



Vapormatt



**Wet blasting in the  
aerospace industry**

**Did you know that the origin of wet blasting all began in the aerospace industry? In fact, it all started when Norman Ashworth developed the first wet blasting machines to produce surface finishing of sufficient quality for cast turbine parts in the late 1940s with Sir Frank Whittle and the development of the jet engine.**

Aerospace continues to be one of the prominent industries that use wet blasting in a wide variety of specifications in original equipment manufacturers (OEMs) and maintenance, repair and overhaul (MROs) companies. Among the applications suitable for aerospace, cleaning before crack detection, preparation of surfaces for bonding and painting, removal of conformal and abrasive coatings and paint, and peening of turbine and fan blades are just a few of the surface finishings wet blasting can offer.

In the aerospace industry manufacturing, precision is key and commercial success depends on meeting strict quality and safety requirements. Surface preparation and finishing, for new parts or for component repair and reconditioning, is just one of many crucial production processes that are widely used in the aerospace sector. In order to conform to established specifications any surface finishing equipment must be able to offer great control and, more importantly, repeatability of results. Wet blasting has historically been used for a diverse range of applications and, through several years of research and development, is among some of the most controllable surface finishing techniques available.

## The wet blasting process

In the aerospace industry, the complexity of wet blasting machines can range from very simple manual cabinets all the way up to fully integrated and highly automated production scale solutions. However, in all cases, there is a need to understand some basic design principles in order for the process to work consistently.



There are three key elements to wet blasting: abrasive media, air, and water. Unlike dry blasting, the introduction of water into the process aids the controllability with the flowing action offering a cushioning effect that produces a smoother finish. Additionally, wet blasting offers high levels of coverage and consistency, particularly on difficult or challenging shapes. Our highly advanced systems combine the water, abrasive and air to form a 'slurry', which is the "lifeblood" of the wet blasting process with the pumping system its "heart".

The option to change and control abrasive particles in the water, gun pressures, water temperature and a host of other factors makes wet blasting a versatile process with clear advantages. For example, changing the abrasive medium can change the process from one of cleaning to one of surface treatment.

However, failing to control the concentration of this slurry can impinge on consistency if not done correctly. What comes out of a blast gun may appear identical in every case – but many underlying parameters can be altered and controlled to allow huge variations in the process depending on the component being treated and its required application.

### **Some of the process variables to consider are:**

**The nature of the abrasive media** – shapes, hardness and size

**Air pressure** – which determines the speed at which the slurry leaves the blast gun and the kinetic energy of the process

**Chemistry** – how alkaline or acidic the sump solution needs to be for cleaning or rust inhibition.

**Blast guns used** – the number, size and angles



By altering the parameters to offer a processing environment that is either very aggressive or delicate the blast slurry can flow over components to achieve a range of finishes. Typically, aerospace users will benefit from a controlled peening effect on turbine and fan blades to achieve a gentle and uniform abrasion on composite frames and blades in preparation for bonding or painting. Water nullifies some of the inherent dangers of the dry blasting process, such as clouds of dust and charged particles – a potentially explosive mixture. It also reduces localised heating (through friction), making it particularly advantageous for the surface treatment of sensitive substrates such as composites.

## The benefits

Understanding the requirement to conform to strict process approvals Vapormatt have developed wet blasting equipment that is trusted by the OEMs and MROs. Through consultation and collaboration with our customers, we have been able to design and build a large range of machines.

**At a glance, the benefits of wet blasting for aerospace components are wide-ranging and include:**

- No static build-up, enhancing surface energy
- Eliminates all dust, to promote better surface adhesion
- Lubricating action, for lower surface Ra
- Reduced abrasive usage
- Lower wear on working parts
- High levels of precision automation
- Improved corrosion resistance

There are also environmental benefits to using the wet blast process. In certain aerospace applications, such as the removal of abradable coatings, wet blasting can reduce or completely eliminate the use of harsh chemicals. For large overhaul sites, the reduction of chemicals is not only a good cost-saving but also an effective way to protect the environment. As a result, wet blasting is well-established for the removal of paint from aircraft wheels where substrate damage can mean replacing the whole component. advantageous for the surface treatment of sensitive substrates such as composites.



