chip evacuation properties enables high efficiency slot milling even at large depths of cut.

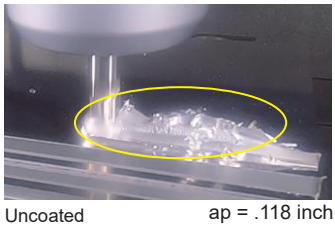


<Cutting Conditions>

Tool	: DC = ø12mm, .472 inch
Cutting Speed	: vc = 1480 SFM
Feed per Tooth	: fz = .004 IPT
Overhang Length	: 1.417 inch
Cutting Mode	: Dry Cutting



DLC Coating ap = .472 inch



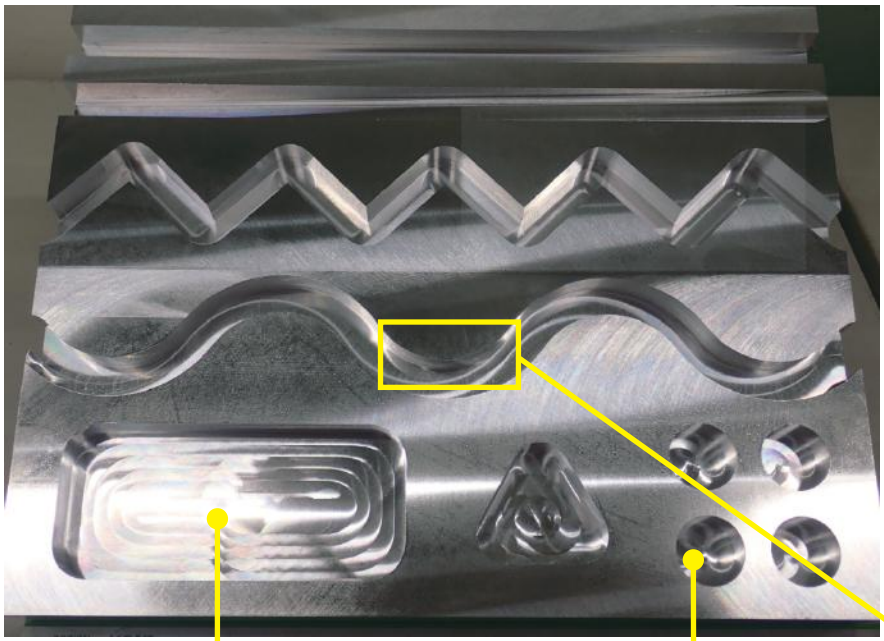
Uncoated ap = .118 inch

* Air blow both internal and external is used to effectively evacuate chips.

Cutting Performance

With DLC Coating - Example of Dry Machining A7075 Material

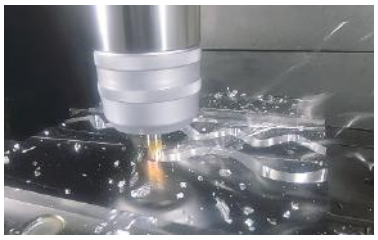
Multi-functional dry machining is possible.



Pocket Milling
3.937x1.772 inch (ap= .472 inch)

Helical Milling
ø.787 inch, Hole Depth .472 inch

Excellent Chip Evacuation







Wall Surface

<Cutting Conditions>
Workpiece Material : A7050
Tool : DLC3SA120N36C
Cutting Mode : Dry Cutting
Machine : Vertical M/C

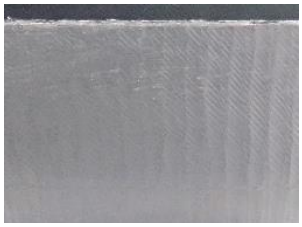
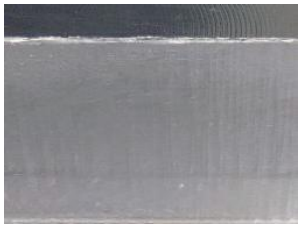
(inch)

Cutting Mode	Revolution **n** (min^{-1})	Cutting Speed **vc** (SFM)	Feed Rate **vf** (IPM)	Feed per Tooth **fz** (IPT)	Depth of Cut **ap**	Width of Cut **ae**
Slot Milling	12000	1480	171.7	.004	.472	.472
Ramping : 3°	12000	1480	70.9	.002	.472	.472
Helical Milling	12000	1480	70.9	.002	Pitch .079	–
Pocket Milling	12000	1480	171.7	.004	.472	.142

* Air blow both internal and external is used to effectively evacuate chips.

