Vapormatt | Oncilla

Overview, technical specifications and options

Vapormatt

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Overview

The Oncilla is an innovative wet blasting system designed to consistently and automatically prepare for round shank tools including solid carbide end mills, drill bits, and taps, for vacuum coating.

The machine can cater to a diverse range of customers with varying production capacities, batch sizes, and cleanliness standards. When processed to these quality standards, these tools are well-prepared for subsequent PVD and CVD coating processes.

As a robotic system, the Oncilla enhances repeatability and ensures reliability through its robust, prefabricated stainless steel cabinet, equipped with advanced monitoring systems.

The system features a configurable design, making it versatile for tasks like edge preparation, surface activation, and posttreatment applications.

Key features include:

- High-quality stainless steel blast cabinet offering a very rigid and robust structure. The main blast enclosure door doubles as a large viewing window to allow observation of the equipment when in use
- This system can produce controlled, consistent edge hones where homogenous edge radii within +/- 3µm can be achieved
- Component surfaces are well prepared for subsequent PVD and CVD coating processes, typically leading to HF-1 adhesion levels according to the Rockwell-based coating adherence standard
- Multiple different processes and blast recipes can be developed, stored and used when required for different component batches
- The machines can accommodate round shank tools between 3 - 25.4mm (0.19" - 1") diameter and 46 - 204mm (1 ¾ - 8") length.
- Maximum tool weight is 1kg (2.2lb). Minimum tool pick-up length is 25mm (1")
- Blast gun innovations within the Oncilla give users the ability to follow cutting edges and helical profiles. This is achieved with patented micro nozzles delivering highly targeted blast streams to selected areas of the tools being honed or polished.
- Simple to use and highly intuitive colour HMI for rapid set-up and operation
- Recipe-driven parameter setting and post-process reporting for very accurate control which yields continuous monitoring and feedback for optimum processing
- Fully self-contained unit suitable for installation in quiet, controlled environments
- Vapormatt 4.0 enabled for remote diagnostics - maximising production up-time

Industries and applications

Thanks to the versatility of application configuration, the Oncilla systems offer sophisticated process control and monitoring that yields extremely consistent and reproducible processing results across the round shank tool industry.

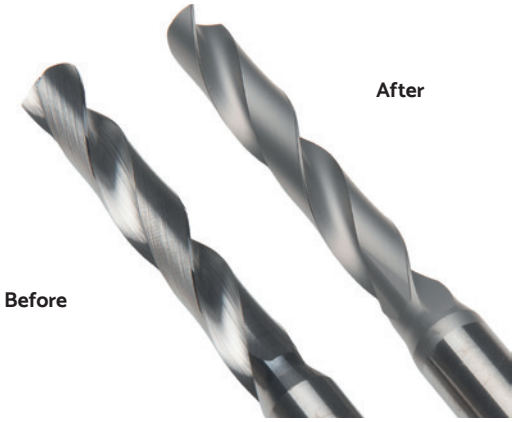
Industry

- Round shank tools

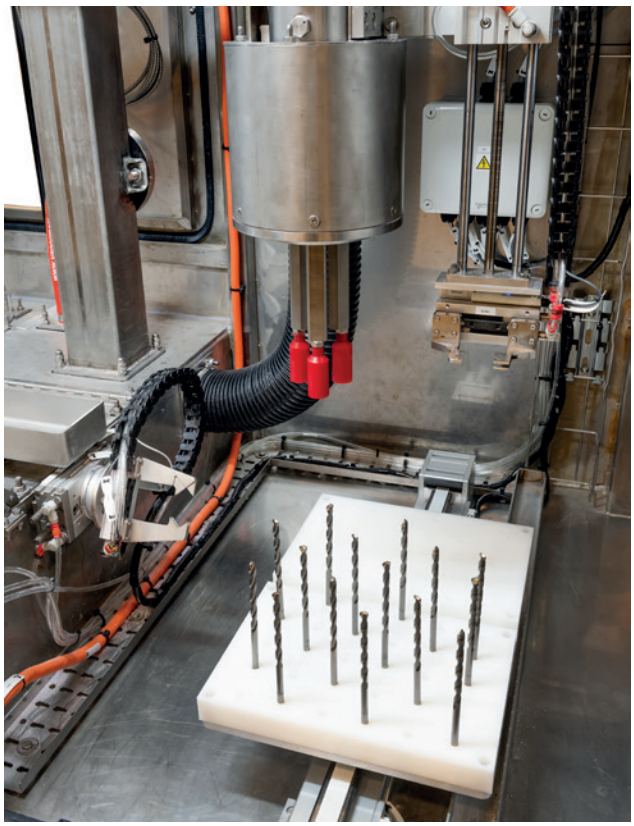
Applications

- Component cleaning
- Edge honing
- Preparation for coating
- Surface activation for PVD/CVD coatings