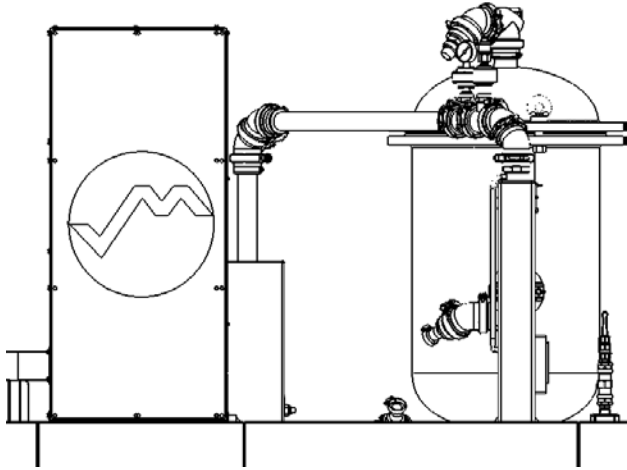
**In addition to these benefits, we have the capability to enhance our systems with a number of patented and unique features:**

- Elutriation towers for accurate abrasive media conditioning
- Low-level “donut” sumps for easier loading of heavy components
- Manifold gun crowns for better, more consistent, distribution of slurry
- Extensive monitoring to aid maintenance schedules and limit operator intervention

**Wet blasting delivers high control capabilities to the blasting process, which are especially important in the high-precision manufacturing applications that are a constant in the aerospace industry.**



Depending on the application users will typically look to hold a concentration of 15-20% abrasive media, however, this will be continually fluctuating as media breaks down, leaving smaller particles in the process along with potential contaminants from the component being processed. To control this aerospace manufacturers are opting to install elutriation towers into their wet blasting systems. These towers can calibrate and condition the slurry to ensure a very high media quality by removing particles that are not of the right size from the machine.



With continual information being fed back to inbuilt HMI's pertaining to the slurry concentrations, water pH, air flows to individual nozzles, wear on abrasive hoses and soap concentrations, advanced wet blasting systems can run for extended periods of time with minimal user interference.

Accessibility is an important consideration for users in the aerospace sector. With most wet blasting systems having a large sump to hold the pumping systems and slurry some suppliers will require either expensive pits to be dug into the production floor or a staged platform built around the machine. Not only will this add to the cost of installation but there will also be issues surrounding the loading and handling of heavy components such as fan blades. The "donut" sump offers the same consistency of processing as alternative machines, but with a much lower loading height making accessibility easier and throughput higher.

Other innovations include automatic abrasive dosing for controlling concentrations, automated adjustment of air and slurry pressures to ensure each nozzle is of the same process intensity and wear tests to help plan services and preventative maintenance.

Based on many years of servicing customers' machines, we offer service contracts to help keep your wet blasting system in good working order and give you the highest production capability. Our service contracts aren't restricted to Vapormatt systems. Thanks to our capabilities and expertise, we're able to service and support all wet blasting machines from other suppliers too.

## No size limitation

Component size is not a limiting factor in wet blasting, as it can be used for everything from nuts and bolts to wing spars. It is common for tiny fixings to undergo the same surface treatment as a large forging, especially if the parts are later attached together. But this can be done in different ways. Small fixings, for example, would be treated in bulk in a tumbling barrel, in order to save cost. But a part like a wing spar would be set up in a large chamber, then blasted by either robotic or servo-controlled nozzles moving across its surface.

For large parts like wing spars, automation ensures consistency. In highly regulated industries like aerospace, the quality of each part needs to be identical. This is achieved by treating each one in exactly the same way, with no variation. A good example is when treating the surface of an aerofoil, allowing a de-icing strip to be glued to it. Automated wet blasting ensures consistent surface cleaning, which guarantees an identical bond every time.







## Automatic and manual finishing

Our automatic and manual wet blasting machines are well suited to the finishing of aerospace components such as engines, propellers and landing gear. All our machines benefit from our construction technology which incorporates the use of stainless steel, composites and /or moulded polymers to create rugged, corrosion-free, sound-insulated cabinets.

The automatic machines ensure complete and consistent surface finishing every time. This is done through our speciality in developing recipes that produce very specific, desired processing effects. Once the parameters have been identified Vapormatt equipment is designed to incorporate extremely sophisticated process control to ensure that different recipes can be selected at will, but in such a way that each is highly repeatable and consistent over the long term. This has been shown to not only boost productivity but also deliver excellent ROI. These types of machines are ideal when components are similar to one another and when production volumes are higher.

Manual machines on the other hand are well suited to smaller production volumes and where components regularly differ from one another. These machines are designed with operator comfort in mind and are built to be robust and long-lasting. Blast guns are light and easy to use and are fully compliant with relevant hand-arm vibration health and safety regulations. Machines are fitted with safety glass windows, door safety interlocks, ergonomic foot switch controls, cushioned armholes and low loading heights

In addition to the ease of maintenance of our machines, there is an option to upgrade or specify to include self-monitoring systems. This will alert manufacturers to even the slightest amount of wear and be able to advise when parts should be replaced. With a range of add-ons and optional features available, old and existing wet blasting machines can be retrofitted to bring greater process control and, ultimately, improved component quality to the aerospace industry, where meeting specifications is a key factor for success.

