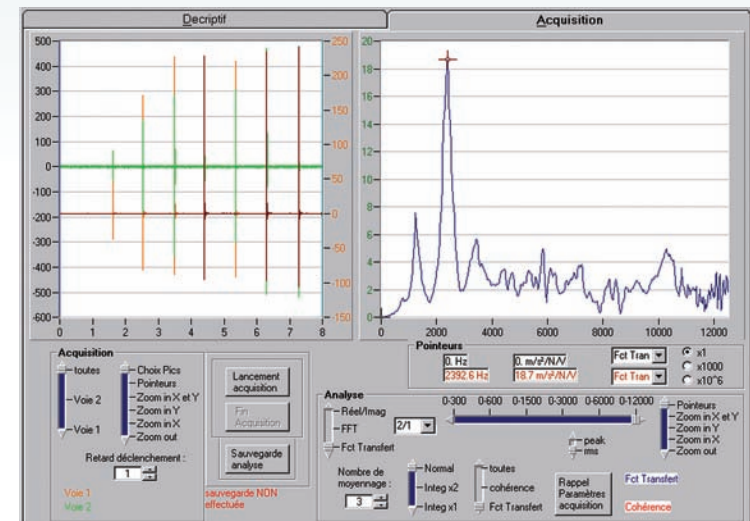




WITH FRESAL UGV END MILLS
DECREASES THE ENERGY CONSUMPTION,
AND INCREASES
TOOL LIFE.

TEST WITH FRESAL END MILLS UGV-F Ø20 R=4 LU=58



01) DYNAMIC IMPULSE

With an accelerometer sensor we recovered the natural vibration frequency of assembly of the tool-spindle-attachment.

With this information we obtained the optimal speed for the testing machine (Meteor 10).

n= 23600 r/min

02) TESTS AND RESULTS

The objective of our test was:
to search the maximum chips volume with a pass depth (ap_{max}) of 15mm.

→ Maximum rate of chips volume (Q_{max}) in the order of **3700 cm³/min.**

The Energy modeling

of cutting energy (W) as a function of chip thickness (h) shows an extremely low value of the specific cutting energy (**W_{cref}=9,8**).

This means the sharpness quality offers its full potential.

FRESAL

AEROSPACE

The new branch of Fresal Aerospace is a high-flying challenge. The new UGV End Mills catalogue, for high speed machining of aluminum, represents the highest level of our technology.



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YORINO PIEROMITE
Aerospace
We know how

UGV END MILLS CATALOGUE

• HIGH SPEED CUTTING OF ALUMINIUM •

FRESAL

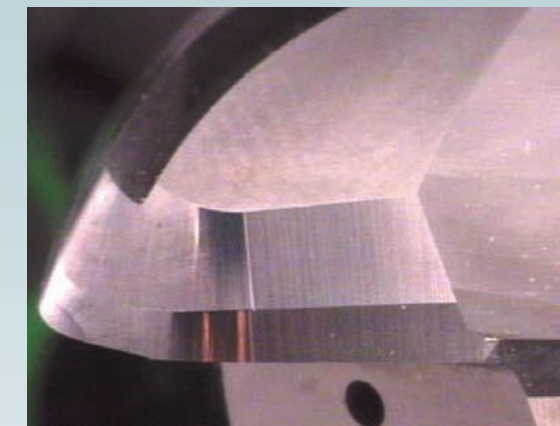
AEROSPACE

FRESAL UGV END MILLS

• HIGH SPEED CUTTING OF ALUMINIUM •

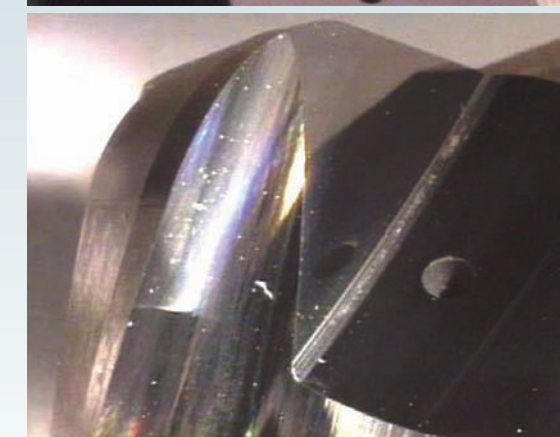
Excellent sharpening regularity

The chosen grinding wheel and the cutting parameters used in sharpening operations help to prevent overheating and any trace of micro-chippings;



