



# Cutting NEWS

## OSG DIAMOND TOOLING

Proven Technology for Composite Materials

### CONTENTS

#### **Moving Forward Without a Bailout**

Doug Brubaker, District Manager

#### **Evolution of Machining**

Shane Soberg, District Manager

#### **Market Survival Strategies**

Mike O'Connor, District Manager

#### **Aero Rougher for the Tough and Nasty**

Chris Presley, District Manager

#### **A Close Examination of Engineered Materials**

Tod Petrik, OSG Sr. Applications Engineer / Aerospace Specialist

**And More...**



## CONTENTS

**Moving Forward without a Bailout . . . . . 2-3**  
Doug Brubaker, District Manager

**Short Cuts . . . . . 3, 5, 7 & 11**

**Evolution of Machining . . . . . 4-5**  
Shane Soberg, District Manager

**Market Survival Strategies . . . . . 6-7**  
Mike O'Connor, District Manager

**EXOCARB® - Aero Routers. . . . . 7**  
NEW Product

**Aero Rougher for the Tough and Nasty . . . . . 8**  
Chris Presley, District Manager

**Stay on top of the industry with OSG Cutting News . . . . . 9**  
Renew Your FREE Subscription

**A Close Examination of Engineered Materials . . 10-11**  
Tod Petrik, OSG Sr. Applications Engineer / Aerospace Specialist

### Editorial

## Moving Forward w/o a Bailout

Doug Brubaker, District Manager



The recession has claimed yet another victim. Not the shop down the street or the dealership around the corner, but Asia's largest airline by revenue, Japan Airlines Corporation. JAL is the fourth

*"There are many distributors who are recruiting and strengthening their position in the market."*

largest corporate bankruptcy in Japanese History with a debt of \$25 billion. It is cutting nearly 16,000 jobs, causing thousands of retail shareholders to be wiped out. JAL's

bankruptcy will affect the aviation market worldwide, including here in the United States. Japan Airlines has orders in the U.S. for new aircraft, but neither JAL nor its suppliers know what will happen to these orders on the books. Despite its recent turmoil, all is not lost for JAL. They will be given a \$10 billion bailout from their government. Sound familiar?

While JAL's latest announcement is concerning and disheartening, it is not indicative of what I am seeing in my territory (U.S. central region). I am seeing optimism and increased activity. I have automotive accounts that are bringing workers back, and aerospace accounts that are busy and getting busier. While some long time distributors are cutting

their sales force, there are many distributors who are recruiting and strengthening their position in the market. The activity for quoting is increasing and companies are optimistic that a high percentage of these quotes will turn into jobs. Although the level of activity is nowhere close to where it was, it is activity and it is growing. There is, however, a definite change of guard in the current market, and you better be bringing value to the customer if you want to survive.

One of the reasons cited for the JAL bankruptcy was "excessive spending." How many of our customers are doing this without even realizing it? Everyone is trying to cut costs and save money, but how many actually are? Customers have a tendency to switch to a less expensive brand when they need to reduce tooling cost. The numbers may look good on paper at first, but they could be spending more in reality.

It is our job as sales people to educate customers on the type of savings quality tools can bring. The method for highlighting quality tools' benefits is actually quite simple – guarantee them a cost savings by using our tools or they don't pay. Use our Cost Savings

Sheet to show them the cost per unit by running our tools against anyone else's. We recently did a sampling of 14 pieces on a drilling application where our drill was significantly more expensive than our competitor's. However, we were able to demonstrate to the customer that by using our

*"With OSG, their labor cost was cut to 19 cents per hole while the "less expensive" tool averages \$1.15 per hole."*

tooling, their labor cost was cut to 19 cents per hole while the "less expensive" tool averages \$1.15 per hole.

No one, including the corporate giants, is untouchable in today's market. How many of us know someone who has lost their job or even lost their home to foreclosure in this economy? You've worked hard your entire life and all of a sudden it's gone and you're starting over. But unlike the corporate giants, you and I have no government bailout. The debt we have is what we owe. No one will forgive it for us regardless of the circumstances. Some people might have been more fortunate than others, but many of us are still trying to shake off the effects of the current economic slump and move forward. It's what we do and it's what we've always done. There will always be those that get the breaks, and those of us that create our own breaks.