Uncoated Type - Slot Machining A7050 Material

Utilizing internal coolant and optimized cutting edge geometry enables double the efficiency levels of conventional products.

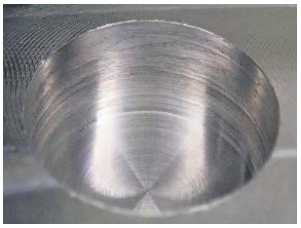
	Feed Rate (IPM) / Feed per Tooth (IPT)		
	100.4 / **.013**	**118.9** / **.015**	**137.8** / **.017**
New **Alimaster**	 ✓ Good Wall Surface	 ✓ Good Wall Surface	 ✓ Good Wall Surface
Conventional A	 ✓ Good Wall Surface	 ✗ Breakage due to chip clogging	
Conventional B	 ✗ Breakage due to chip clogging		

<Cutting Conditions>
Workpiece Material : A7050
Tool : A3SA120N36C
DC = ø.472 inch
Cutting Speed : vc = 330 SFM
Depth of Cut : ap = .472 inch
Overhang Length : 1.417 inch
Cutting Mode : Internal Coolant
(Water-soluble Coolants)

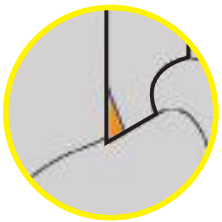
Cutting Performance

Uncoated Type - Plunge Machining A7050 Material

Higher feed rates than conventional products brings greater machining efficiencies.

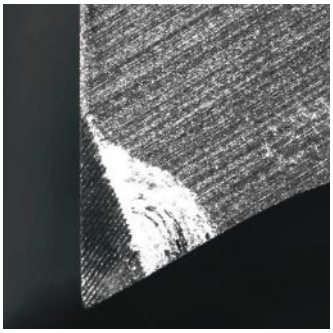
Feed Rate (IPM)	40.9	50.4	59.8
Feed per Rev. (IPT)	.005	.006	.007
New Alimaster	 ✓	 ✓	 ✓



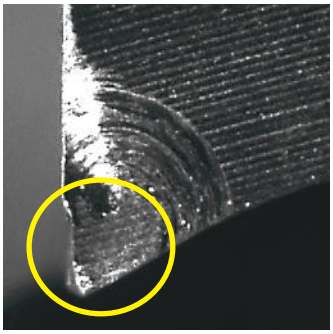


Strengthened Center Cutting Edges

After F = 59.8 IPM, fz = .007 IPT Plunging



New Alimaster ✓



Conventional Fracture ✗

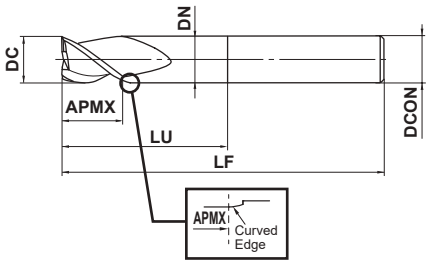
<Cutting Conditions>
Workpiece Material : A7050
Tool : A3SA120N36C
DC = ø.472 inch
Cutting Speed : vc = 985 SFM
Depth of Cut : ap = .472 inch
Overhang Length : 1.417 inch
Cutting Mode : Internal Coolant
(Water-soluble Coolants)

DLC3SA NEW

End mill, Short cut length, 3 flute, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎





DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- DLC coating aids in providing excellent chip evacuation.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	* No.F	Stock
DLC3SA120N36C	12	18	36	11.4	80	12	3	●
DLC3SA160N48C	16	24	48	15.4	90	16	3	●
DLC3SA200N55C	20	30	55	18	100	20	3	●
DLC3SA250N55C	25	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

● : **USA Stock**

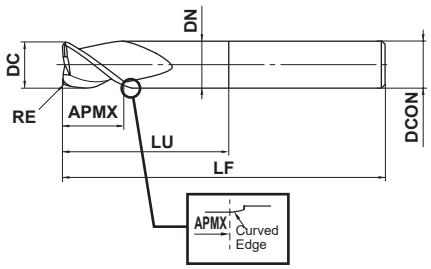
High Efficiency Machining of Aluminum Alloys

DLC3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal through coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎





DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- DLC coating aids in providing excellent chip evacuation.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	* No.F	Stock
DLC3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
DLC3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
DLC3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
DLC3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
DLC3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
DLC3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
DLC3SARB200R200N55C	20	2	30	55	18	100	20	3	●
DLC3SARB200R300N55C	20	3	30	55	18	100	20	3	●
DLC3SARB200R400N55C	20	4	30	55	18	100	20	3	●
DLC3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
DLC3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
DLC3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
DLC3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

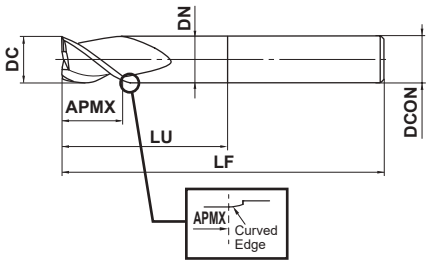
● : **USA Stock**

A3SA NEW

End mill, Short cut length, 3 flute, with multiple internal thru-coolant holes

Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎





DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	APMX	LU	DN	LF	DCON	* No.F	Stock
A3SA120N36C	12	18	36	11.4	80	12	3	●
A3SA160N48C	16	24	48	15.4	90	16	3	●
A3SA200N55C	20	30	55	18	100	20	3	●
A3SA250N55C	25	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

High Efficiency Machining of Aluminum Alloys

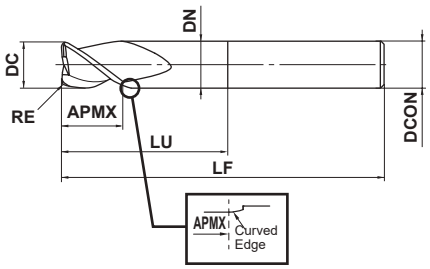
A3SARB NEW

Corner radius end mill, Short cut length, 3 flute, with multiple internal thru-coolant holes



Carbon Steel, Alloy Steel, Cast Iron (<30HRC)	Tool Steel, Pre-hardened Steel,Hardened Steel (≤45HRC)	Hardened Steel (≤55HRC)	Hardened Steel (>55HRC)	Austenitic Stainless Steel	Titanium Alloy Heat Resistant Alloy	Copper Alloy	Aluminum Alloy
							◎





DC=12	DC>12			
0 - 0.020	0 - 0.030			
12≤DCON≤16	20≤DCON≤25			
0 - 0.011	0 - 0.013			

- Stability and reliability even when slotting, ramping and plunging.
- The cross sectional geometry of the flutes is perfect for efficient chip discharge.

(mm)

Order Number	DC	RE	APMX	LU	DN	LF	DCON	* No.F	Stock
A3SARB120R100N36C	12	1	18	36	11.4	80	12	3	●
A3SARB120R200N36C	12	2	18	36	11.4	80	12	3	●
A3SARB120R300N36C	12	3	18	36	11.4	80	12	3	●
A3SARB160R200N48C	16	2	24	48	15.4	90	16	3	●
A3SARB160R300N48C	16	3	24	48	15.4	90	16	3	●
A3SARB160R400N48C	16	4	24	48	15.4	90	16	3	●
A3SARB200R200N55C	20	2	30	55	18	100	20	3	●
A3SARB200R300N55C	20	3	30	55	18	100	20	3	●
A3SARB200R400N55C	20	4	30	55	18	100	20	3	●
A3SARB250R200N55C	25	2	37.5	55	23	100	25	3	●
A3SARB250R300N55C	25	3	37.5	55	23	100	25	3	●
A3SARB250R400N55C	25	4	37.5	55	23	100	25	3	●
A3SARB250R500N55C	25	5	37.5	55	23	100	25	3	●

* Number of Flutes

DC = Cutting Dia.
RE = Corner Radius
APMX = Depth of Cut Max.
LU = Usable Length
DN = Neck Dia.
LF = Functional Length
DCON = Connection Dia.

● : **USA Stock**

A3SA/A3SARB, DLC3SA/DLC3SARB

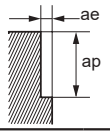
Recommended Cutting Conditions

Use high efficiency cutting conditions when the machine and workpiece rigidity, and chip evacuation properties are sufficient. Use lower, general-purpose cutting conditions when the mechanical or workpiece rigidity or chip evacuation porperties are insufficient.