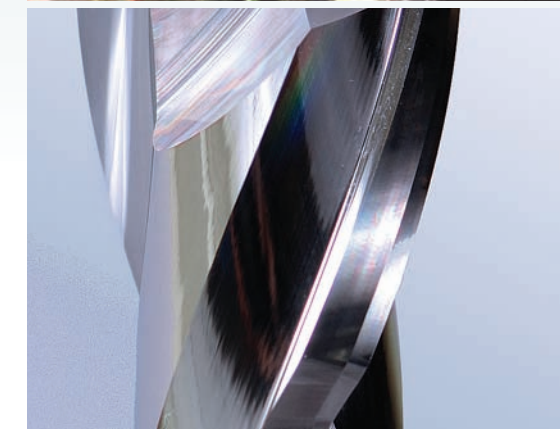
Mirror effect due to the glossy polished surface quality.

The tooth is naturally reflected on the leading face and vice versa;



The glossy polished sharpness of the flutes is perfectly mastered.

Allows to reduce typical adhesion phenomena at the cutting edges;



Rounded joint at the bottom of the cutting part.

Allows to finish deep walls reducing the marks of previous passes.





UGV END MILLS CATALOGUE

• HIGH SPEED CUTTING OF ALUMINUM •

UGV END MILLS - WITHOUT COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
8	8	40	7,4	70	8	0,2	UGV-D08.040R02
8	8	40	7,4	70	8	2,5	UGV-D08.040R25
8	8	40	7,4	70	8	4	UGV-D08.040R40
10	10	30	9,2	62	10	0,2	UGV-D10.030R02
10	10	30	9,2	62	10	2,5	UGV-D10.030R25
10	10	30	9,2	62	10	4	UGV-D10.030R40
10	10	40	9,2	72	10	4	UGV-D10.040R40
10	10	50	9,2	82	10	0,2	UGV-D10.050R02
10	10	50	9,2	82	10	2,5	UGV-D10.050R25
10	10	50	9,2	82	10	4	UGV-D10.050R40
12	12	45	11,1	80	12	0,2	UGV-D12.045R02
12	12	45	11,1	80	12	2,5	UGV-D12.045R25
12	12	45	11,1	80	12	4	UGV-D12.045R40
12	12	65	11,1	100	12	0,3	UGV-D12.065R03
12	12	65	11,1	100	12	2,5	UGV-D12.065R25
12	12	65	11,1	100	12	4	UGV-D12.065R40
12	12	65	11,1	100	12	6	UGV-D12.065R60
12	12	85	11,1	120	12	4	UGV-D12.085R40
16	16	45	14,8	83	16	0,2	UGV-D16.045R02
16	16	45	14,8	83	16	2,5	UGV-D16.045R25
16	16	45	14,8	83	16	4	UGV-D16.045R40
16	16	45	14,8	83	16	6	UGV-D16.045R60
16	16	65	14,8	103	16	0,2	UGV-D16.065R02
16	16	65	14,8	103	16	2,5	UGV-D16.065R25
16	16	65	14,8	103	16	4	UGV-D16.065R40
16	16	65	14,8	103	16	6	UGV-D16.065R60
16	16	85	14,8	123	16	4	UGV-D16.085R40
20	20	45	18,5	85	20	0,2	UGV-D20.045R02
20	20	45	18,5	85	20	2,5	UGV-D20.045R25
20	20	45	18,5	85	20	4	UGV-D20.045R40
20	20	45	18,5	85	20	5	UGV-D20.045R50
20	20	65	18,5	105	20	0,2	UGV-D20.065R02
20	20	65	18,5	105	20	2,5	UGV-D20.065R25
20	20	65	18,5	105	20	4	UGV-D20.065R40
20	20	65	18,5	105	20	5	UGV-D20.065R50