## Short Cuts

Japan Airlines files for \$25 billion bankruptcy

JAL, Asia's largest airline by revenues and an ambassador for Japan across the world, has filed for bankruptcy protection on Tuesday, Jan. 19, 2010, owing more than \$25 billion.

JAL has now been bailed out by the Japanese government four times in the past 10 years. It vowed to slash 15,700 jobs and will be replacing many of its older and less fuel-efficient planes.

## Feature

## Evolution of Machining

Shane Soberg, District Manager

When I think of aerospace and what is happening with the market, there are changes I see taking place. Materials, tolerances and tool designs have evolved significantly over time. In order to be in sync with market demand, traditional machining practices must be replaced with the new and advanced methods.

### Materials

For instance, beryllium copper is a material that has been widely used in the aerospace industry for years. With the health risks involved in producing and machining beryllium copper, however, aerospace manufacturers are switching to materials such as NC25 and NC50 (copper alloy) for their high wear parts.

NC25 and NC50 are dense materials. A 6"x6"x3/4" piece weights approximately 26 lbs.

*"Aerospace technology is advancing at a rapid rate."*

In comparison, the same size stainless steel piece weights only 7.6 lbs. NC25 is widely used in

optics, electrical conductors for missiles, planes and fighter jets. NC25 is a very abrasive

material. Tools that used to be able to machine beryllium copper are not capable of handling NC25. Consistency in tool life is simply difficult to obtain. However, with the correct geometry, tougher substrates and new coatings that recently have been introduced into the market, such arduous tasks can too be achieved.

In addition to NC25 and NC50, the evolution of lighter commercial and military aircraft has triggered an increase in demand for tougher stainless steels like 15-5, 17-4 and 555 titanium alloys. These materials are needed due to their superior strength and wear resistance. One common component that is utilizing these

new super high temperature alloys is landing gear brackets. Recently, I witnessed a bracket being machined in 15-5 stainless steel. It was completely machined from one billet, which measured

12"x22"x3.5" and weighed 262 lbs. Upon completion, the landing gear weighed under 50 lbs. and had a tolerance of .003" over 22."

### Machining

High speed machining technologies are becoming more prevalent in machining. Burying a 2" diameter HSS rougher and waiting six hours for the cycle to complete is a thing of the past. Faster machines, HSM practices and new cutter technology are common topics in today's shop talk. For example, taking a high performance 1/2" carbide end mill and profile cutting 303 Stainless at an axial depth of 1.5xD, radial cut of .100" with a RPM of 8,400 at 136 IPM, is becoming standard machining. In addition, cycle time has been reduced from six hours to one. With high precision CNC machines, the possibility of what we are capable of doing is endless. These sophisticated machines are able to hold tight tolerances on a consistent basis, enabling users to meet the need and demand of the aerospace industry.

### New standard of tolerances and designs

The military side of aerospace is going strong with state of the art optics. Some of the optics includes new rifle scopes and night vision binoculars that are built with infrared cameras. Such design enables images to be seen at the troops control desk from anywhere



in the world in real time. These optics are made from ranges of .100" to .150" wall thickness, aircraft grade cast aluminum. They provide our troops lighter and stronger optics.

Moreover, the tolerances of these parts must be held to .0004" true

positioning up to as many as 6 to 10 features and hold .001" flatness. These features are held at such tight tolerances to ensure the highest quality and accuracy possible.

In overview, changes in materials,

tolerances and tool designs have become more specific to accommodate new manufacturing processes. Coatings, in some cases, are grown on the tools for

the purpose of withstanding new abrasive materials.

Fixture designs have become more critical and complicated

in order to meet tolerances and reactions of materials.

Aerospace technology is advancing at a rapid rate. To be competent with the industry's needs, continuous improvement in machining practices is critical.

