Vapormatt | Lion Rotary

Overview, technical specifications and options

Vapormatt

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Overview

The Vapormatt Lion Rotary machine has been designed to offer automatic wet blasting for components with surface of revolution or that can be held vertically.

The machine will process components mounted at the centre of the satellites and has the capability to process the following range of components:

Dimension	Max
OD	430mm (17")
Length	559mm (22")
Weight	91kg (200lb)

Key features

The machine's highly advanced and designed technical features results in the following benefits:

- Manufactured in stainless steel for strength and corrosion resistance
- Improved surface finish functionality compared with conventional processes
- Consistent slurry quality due to a highly effective filtration system
- Low noise levels and an ability for operators to easily maintain a very clean operating environment are facilitated by the fully enclosed design

Industries and applications

Thanks to the robust and highly efficient build of the Lion Rotary, it is well suited to a range of applications in the aerospace and composite industries:

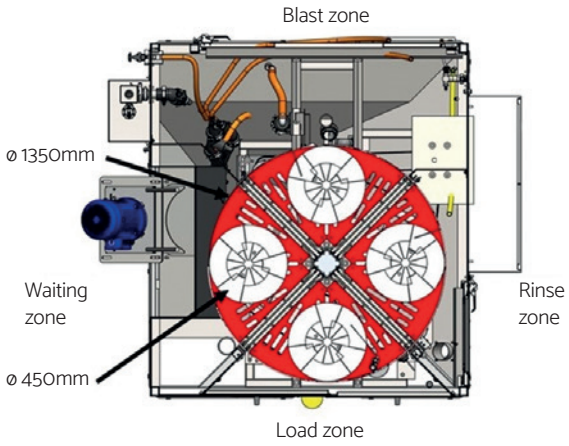
Industries

- Aerospace
- Composites

Applications

- Component cleaning
- Surface preparation
- Paint removal
- Titanium scale removal

Processing description

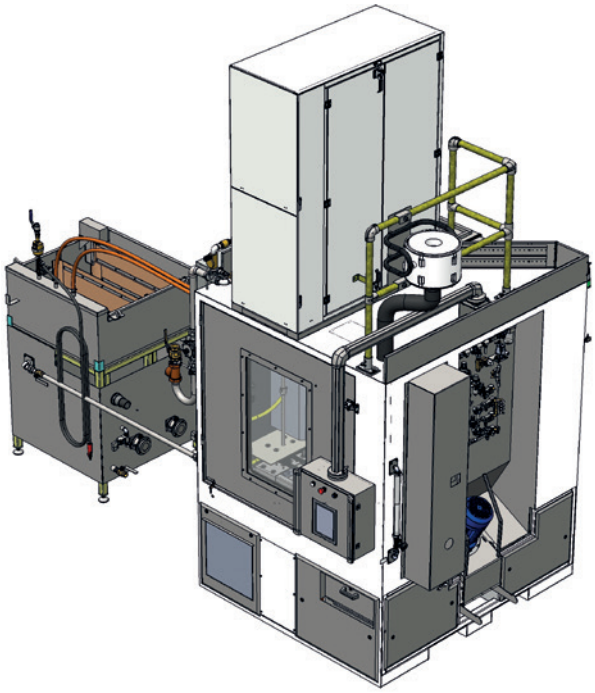


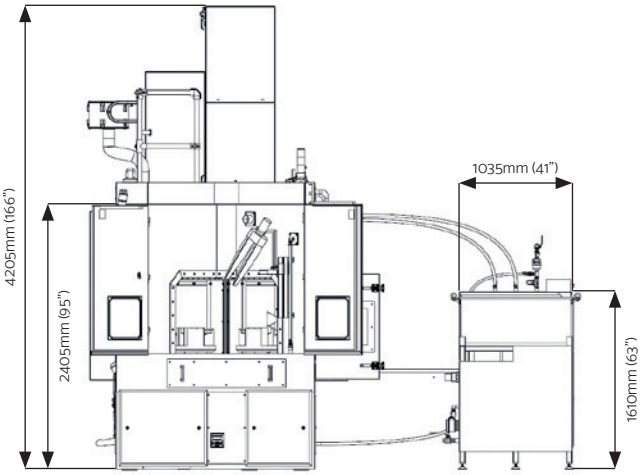
The machine operates on the rotary index principle (as shown above).