UGV END MILLS - WITHOUT COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
20	20	65	18,5	105	20	6	UGV-D20.065R60
20	20	95	18,5	135	20	4	UGV-D20.095R40
20	20	95	18,5	135	20	6	UGV-D20.095R60
20	20	95	18,5	135	20	8	UGV-D20.095R80
25	20	45	22,8	85	25	0,2	UGV-D25.045R02
25	20	45	22,8	85	25	2,5	UGV-D25.045R25
25	20	45	22,8	85	25	4	UGV-D25.045R40
25	20	45	22,8	85	25	5	UGV-D25.045R50
25	20	65	22,8	105	25	0,2	UGV-D25.065R02
25	20	65	22,8	105	25	2,5	UGV-D25.065R25
25	20	65	22,8	105	25	4	UGV-D25.065R40
25	20	65	22,8	105	25	5	UGV-D25.065R50
25	20	65	22,8	105	25	6	UGV-D25.065R60
25	20	65	22,8	105	25	10	UGV-D25.065R100
25	20	95	22,8	135	25	0,2	UGV-D25.095R02
25	20	95	22,8	135	25	2,5	UGV-D25.095R25
25	20	95	22,8	135	25	4	UGV-D25.095R40
25	20	95	22,8	135	25	8	UGV-D25.095R80

UGV END MILLS - WITH COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
8	8	34	7,4	69	8	0,3	UGV-FD08.034R03
8	8	34	7,4	69	8	2,5	UGV-FD08.034R25
8	8	34	7,4	69	8	4	UGV-FD08.034R40
8	8	46	7,4	81	8	0,3	UGV-FD08.046R03
8	8	46	7,4	81	8	2,5	UGV-FD08.046R25
8	8	46	7,4	81	8	4	UGV-FD08.046R40
8	8	52	7,4	87	8	0,3	UGV-FD08.052R03
8	8	52	7,4	87	8	2,5	UGV-FD08.052R25
8	8	52	7,4	87	8	4	UGV-FD08.052R40
8	8	58	7,4	93	8	0,3	UGV-FD08.058R03
8	8	58	7,4	93	8	2,5	UGV-FD08.058R25
8	8	58	7,4	93	8	4	UGV-FD08.058R40

UGV END MILLS - WITH COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
8	8	70	7,4	105	8	0,3	UGV-FD08.070R03
8	8	70	7,4	105	8	2,5	UGV-FD08.070R25
8	8	70	7,4	105	8	4	UGV-FD08.070R40
12	12	35	11,1	72	12	0,3	UGV-FD12.035R03
12	12	35	11,1	72	12	2,5	UGV-FD12.035R25
12	12	35	11,1	72	12	4	UGV-FD12.035R40
12	12	35	11,1	72	12	6	UGV-FD12.035R60
12	12	44	11,1	81	12	0,3	UGV-FD12.044R03
12	12	44	11,1	81	12	2,5	UGV-FD12.044R25
12	12	44	11,1	81	12	4	UGV-FD12.044R40
12	12	44	11,1	81	12	6	UGV-FD12.044R60
12	12	53	11,1	90	12	0,3	UGV-FD12.053R03
12	12	53	11,1	90	12	2,5	UGV-FD12.053R25
12	12	53	11,1	90	12	4	UGV-FD12.053R40
12	12	53	11,1	90	12	6	UGV-FD12.053R60
12	12	62	11,1	99	12	0,3	UGV-FD12.062R03
12	12	62	11,1	99	12	2,5	UGV-FD12.062R25
12	12	62	11,1	99	12	4	UGV-FD12.062R40
12	12	62	11,1	99	12	6	UGV-FD12.062R60
12	12	71	11,1	108	12	0,3	UGV-FD12.071R03
12	12	71	11,1	108	12	2,5	UGV-FD12.071R25
12	12	71	11,1	108	12	4	UGV-FD12.071R40
12	12	71	11,1	108	12	6	UGV-FD12.071R60
12	12	80	11,1	117	12	0,3	UGV-FD12.080R03
12	12	80	11,1	117	12	2,5	UGV-FD12.080R25
12	12	80	11,1	117	12	4	UGV-FD12.080R40
12	12	80	11,1	117	12	6	UGV-FD12.080R60
12	12	89	11,1	126	12	0,3	UGV-FD12.089R03
12	12	89	11,1	126	12	2,5	UGV-FD12.089R25
12	12	89	11,1	126	12	4	UGV-FD12.089R40
12	12	89	11,1	126	12	6	UGV-FD12.089R60
16	16	40	14,8	80	16	0,3	UGV-FD16.040R03
16	16	40	14,8	80	16	2,5	UGV-FD16.040R25
16	16	40	14,8	80	16	4	UGV-FD16.040R40
16	16	40	14,8	80	16	6	UGV-FD16.040R60