*"To be competent with the industry's needs, continuous improvement in machining practices is critical."*



## Short Cuts

Embraer may get boost from JAL woes

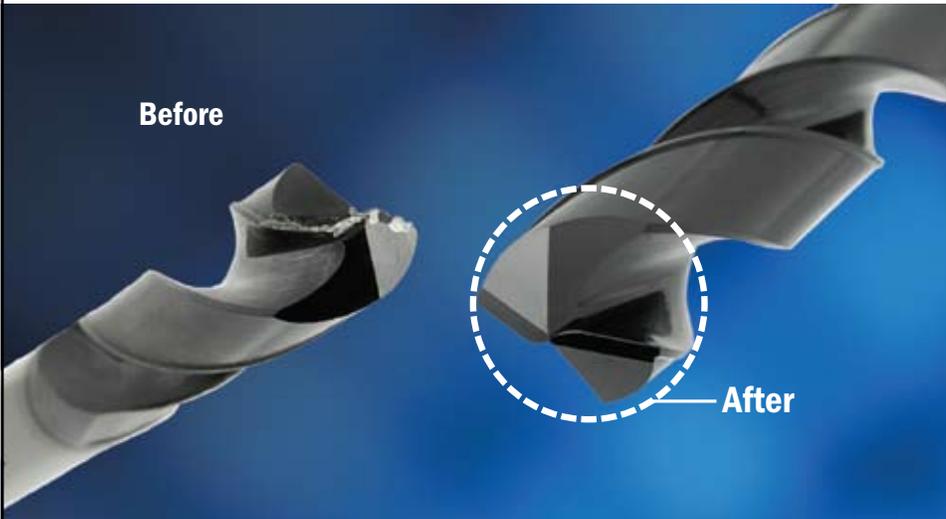
Embraer could see an uptick in business from Japan Airlines as the bankrupt carrier begins replacing its fleet towards smaller and more fuel-efficient aircraft. JAL plans to retire all of its 37 Boeing 747-400 jumbo jets, all 16 McDonnell Douglas MD-90 planes, and will be introducing 50 small and mid-sized regional jets as part of its revival plan.

Airline analyst says the downsizing could translate into new orders for Embraer, who is the world's third largest commercial aircraft maker after Airbus and Boeing. Embraer manufactures regional jets seating up to 120 passengers, as well as business jets and military aircraft.



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**Before**

**After**

## OSG Insider

## Market Survival Strategies

Mike O'Connor, District Manager



Today's market is more competitive than ever. Many companies in my territory, including aerospace, medical, oil and gun manufacturers, have had to adapt in order to survive. They have diversified from a specific supplier to a supplier of several industries. This fundamental change, however, presents a number of challenges.

### Process and material can be polar opposite from one industry to the next

When an aerospace shop changes gear toward gun manufacturing, it could easily fall into the trap of over-analyzing and over-engineering a utility gun part. Aerospace shops often possess the capability to produce gun parts. However, the functionality between airplanes and guns vary significantly. Often time aerospace parts require a great amount of preparation and calculation in order to configure one small part into an aircraft. Although the structure of a gun can be sophisticated as well, the production method of an aerospace part should not be applied to a gun part.

Work material also plays a critical

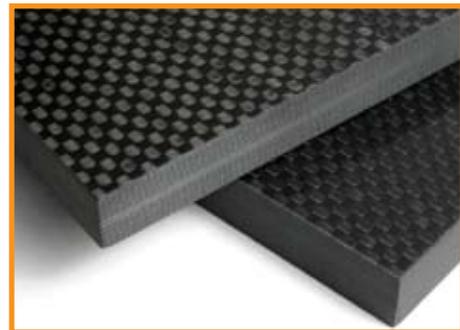
role when changing from one industry to the next. A gun maker, for example, could produce a medical part to print but fail in surface finish. Such

issue is prone to occur when shops neglect the difference in functionality between a gun part and a medical part. The safety requirement between a gun part and a medical part differs drastically. Gun makers rarely have to worry about an allergic reaction or a bacterial infection. Medical shops, on the other hand, have to pay close attention to work material in order to avoid possible patient complications.

### How have companies adapted?

Manufacturers have used a number of strategies to adapt to today's ever-changing market. One strategy is to purchase an engineered machine tool solution, which brings fresh ideas as well as an operational money maker. This option enables a company to attract contracted customers, and allows it to learn as it earns. I have seen a dedicated aerospace supplier make the jump to medical via such process. Ideas in process for the medical part were incorporated into their existing aerospace parts. The result was a decrease in machine cycle time of up to 75 percent. It opened a whole new world to that company.

Another strategy is to rely on cutting tool suppliers to broaden a manufacturer's capabilities. Why go through all the pain of learning to cut exotic materials, when a cutting tool supplier can provide decades of experience? Many companies now are engaging their engineers in cutting tool seminars and inviting suppliers for on-site training. Such training may consist of basic principles to very complex processes. An engineer or machinist should never stop learning. Sometimes even 30 years of experience doesn't make one immune to missing a basic principle. Moreover, a fresh perspective from a cutting tool engineer or salesman could be the solution to a costly ongoing challenge. With a quality cutting tool supplier's assistance, a company can further broaden their capabilities.