- Parts will be loaded by hand, robot, or crane onto the satellite in the un/load zone. Some components will need an external fixture to hold them in place
- The satellite indexes 90° to the waiting zone
- When the blast zone is free the satellite indexes 90° into position
- The nozzles will be lowered by an oscillation unit.
- A set of angled nozzles will ensure even coverage of the component as it turns on the satellite
- When the blasting has finished the satellite indexes 90° to the rinsing zone
- A rinse is carried out to remove abrasive media from the component
- When the rinse cycle is complete the satellite indexes 90° to the un/load zone
- A drying section can be included to remove excess water from the components
- Components can be unloaded by hand, robot, or crane from the un/load zone

Component detection

Provisions can be made so that if future integration of a robot is undertaken, there will be no situation where the robot can place two components in the same position. This will be achieved by way of sensors to identify occupied space.

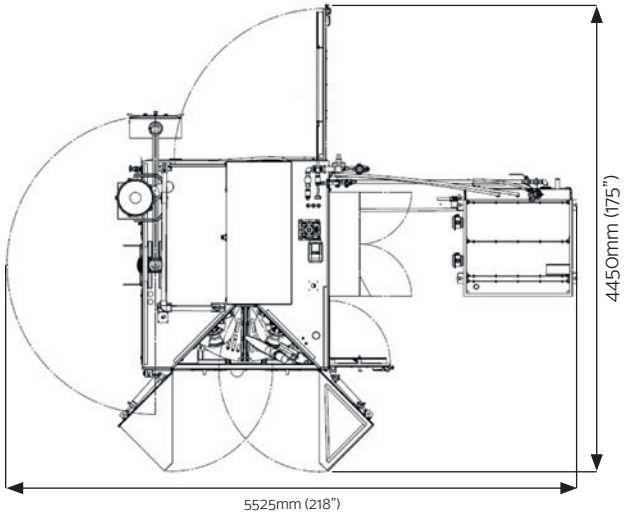




Blasting description

Standard Vapormatt Mk3 guns will be included. Two Mk3 guns may be used and mounted at opposing angles to ensure coverage of the critical areas. Both guns can be mounted on either a manually adjustable gun arm or a motorised horizontal axis. This will be used to select the blast range.

A motorised vertical axis will be used to move the wet blast the rotating components. The Human-Machine Interface (HMI) recipe controls the movements. The removal of the broken particles shall be done with the use of hydro cyclones to ensure the slurry is of consistent quality. Media dosing is recommended to ensure that the correct amount of new media is added to replace the broken media. This reduces operator intervention and improves process repeatability. The outside diameter and end faces of the components will not be blasted.



Rinsing description

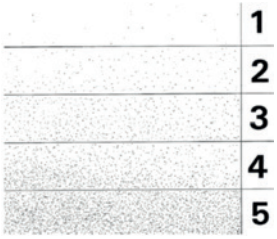
Primary rinse nozzles will be positioned to give good rinsing of the surface of the component. Additionally, extra nozzles will be positioned to give good rinsing of the turntable areas. The use of fixed baffles on the turntable provides walls that stop any contamination from the blasting zone from entering the rinsing zone.

All rinsing water will come from a re-circulated rinse system that has been filtered to remove abrasive fines.

Blow-off

An integrated drying system can be fitted in the load area of the machine to remove excess water from the components.

Following the rinsing, the components will be cleaned to ISO 8503-2 class 2 (see below).



Class	Description
1	Particles visible under x10 magnification but not with normal or corrected vision (usually particles less than 50 µm in diameter).
2	Particles just visible with normal or corrected vision (usually particles between 50 µm and 100 µm in diameter).
3	Particles clearly visible with normal or corrected vision (particles up to 0.5mm in diameter).
4	Particles between 0.5mm (0.02") and 2.5mm (0.1") in diameter.
5	Particles larger than 2.5mm (0.1") in diameter.