UGV END MILLS - WITH COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
16	16	40	14,8	80	16	8	UGV-FD16.040R80
16	16	52	14,8	92	16	0,3	UGV-FD16.052R03
16	16	52	14,8	92	16	2,5	UGV-FD16.052R25
16	16	52	14,8	92	16	4	UGV-FD16.052R40
16	16	52	14,8	92	16	6	UGV-FD16.052R60
16	16	52	14,8	92	16	8	UGV-FD16.052R80
16	16	64	14,8	104	16	0,3	UGV-FD16.064R03
16	16	64	14,8	104	16	2,5	UGV-FD16.064R25
16	16	64	14,8	104	16	4	UGV-FD16.064R40
16	16	64	14,8	104	16	6	UGV-FD16.064R60
16	16	64	14,8	104	16	8	UGV-FD16.064R80
16	16	76	14,8	116	16	0,3	UGV-FD16.076R03
16	16	76	14,8	116	16	2,5	UGV-FD16.076R25
16	16	76	14,8	116	16	4	UGV-FD16.076R40
16	16	76	14,8	116	16	6	UGV-FD16.076R60
16	16	76	14,8	116	16	8	UGV-FD16.076R80
16	16	88	14,8	128	16	0,3	UGV-FD16.088R03
16	16	88	14,8	128	16	2,5	UGV-FD16.088R25
16	16	88	14,8	128	16	4	UGV-FD16.088R40
16	16	88	14,8	128	16	6	UGV-FD16.088R60
16	16	88	14,8	128	16	8	UGV-FD16.088R80
16	16	100	14,8	140	16	0,3	UGV-FD16.100R03
16	16	100	14,8	140	16	2,5	UGV-FD16.100R25
16	16	100	14,8	140	16	4	UGV-FD16.100R40
16	16	100	14,8	140	16	6	UGV-FD16.100R60
16	16	100	14,8	140	16	8	UGV-FD16.100R80
16	16	112	14,8	152	16	0,3	UGV-FD16.112R03
16	16	112	14,8	152	16	2,5	UGV-FD16.112R25
16	16	112	14,8	152	16	4	UGV-FD16.112R40
16	16	112	14,8	152	16	6	UGV-FD16.112R60
16	16	112	14,8	152	16	8	UGV-FD16.112R80
20	20	58	18,5	101	20	0	UGV-FD20.058R00
20	20	58	18,5	101	20	2,5	UGV-FD20.058R25
20	20	58	18,5	101	20	4	UGV-FD20.058R40
20	20	58	18,5	101	20	6	UGV-FD20.058R60

UGV END MILLS - WITH COOLANT HOLES

Ø	LC	LU	ØU	LT	Shank	R	Codes
20	20	58	18,5	101	20	8	UGV-FD20.058R80
20	20	58	18,5	101	20	10	UGV-FD20.058R100
20	20	73	18,5	116	20	0	UGV-FD20.073R00
20	20	73	18,5	116	20	2,5	UGV-FD20.073R25
20	20	73	18,5	116	20	4	UGV-FD20.073R40
20	20	73	18,5	116	20	6	UGV-FD20.073R60
20	20	73	18,5	116	20	8	UGV-FD20.073R80
20	20	73	18,5	116	20	10	UGV-FD20.073R100
20	20	88	18,5	131	20	0	UGV-FD20.088R00
20	20	88	18,5	131	20	2,5	UGV-FD20.088R25
20	20	88	18,5	131	20	4	UGV-FD20.088R40
20	20	88	18,5	131	20	6	UGV-FD20.088R60
20	20	88	18,5	131	20	8	UGV-FD20.088R80
20	20	88	18,5	131	20	9	UGV-FD20.088R90
20	20	88	18,5	131	20	10	UGV-FD20.088R100
20	14	103	18,5	146	20	0	UGV-FD20.103R00
20	14	103	18,5	146	20	2,5	