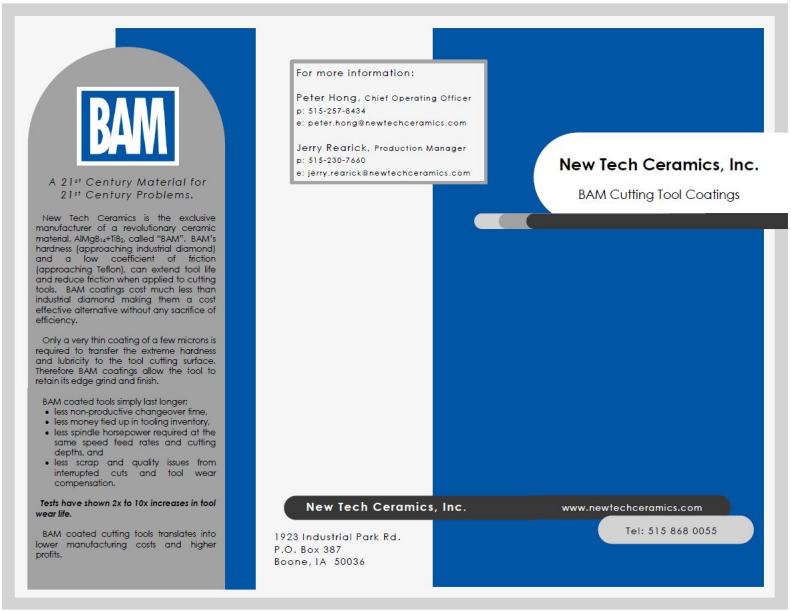

BAM

A 21st Century Material for 21st Century Problems.

New Tech Ceramics is the exclusive manufacturer of a revolutionary ceramic material, $AlMgB_{14}$+TiB_2, called "BAM". BAM's hardness (approaching industrial diamond) and a low coefficient of friction (approaching Teflon), can extend tool life and reduce friction when applied to cutting tools. BAM coatings cost much less than industrial diamond making them a cost effective alternative without any sacrifice of efficiency.

Only a very thin coating of a few microns is required to transfer the extreme hardness and lubricity to the tool cutting surface. Therefore BAM coatings allow the tool to retain its edge grind and finish.

BAM coated tools simply last longer:

- less non-productive changeover time,
- less money tied up in tooling inventory,
- less spindle horsepower required at the same speed feed rates and cutting depths, and
- less scrap and quality issues from interrupted cuts and tool wear compensation.

Tests have shown 2x to 10x increases in tool wear life.

BAM coated cutting tools translates into lower manufacturing costs and higher profits.

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BAM Cutting Tool Coatings

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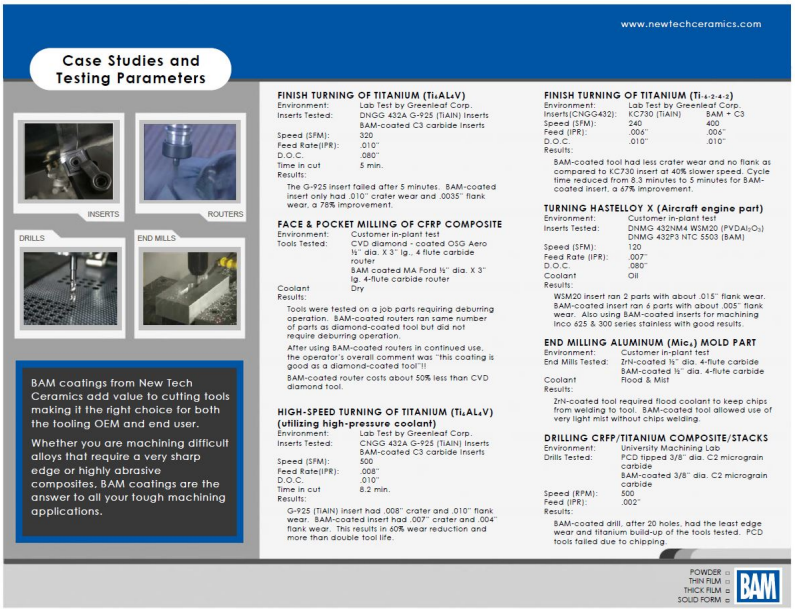

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Case Studies and Testing Parameters

INSERTS

ROUTERS

DRILLS

END MILLS

BAM coatings from New Tech Ceramics add value to cutting tools making it the right choice for both the tooling OEM and end user.