Technical specification

The following features are included within the machine's basic specification.

Feature	Description
1	**Blast cabinet** Constructed from welded stainless steel with abrasion-resistant lining. The main blast enclosure has a viewing window. Sufficient space should be allowed around the machine for the opening of service doors, the approximate footprint required is: 5.5 x 6.0 x 4.2m (18.0 x 19.7 x 13.8').
2	**Service door** A large swing door on the side of the machine with a viewing window.
3	**Sound attenuation** Maximum noise level of 80dBA.
4	**Turntable** The turntable is split into 4 zones separated by baffles. Each zone has a satellite turntable fitted onto which the components are placed for processing. The satellite rotation speed is a recipe variable, 10 - 30 rpm.
5	**Oscillation system with Z-axis adjustment** A vertical oscillation system is mounted externally on the roof. This prevents media and water encroachment into critical bearing areas, allowing the blast gun height to be set as part of each recipe parameter. The oscillation provides good control of the process with approx. 600mm (23.6") stroke at 0–1500mm/min (0-59"/min).
6	**Abrasive slurry system** The slurry system incorporates 1 Vapormatt 4 kW vortex pump. The slurry is pumped through a series of abrasion-resistant hoses and solid polyurethane components from the unique Vapormatt slurry pipework system.
7	**Blast guns** 2 Vapormatt MK3 blast guns made from solid abrasive-resistant polyurethane and fitted with 10mm boron carbide nozzles will supply a high-quality and controlled blast stream to deliver the required surface finish.
8	**Vapormatt VSPS Polyurethane Slurry Conduits** This system is unique to Vapormatt and consists of a range of elbows, tees, Y branches and flow splitters that connect with quick release stainless steel clamps. This eliminates the need for screwed pipe connections and steel pipework elements. Benefits include substantially longer component life, superior flow characteristics ensuring consistency of slurry, and ease of maintenance. It is Vapormatt's design policy to avoid threads within the process enclosure wherever possible due to the problems of thread galling because of contamination with process media.
9	**Abrasive slurry conditioning** This continuous abrasive filtration system facilitates accurate and controlled media size which is essential for long-term consistent blasting performance. Particles of broken- down abrasive and debris finer than the selected size are continually removed from the slurry circulation with a Hydrocyclone and collected in settling tanks at the rear of the machine. To compensate for lost abrasive due to breakdown, media level will need to be checked and added. The settling tanks are designed to allow their contents to be easily removed.
10	**Sight glass** A media concentration sight glass will be provided. Operated by a manually controlled valve, this shows how much abrasive is in the machine.
11	**Component washing** Primary rinse nozzles will be positioned to give good rinsing of the components. Additionally extra nozzles will be positioned to give good rinsing of the turntable areas
12	**Electrical control system** The machine is provided with a sophisticated control system accessed via a HMI unit. All on- screen instructions will be in English. Units will be metrics. Electrical equipment is mounted in an IP65 enclosure.
13	**Preventative maintenance** The control system monitors usage of key components such as blast guns, hoses, valves and pumps. Reminders are set to warn when maintenance is due.

14	**Process monitoring** A process monitor screen with moving bar chart graphics to allow all critical process variables to be monitored by the operator / machine setter is provided. The process monitor will also display trend lines for grit water ratio, air flow, actuator movement and media added.
15	**Cabinet exhaust system** The machine needs to be connected to an in- house forced extraction system to maintain a slight negative pressure within the cabinet when operating.
16	**LED lighting** Light units are mounted on the blast cabinet.
17	**Manual rinse nozzle** Positioned at the un/load zone to allow additional rinsing of parts and machine interior.
18	**Manual blow off nozzle** Positioned at the un/load zone to allow parts to be dried.

Optional items

The following features can be added to the machine's basic specification.

Feature	Cabinet enhancement
1A	**Labels in non-English**
1B	**Translation of operation manual and HMI screen**
2	**Programmable ANDON status beacon** Allows the progress of production/process of the unattended machine to be monitored at a distance from the unit itself.
3	**Cabinet roof access** A fixed handrail around the roof of the machine is provided for maintenance access.