## Conclusion

In the aerospace industry, Vapormatt have to be able to offer highly controlled systems that can reliably and repeatedly provide the standard of finish that is demanded by OEMs and MRO companies. We are a specialist solutions provider dedicated to wet blasting technology. We have experience in a range of aerospace applications across the globe with installations at both OEM and MRO levels. Our ability to control the process using patented technologies has made us an approved supplier for several blue-chip firms. The quality of surface finishing we can provide is not only consistent but always improving. This is why Vapormatt wet blasting machines are able to stay ahead of the competition and offer great advantages to the aerospace industry.



# Vapormatt's automatic wet blasting machines for aerospace

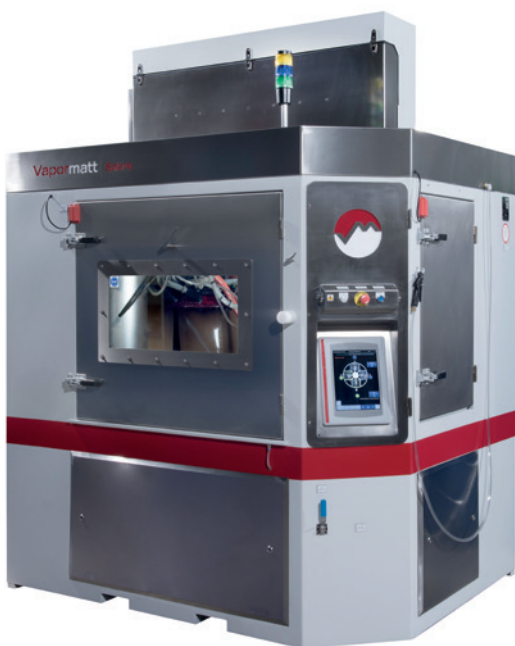
Leopard Cub



The Leopard Vertical



Sabre



Lion Rotary



## Why work with us?

Vapormatt isn't just the world leader in wet blasting. We invented the process and remain solely focused on it to this day.

Since Norman Ives Ashworth developed the first wet blasting machines in the 1940s, we've been developing, improving and refining wet blasting for edge radiusing, surface preparation and peening. And we're still led by the Ashworth family today, continuing to design and manufacture bespoke machinery and after-market services built to the specific requirements of your business.

Our expertise spans many different sectors: from tooling carbide insert manufacturing, to stainless steel weld cleaning. Our breadth of knowledge means we can explore a wider range of applications that benefit a business like yours.

Because at Vapormatt, while we might be pioneers of wet blasting technology, we never believe the job is done. We're constantly researching, developing our techniques and discovering new technological enhancements that we can apply to cutting tool inserts. Consequently, we hold and have patent applications pending in significant areas of process control and repeatability.

When working with you, we'll build a long-term technical partnership, giving you access to our know-how and world leading wet blasting services. As a result, we understand you may need us to develop methods and processes in confidence. You'll benefit from our discretion too – in fact, we have a long track record of doing just that with our key customers across a number of high-tech sectors.

## What you can expect of us?

- **Integrity** - We always conduct business with you in a confidential, honest, open and ethical manner
- **Commitment** - Every member of our team aims to exceed your expectations at every level
- **Innovation** - We're at the forefront of wet blasting technology, implementing our technical expertise
- **Value** - You gain value from us through our high levels of service and technical excellence
- **Collaboration** - As a customer focused company, we work collaboratively to ensure you enjoy the best possible experience

## The Vapormatt Promise

In designing and manufacturing specialist machines that meet your exact requirements, we're always improving. Always refining. Always pushing the boundaries. We build on the successes of the past, incorporating proven designs and approaches, and combine them with innovative thinking to meet the specific challenges we face together with you.

Throughout that collaborative process, we're also completely honest and discreet. And it's in this respect that we make a promise to you. As we develop more efficient, more seamless and more effective ways to deliver the benefits of wet blasting to you, any off-the-shelf solution is unlikely to be suitable.

So complete validation of every design detail is practically impossible, and some functions – software, for example – will inevitably need modification as they're integrated into your processes.

Equally, once the equipment is installed on your premises, things are unlikely to be up and running without a glitch from the first moment, in a plug-and-play manner. Performance will always improve as operators and maintenance teams become familiar with the machines and their operations.

Other manufacturers might shy away from such an honest admission. However, we accept that this is simply part of building and refining the right wet blasting machines for you. That's why we promise to make the entire Vapormatt team, including our engineers, designers and sales specialists, available to offer advice, guidance and practical assistance once the equipment is installed and integrated into your workplace.

**And we won't be satisfied until it's working to its full potential and this promise is kept.**

### The four pillars of our promise:

- To continuously improve the design and manufacture of our equipment
- To provide you with machines of the highest possible quality
- To support you in achieving optimal performance from your machines
- To collaborate with honesty and discretion



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