High Efficiency Conditions

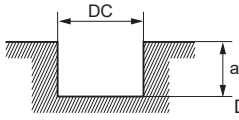
■Side Milling

(inch)

Workpiece Material		Aluminum Alloys				
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ae	Depth of Cut ap
(mm)	(inch)					
12	**.472**	4070	33000	590.6	.236	.472
16	**.630**	5445	33000	787.4	.315	.630
20	**.787**	6790	33000	1023.6	.394	.787
25	**.984**	8495	33000	1259.8	.492	.984
Depth of Cut						

■Slot Milling

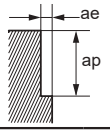
(inch)

Workpiece Material		Aluminum Alloys			
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)				
12	**.472**	4070	33000	590.6	.236
16	**.630**	5445	33000	787.4	.315
20	**.787**	6790	33000	1023.6	.394
25	**.984**	8495	33000	1259.8	.492
Depth of Cut		 DC:Cutting Dia.			

General-purpose Conditions

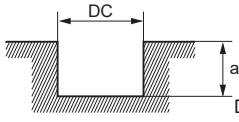
■Side Milling

(inch)

Workpiece Material		Aluminum Alloys				
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ae	Depth of Cut ap
(mm)	(inch)					
12	**.472**	1970	16000	283.5	.236	.472
16	**.630**	1970	12000	283.5	.315	.630
20	**.787**	1970	9500	291.3	.394	.787
25	**.984**	1970	7600	287.4	.492	.984
Depth of Cut						

■Slot Milling

(inch)

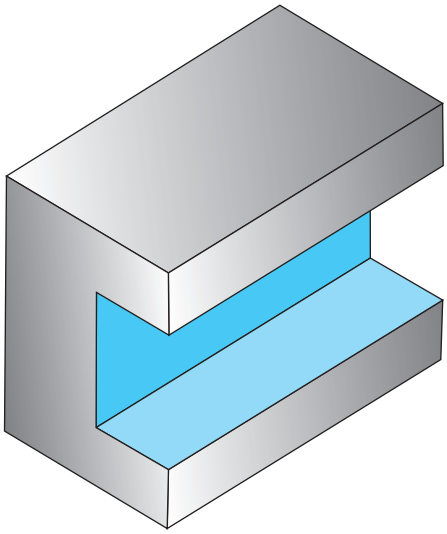
Workpiece Material		Aluminum Alloys			
Dia.**DC**		Cutting Speed (SFM)	Revolution (min^{-1})	Feed Rate (IPM)	Depth of Cut ap
(mm)	(inch)				
12	**.472**	1970	16000	283.5	.236
16	**.630**	1970	12000	283.5	.315
20	**.787**	1970	9500	291.3	.394
25	**.984**	1970	7600	287.4	.492
Depth of Cut		 DC:Cutting Dia.			

Note 1) It is recommended to use a water-soluble coolant. It is also possible to use air blow (external/internal) for DLC coated types.
Note 2) Climb milling is recommended for side cutting.
Note 3) This table shows the cutting condition with less than 4D overhang length. If more than 4D, spindle speed, feed rate and depth of cut should be reduced.
Note 4) When ramping, consider the chip discharge and use a feed rate 50% lower than the slotting conditions above and also use a ramping angle of 5º or less.
Note 5) If the rigidity of the machine or the workpiece materials installation is very low, or chattering and noise are generated, reduce the revolution and feed rate proportionately within the range described in the above table, or reduce the depth and width of cut.

Cutting Example

Machining with a High-speed, High-output Horizontal 5-axis Machining Center

Ultra-high efficiency processing was achieved with a stable chip discharge and no chattering.
Metal Removal Rate of 10,000cm^3/min (>600 in^3/min)



<Cutting Conditions>

Workpiece Material	: A7050
Tool	: A3SARB250R300N55C DC = ø25 mm (.984 inch) RE=3.0 mm (.118 inch)
Spindle Revolution	: 33000 min^{-1}
Cutting Speed	: vc = 2600 m/min (8530 SFM)
Feed Rate	: f = 25000 mm/min (984 IPM)
Feed	: fz = 0.25 mm/t. (.010 IPT)
Depth of Cut	: ap = 16 mm (.630 inch) ae = 25 mm (.984 inch)
Cutting Mode	: Internal Coolant (Water-soluble Coolants)
Machine	: For machining aluminum structural parts for aircraft High-speed, high-output horizontal 5-axis M/C

Memo

MTEC

MACHINING TECHNOLOGY AND EDUCATION CENTER

Welcome to our new world-class Machining Technology and Education Center (MTEC) in Mooresville, NC providing year round support and services to North America.



ABOUT MTEC

TOOLING PROPOSALS & EVALUATION

We will review your current processes or outline a new process. From this review, we will improve productivity, analyze programming methods and output a solution with programming, tooling and time savings.