Feature	Loading and component handling
4	**Component holding** Jigs designed for component holding and aid with loading. All designs will be jointly approved by Vapormatt and the customer prior to manufacture.
5	**Jib crane** A floor-mounted crane, on swing arm, 2m (3') arm length, with electric hoist, to load and unload parts; maximum load 450kg (992lb).

Feature	Slurry system enhancements
6	**Oscillation with Y-axis adjustment** Allows the blast gun range to be set as part of each recipe parameter, allowing for the processing of various sizes of components.
7	**Slurry concentration sensor** The SCS offers continuous monitoring of the liquid abrasive concentration and has a closed- loop control of the amount of abrasive media being circulated. The value of concentration will be displayed on the HMI unit. This parameter is changeable but will be set at the factory to the user's requirements. Watchdog guards are provided to inhibit machine start and prevent blast processing should slurry concentration levels drift outside of predetermined control limits.
8	**Automatic abrasive dosing system** The automatic media feed compensates for the broken-down media removed by the separation system. Avoiding the need for the operator to manually add abrasive on demand.
9	**Rinse water immersion heater** The rinse water temperature control thermostat can be set to between 10 °C and 60 °C (50 °F and 140 °F). Washing is more efficient with warm water and detergent foaming is reduced. The heater operation can be set on the HMI to pre-heat the system before work starts.
10	**Automatic chemical dosing** Provided to maintain consistent chemical concentration within the blast process area. A volume-based device that doses liquid chemicals into incoming raw water to maintain the correct ratio. Chemicals are used for: corrosion protection, degreasing and the prevention of bacterial growth. Having additive levels automatically maintained will ensure the process works well and preventing any bacteria means the machine is safer to use.

Feature	Filtration and Re-circulation
11	**Oil removal system** A skimmer is installed on the cascade system of the settling tanks to remove floating oil from the machine and filter system.
12	**Elutriation tower** This patented slurry conditioning system offers a more consistent blast slurry quality which allows for more reliable and repeatable processing. Particles of broken-down abrasive and debris finer than the selected size are continually removed from the slurry circulation.
13	**Magnetic filtration** A sump magnet and a separate magnetic filter can be installed in the system as part of the recirculated system.
14	**Exhaust extractor** Forced centrifugal extraction unit to maintain a negative pressure within the machine. Exhaust needs ducting to the external atmosphere.
15	**Exhaust extractor with mist eliminator** Forced extraction unit to maintain a negative pressure within the machine. The filter unit removes mist and dust and allows exhaust to workshop atmosphere. Will include an additive dosing system.
16	**Slurry removal system for quick change of abrasive** This secondary tank is connected to the machine and a "purge" valve can be selected to quickly pump the slurry within the machine through the buckets and tanks to quickly empty the system.
17	**DI water cleaning station** This option provides a filter and regeneration unit to purify the water supply to the required standard. The input water can either be from a mains water supply or water recirculated from the final rinse tank (this reduces overall water usage).
18	**Centrifugal separator** Waste control instead of filtering the mixture of solid and liquid particles, the mixture is centrifuged to force the (usually) denser solid to the bottom, where it often forms a firm cake. The liquid above can then be decanted.
19	**Wet and dry vacuum cleaner** A small size vacuum cleaner for daily routine cleaning and maintenance.

Feature	Process functionality
20	**MK9 gun** These latest Vapormatt blast guns are approximately 10% more efficient than the Mk3 blast guns.
21	**Manufacturing execution system (MES)** Allows for data logging of machine status during the wet blasting process.
22	**Barcode scanner** This enables the reading of data from any batch card for the automatically loading of recipes.
23	**Drying system** Components are dried by an air sock. These are powered by a separate blower unit. The heated air temperature is controlled and can be adjusted.
24	**Blast airflow monitoring system** If flow drifts outside pre-set limits, at any given pressure, due to air jet or hose failure, a signal appears on the HMI unit.
25	**Drain pump** An additional pump to remove drain water to a remote drain if an adjacent floor-level drain is not available.