Drill bit before and after wet blasting



Processing description



The Vapormatt Oncilla system brings ultimate repeatability when preparing round shank tools. The through-process machine is designed to give better control to manufacturers with medium to high volume production. Taking Vapormatt established monitoring and control technology, the Oncilla offers high process control in a compact footprint.

Constructed from stainless steel, the Oncilla provides a robust, non- corrosive and quiet structure (80dBA) for the sophisticated processing controls. Using the integrated HMI screen to develop recipes, programming becomes easy and effortless, ensuring consistent results with minimal supervision.

The operator places a multiple-line pallet loaded with tools on the Y-axis load station.

The pallet of tools is moved into position underneath the gantry robot, it picks up from the pallet by the base of the tool without touching the cutting edges.

The robot moves the tool to the blasting station and lowers the tool facing downward into the blast stream for processing, air knives blow off most of the abrasive before moving to the next stage. Depending on the configurable options selected the robot could move to a second blasting process or if this option is not selected it will move to the recirculated rinse station where majority of the abrasive is removed.

Note: The processing margin between blast and non-blasted shank will be a gradual fade rather than a sharp demarcation.

Further rinsing systems are available and would be processed sequentially.

After the rinsing stage, the tools are moved to the unloading station where they are placed in a clean pallet (in the same orientation it was taken from).

The drying of the components is performed by a forced air system that is constantly blowing over the unload section drying the processed tools whilst waiting for the rest of the batch to be completed.

The operator manually unloads the processed batch.

The process for any of the machine configurations can be paused at any time, and the doors opened to allow operator intervention and then be restarted at the point where it was stopped.

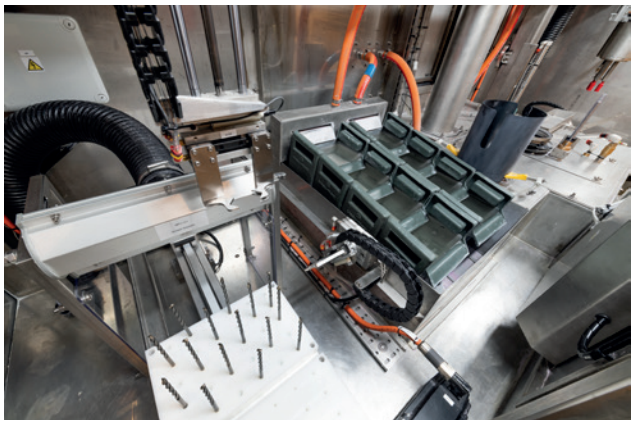
Note: The machine is controlled via an HMI (Human Machine Interface) panel mounted at the front of the machine. All on screen instructions will be in English. Units will be metric.

Some process parameters require the appropriate gun arrangement and to obtain repeatable edge radii results and accurate tolerances, some quoted options will be mandatory.

Follow on stages after Oncilla processing

Depending on options selected, it may be necessary to carry out additional rinse and drying operations in a separate washing and drying machine.

Coating should be carried as soon as possible after wet blast processing to take full advantage of the reactive surface which the Oncilla wet blast stage has achieved.



Process stages

	Stage	Media	Heating	Chemical dosing	Water purity (µS/cm)	Purpose
1	Wet blast 1			O		Macro blasting
2	Blow off 1	Compressed air				Removal of most abrasive from tools
3	Rinse 1	Recirculated towns water	O	✗		Removal of most abrasive from tools to prevent contamination between blast stations (if selected)
4	Wet blast 2 *			O		Micro/Macro blasting
5	Blow off 2	Compressed air				Removal of most abrasive from tools
6	Rinse 2	Recirculated towns water	O	✗		Removal of abrasive from tools
7	Ultrasonic rinse*	Clean water	O	✗	~20	Improved rinse to allow direct transfer to coating
8	Deionised water rinse*	Clean water	O	✗	~10	Polish rinse
9	Dry	Air blower	✗			Drying to avoid staining or corrosion or cobalt leaching