MACHINING SIMULATION

Using the latest CAD/CAM software and our cutting tool experience, we will outline a new process using proper machining techniques to maximize tool life and productivity.

TECHNICAL SUPPORT

Dedicated local professionals to answer any of your order, product or technical questions.

TRAINING

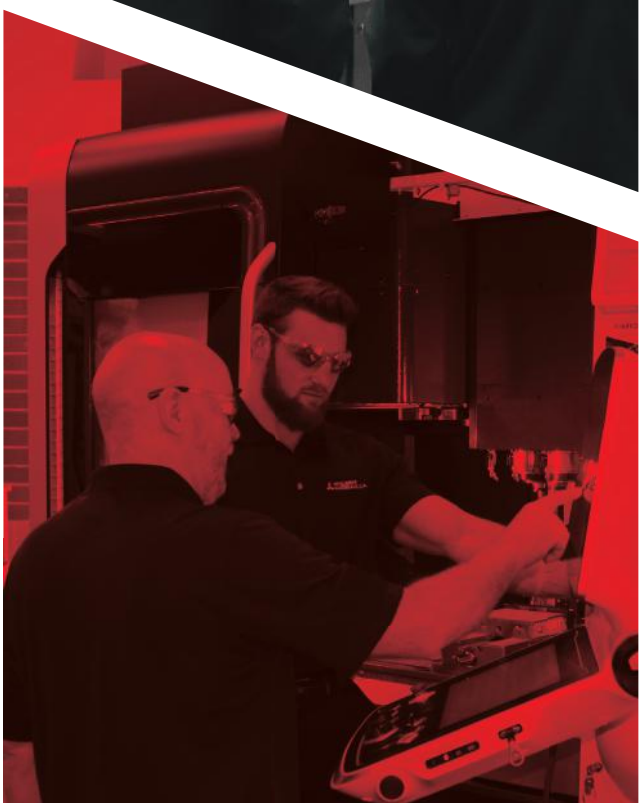
We are excited to offer several levels of training with goals to reach our highest level--Craftsman Machining Technology. At MTEC NC, we will train using a combination of classroom and hands-on machine time to develop skills and real-world understanding of materials, tools and applications. In addition to multi-day courses, we will have Machining Technology skills seminars, as well as seminars from our partners to complement our apprentice level courses, our journeyman courses, and up to our craftsman level courses.

PROCESS IMPROVEMENTS

Review of the complete part processing and recommend changes of speed, feed, new tooling, reduction of passes, modifying programming and other solutions to reduce cycle time, save money and be proactive.







WEBINARS

Our FREE online webinar series is available anytime on-demand. Narrated by the MTEC training staff, you will receive in-depth knowledge of the topic. Simply register online at the link below for access. You will receive a certificate upon completion of each course.

mmusnewsstand.com/register

ONLINE TRAINING

Our FREE e-learning program offers 11 courses in drilling, milling, turning, threading, tool grades and workpiece materials. Once each course is completed, you will be given the opportunity to print a certificate.

- Basic Drilling
- Basic Milling
- Basic Turning
- Advanced Drilling
- Advanced End Milling
- Advanced Turning
- Basic Threading
- Advanced Face Milling
- Basic Workpiece Materials
- Tool Grades
- Advanced Workpiece Materials

TRAINING COURSES

Programs are designed for several levels of skill development – from basic understanding to advance manufacturing with digital solutions, complementing to your valued experience in CNC machining environment. Participate in machining demonstrations with Mitsubishi Materials' skilled engineers. Discover methods to reduce setup and cycle time, optimize programs and enhance your knowledge base.

Information on course schedule,
course description, and accommodations

MTECTRAINING.INFO

Follow the QR Code for a virtual facility tour

MITSUBISHI MATERIALS U.S.A.

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(Moldino CS)

41700 Gardenbrook Road, Suite 120
Novi, MI 48375
Main: 248.308.2620
Fax: 248.308.2627

FOR YOUR SAFETY

- Don't handle inserts and chips without gloves.
- Please machine within the recommended application range and exchange expired tools with new ones in advance of breakage.
- Please use safety covers and wear safety glasses.
- When using compounded cutting oils, please take fire precautions.
- When attaching inserts or spare parts, please use only the correct wrench or driver.
- When using rotating tools, please make a trial run to check run-out, vibration and abnormal sounds etc.

www.mmc-carbide.com/us

Tools specifications subject to change without notice.

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