Whether you are machining difficult alloys that require a very sharp edge or highly abrasive composites, BAM coatings are the answer to all your tough machining applications.

FINISH TURNING OF TITANIUM (Ti_6Al_4V)

Environment:	Lab Test by Greenleaf Corp.
Inserts Tested:	DNGG 432A G-925 (TiAlN) Inserts BAM-coated C3 carbide Inserts
Speed (SFM):	320
Feed Rate(IPR):	.010"
D.O.C.	.080"
Time in cut	5 min.

Results:

The G-925 insert failed after 5 minutes. BAM-coated insert only had .010" crater wear and .0035" flank wear, a 78% improvement.

FACE & POCKET MILLING OF CFRP COMPOSITE

Environment:	Customer in-plant test
Tools Tested:	CVD diamond - coated OSG Aero ½" dia. X 3" lg., 4 flute carbide router BAM coated MA Ford ½" dia. X 3" lg. 4-flute carbide router
Coolant	Dry

Results:

Tools were tested on a job parts requiring deburring operation. BAM-coated routers ran same number of parts as diamond-coated tool but did not require deburring operation.

After using BAM-coated routers in continued use, the operator's overall comment was "this coating is good as a diamond-coated tool"!!

BAM-coated router costs about 50% less than CVD diamond tool.

HIGH-SPEED TURNING OF TITANIUM (Ti_6Al_4V) (utilizing high-pressure coolant)

Environment:	Lab Test by Greenleaf Corp.
Inserts Tested:	CNGG 432A G-925 (TiAlN) Inserts BAM-coated C3 carbide Inserts
Speed (SFM):	500
Feed Rate(IPR):	.008"
D.O.C.	.010"
Time in cut	8.2 min.

Results:

G-925 (TiAlN) insert had .008" crater and .010" flank wear. BAM-coated insert had .007" crater and .004" flank wear. This results in 60% wear reduction and more than double tool life.

FINISH TURNING OF TITANIUM ($Ti_{6\text{-}2\text{-}4\text{-}2}$)

Environment:	Lab Test by Greenleaf Corp.	
Inserts(CNGG432):	KC730 (TiAlN)	BAM + C3
Speed (SFM):	240	400
Feed (IPR):	.006"	.006"
D.O.C.	.010"	.010"

Results:

BAM-coated tool had less crater wear and no flank as compared to KC730 insert at 40% slower speed. Cycle time reduced from 8.3 minutes to 5 minutes for BAM-coated insert, a 67% improvement.

TURNING HASTELLOY X (Aircraft engine part)

Environment:	Customer in-plant test
Inserts Tested:	DNMG 432NM4 WSM20 (PVD Al_2O_3) DNMG 432P3 NTC 5503 (BAM)
Speed (SFM):	120
Feed Rate (IPR):	.007"
D.O.C.	.080"
Coolant	Oil

Results:

WSM20 insert ran 2 parts with about .015" flank wear. BAM-coated insert ran 6 parts with about .005" flank wear. Also using BAM-coated inserts for machining Inco 625 & 300 series stainless with good results.

END MILLING ALUMINUM (Mic_6) MOLD PART

Environment:	Customer in-plant test
End Mills Tested:	ZrN-coated ½" dia. 4-flute carbide BAM-coated ½" dia. 4-flute carbide
Coolant	Flood & Mist

Results:

ZrN-coated tool required flood coolant to keep chips from welding to tool. BAM-coated tool allowed use of very light mist without chips welding.

DRILLING CRFP/TITANIUM COMPOSITE/STACKS

Environment:	University Machining Lab
Drills Tested:	PCD tipped 3/8" dia. C2 micrograin carbide BAM-coated 3/8" dia. C2 micrograin carbide
Speed (RPM):	500
Feed (IPR):	.002"

Results:

BAM-coated drill, after 20 holes, had the least edge wear and titanium build-up of the tools tested. PCD tools failed due to chipping.

POWDER ☐
THIN FILM ☐
THICK FILM ☒
SOLID FORM ☐

BAM