Services to be provided by the customer

We always ensure our machines operate to the specification.

Service	Requirement
Electricity	400/480V 3 phase 50/60Hz, 12kW load (Subject to change), supply with isolator.
Process air supply	Pressure 6 - 7 bar (90 - 100 psi). Max consumption 2.90Nm³/min (100 SCFM). Connection DN25 (1" BSP). Quality DIN ISO 8573-1: class 5.6.4. The pipework is marked light blue as per 92/58 EEC. An isolation valve is provided.
Water supply	Pressure 2 – 7 bar (30 – 100 psi). Volume 13L/min (2.86 gpm) intermittent. Connection; DN15 (1/2" BSP). Drinking quality. The pipework marked dark blue as per 92/58 EEC. Isolation valve is provided.
Drain	Floor level with grit trap 40L/min (8.8 gpm). A drain pump can also be provided.
Vent or extraction	To be ducted to an in-house ventilation system or to the outside atmosphere. Forced ventilation must be of sufficient capacity to maintain a negative pressure of 62Pa within the machine when all blast systems are operating at full capacity. Optional extraction unit can be supplied.
Foundations	Flat and level waterproof floor. Must be able to carry a point load of 500kg (1102lb).
Networking	The machine's Programmable Logic Controller (PLC) runs TCP/IP network and connection to the internet is required. If via customer network, then it must be outside any firewall. To be available prior to commissioning.

Dedicated project management and the Vapormatt Promise

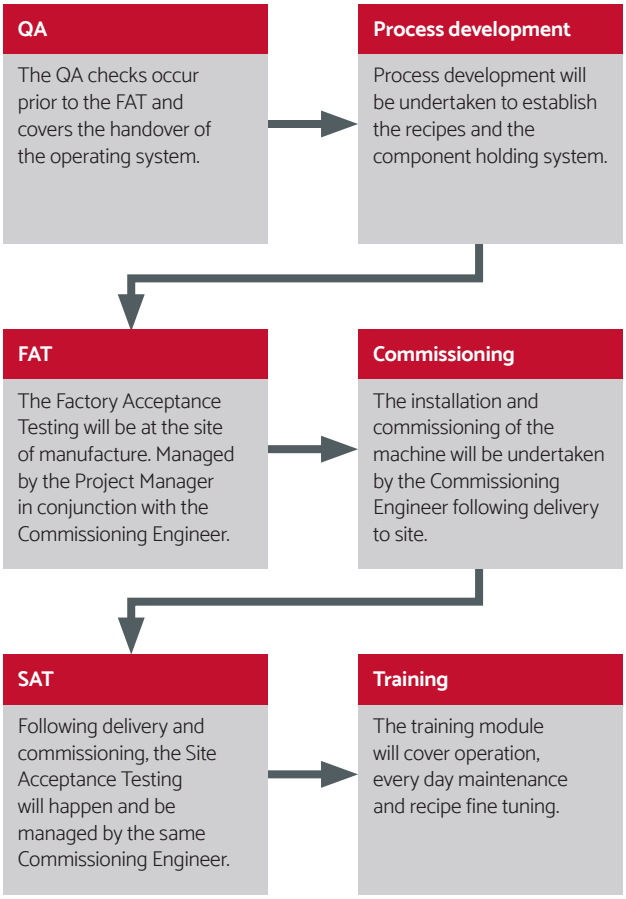
We always ensure our machines operate to the specification agreed upon with the customer, that's the Vapormatt Promise.

To achieve this every customer is assigned a dedicated project leader from order to installation.

Project management includes our detailed technical acceptance process, see below, a key part of which is our factory acceptance testing (FAT). This is where the customer's wet blasting system is extensively tested, often with the actual components the customer will be regularly processing before it leaves us.

Vapormatt support doesn't end there, our aftermarket support includes spares, servicing and Vapormatt 4.0, our Industry 4.0 solution, to ensure maximum production uptime.

Technical acceptance process



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