In addition to training, hiring engineers and machinists from other industries can give a company fresh insight into other worlds of metal cutting. There was a customer in my territory who was so impressed by their engineered machine tool solution that they hired the applications engineer to be their

engineering manager. This one hiring took the company from being a gun parts focused supplier to having expert experience in all industries. There is no quicker way to getting staff to be experienced in a discipline than hiring new staff already versed in that discipline.

Manufacturers who have employed

these strategies have been the most successful at adapting. However, there is no absolute solution. Each

*"It is very easy to spot companies that have not adapted – their doors are closed."*

strategy has to be adapted to the existing company and culture. In today's economy, it is very easy to spot companies that have not adapted – their doors are closed.



## Short Cuts

Boeing to invest \$100 million in India maintenance unit

Boeing plans to supply India's national airline, Air India, with its first 787 Dreamliner in 2011, and invest \$100 million in building a unit to maintain it, Boeing India President Dinesh Keskar said in a statement earlier this year. Keskar added that the maintenance facilities in the city of Nagpur should be completed in two-and-a-half years and will maintain 787 and 777 aircraft.

The 787 twin-aisle, mid-sized plane can carry up to 330 people over very long distances. It has initial orders of 840 aircraft from various airlines around the world.

The first Dreamliner delivery is planned for the fourth quarter of this year, to All Nippon Airways, Boeing officials said.

Insider

## EXOCARB® -Aero Routers

OSG has introduced cutting edge technology for milling CFRP and other composites with two new EXOCARB®-Aero Routers.

The first router features up to 12 opposing helix angles for heavy milling work in low and high horsepower machines. The second router is a 6-flute herringbone design ideal for finishing CFRP. Their specially engineered flutes compress material in opposing directions to produce an excellent finish with no delamination.

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Herringbone Router

## Testimonial

# Aero Rougher for the Tough and Nasty

Chris Presley, District Manager



“Inconel – oh no!! It’s a tool killer. It’s too tough and nasty to cut!”

This is a common customer reaction when dealing with Inconel. Inconel is a difficult material, but is it a material that should make shops “run for the hills?” Absolutely not! Inconel is probably one of the toughest, most common high temperature resistant materials we come across in the aerospace industry. However, with the correct tool, it too can be an easier material to machine.

Recently, one of my customers

was in need of a 5/8 end mill for a new project involving an aerospace engine part that they were quoting on. We examined the job and concluded that removing all the material would be the biggest challenge.

Slotting may be one of the worst

however, is not just a typical Corncob Rougher. It is specially designed for maximum metal removal in exotic high temperature materials. Aero Rougher’s uniquely configured serrations on the cutting edge reduce friction, thereby generating less heat and requiring less horsepower than standard or variable helix carbide end mills. In addition, the combination of the shallow profile serration and the 45° helix provides a much smoother surface finish.

*“Inconel – oh no!!  
It’s a tool killer. It’s too tough  
and nasty to cut!”*

to keep cost down in order to win the bid. I was offered to be in the mix of testing for the job. It was a competition between the Aero Rougher and two other competitors that had a variable design.

One of the operators at the shop believed that the variable design

operations in Inconel. When removing a large amount of material, many people in the industry are familiar with older end mill designs such as the Corncob Rougher and Knuckle End Mill. OSG’s Aero Rougher,

would be the only tool that would work on the part. However, tool performance results proved him wrong. We used the speeds and feeds according to the product flyer. The application was with a 520 RPM and a feed of 2.7 IPM. With majority of the cuts being a slot, we recommended .156 on the depth of cut (DOC). After several trials, the customer was able to push it to .200 DOC. OSG scored lower in cost and provided the customer a completed part with the Aero Rougher. Our competitors, on the other hand, were not able to finish a part.

OSG’s Aero Rougher is able to provide users the ability to run tools with higher feed rate, which is a vital advantage in today’s competitive market.

Next time when you are in need of a tool for Inconel, don’t forget the Aero Rougher. It can handle the tough, the nasty, and help eliminate stress in making a part!



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**Automotive**

**Medical**

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## Engineer Insight

# A Close Examination of Engineered Materials

Tod Petrik, OSG Sr. Applications Engineer / Aerospace Specialist

Upon evaluating the direction of where manufacturing is headed, it is clear that the accepted material standards in product design are rapidly changing to capitalize on the advantages of new options. This trend has created an opportunity to design a new generation of tooling that specifically addresses a whole new world of materials.

## Engineered Materials

Up until roughly 1960, materials science was widely considered to be metallurgy. However, since then the development of different

types of polymers, ceramics, biological materials and composites has drastically changed the way engineers look at designing and manufacturing new products.

*"...the sky is the limit for products in our future."*

These new materials are considered "engineered materials." In other words, they are created with specific properties in mind. By creating a material that has specified strengths and other properties, the sky is the limit for products in our future.

Polycarbonates, Polyethylene, Polypropylene, Polystyrene, Polyamide, PVC, Nylon, Kevlar, Polyurethane, Acrylic, Phenolic, PEEK, FR-PEEK, MDPE, Reinforced

Carbon – Carbon, FRP, GRP, CFRP, RTM are some examples of engineered materials. This group of materials can be quite imposing to those who do not hold an advanced degree in materials science related realm, and it indeed should, as some of this stuff really is "rocket science."

## Choosing the Right Tooling

OSG's engineering group spends a great deal of time



answering questions and making recommendations on how to machine a tremendous variety of materials. Up until fairly recently, it was consisted mainly of steels, alloys and various metals. Now, with the introduction of these new material types, questions and confusions regarding them have also surfaced increasingly.

Choosing tooling for these new materials is really similar to choosing tools to cut an unfamiliar metal. If you make a routine out of asking your contact (preferably the end user) a series of questions every time you have a composite tooling opportunity, the process will go rather smoothly.

Ask the Engineer

## The Phone Call



**Sales:** "Hey, my distributor wants some of your new 1/4" composite drills. Can you rush over a quote?"

- A prolonged pause -

**Engineer:** "Unfortunately it's not quite that simple."

There is not one specific tool that will work best in "composites," precisely because nearly every one of these materials exhibits different physical properties, just as 1018 steel and Waspaloy are two completely different animals. They are both "metal" but are different in many ways. Just as we manufacture different tools for these two metals we also make different tooling for various types of composites! Some production methods already specify the type of tool design that MUST be used. There is no magic bullet.

## Tooling Check List

- Material type** – this is probably the most difficult part as many times there will be limited information available. However, some manufacturers may be willing to part with a sample.
- Material thickness**
- Production method** – what kind of machine are they running their tooling in? What other details can your customer add? (spindle size, tool holder type, etc.)
- Operation type** – roughing or finishing?
- Coolant or non coolant** – if coolant is applied, how it is delivered. What type is it?
- Part tolerance constraints** - hole diameter tolerance, or part size and tolerance.
- Surface finish concerns/ requirements**
- Are existing tooling prints available?** A picture really is worth a thousand words.
- Are specific tool features required?**
- Does the customer require a certain shank size?**
- What is the goal of the person that signs the check (or cuts the PO as the case may be)?**
- Tool life, cost per part, and cost per tool?**
- Competitors used tooling, part number** – as we continue to develop new tooling for different opportunities, we must stay on top of what other competitions are doing.

If the list seems like the road to building special tooling, that's because quite often that is the case. To those accustomed to doing a lot of special tooling business this may be old hat. However, if your territory and customer base consists largely of standards, then hopefully this list will help you streamline some composite tooling sales. The answers to these questions will also help determine if a standard offering will fit the bill. With such information, engineering can more effectively help you get the right tool design to the spindle!



## Short Cuts

Air New Zealand unveils new 'Skycouch' economy seats

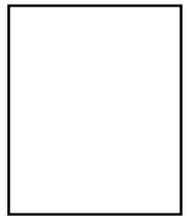
Air New Zealand will begin installing the "Skycouch," a Kiwi-designed row of three economy seats providing a flat surface for two adults to sleep on, at the end of 2010 when it takes delivery of the first of its new Boeing 777-300 aircraft.

A Skycouch ticket will be based on buying two seats at standard prices and the third seat at half-price, according to Air New Zealand's press release. The new seats will be offered to travelers on selected services between Auckland and Los Angeles beginning December 2010.





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