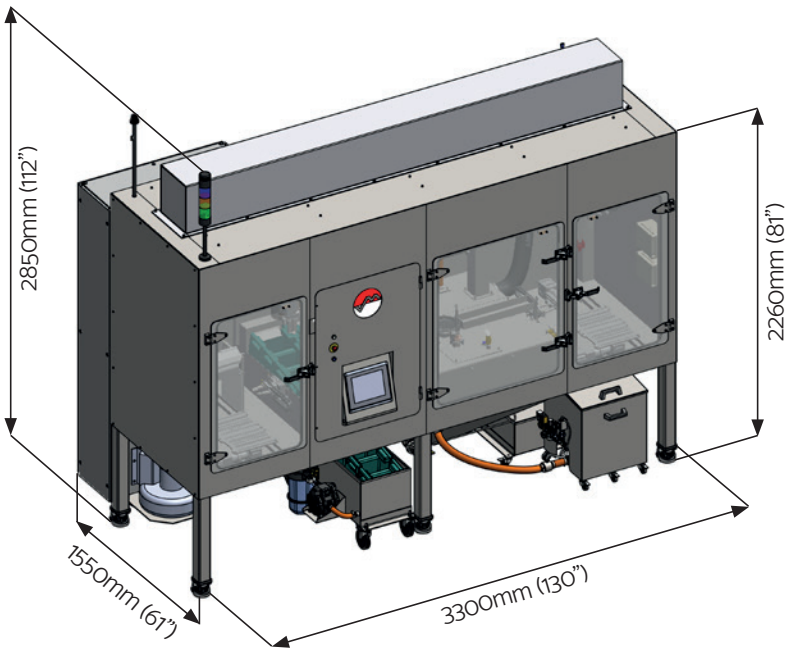
O = dependent on options specified.

* = optional.

Indicative TAKT time for 10mm diameter drill, 133mm long, 81mm blasted: 41 seconds.

Times are non-contractual until confirmed by tests at Vapormatt R&D department.

Note: An optional second blast chamber is supplied in the above process stage example. This model is ideal for individuals who want to edge hone and then immediately prepare the surface for coating to maximise surface reactivity. It comes supplied with twin gantry robots for independent handling on the blast and cleaning sides, resulting in faster processing times per tool.



Technical specification

The following features are included within the machines basic price.

Feature	Description
1	**Cabinet** Constructed from welded stainless steel, the Oncilla machine offers a very rigid and robust structure. Large maintenance access doors are provided at the front and rear of the cabinet. The main blast enclosure doors double as large viewing windows to allow observation of the equipment when in use. Minimum installed dimensions (doors closed): 3300mm long x 1550mm wide x 2850mm high (130" x 61" x 112"). Some options will increase the overall length (extra blast station: 635mm (25"), extra rinse station: 400mm (16") each). Dimensions are approximate and will be confirmed depending on machine final configuration.
2	**Electrical control system** IP54 electrical equipment enclosure is fitted mainly with Rockwell components, an Allen-Bradley PLC and servo drives. A panel mounted touch screen HMI display gives the necessary versatility to program and store recipes for a wide range of tools. Built-in diagnostics are also included. The machine is fitted with a 'site manager' which, when enabled, allows remote access for machine diagnosis and minor program upgrades. All on-screen instructions will be in English. Units will be metric.
3	**Overhead gantry robot** Using servo driven axes, the Oncilla combines two vertical and two horizontal oscillations which are extremely accurate and fast. With all axes travelling at up to 1000mm/s (39.4 in/s) speed coupled with good position accuracy gives the user reduced cycle times and ensures uniform blasting across complex tool geometries.
4	**Y-Axis loader and unloader** Enables pallets rather than a single row of tools to be loaded. This allows a greater volume of tools to be processed before human intervention required. See options for pallet information.
5	**Pneumatic 180° flipper** Enables tools to be placed 'cutting end up' in pallets to avoid cutting edges touching the pallets.
6	**Effector jaw** Holding device mounted on a rotary head. Each set of axes (vertical and horizontal) is fitted with its effector. One operates from the load area to the first rinse. The second set operates from the first rinse to the unload area. This prevents abrasive carry-over to maintain tool cleanliness. The machine is fitted with a standard effector suitable for 8 to 20mm (0.31 - 0.79") Ø tools, see options for other available effectors.
7	**Abrasive pump** The 4kW slurry pump acts as the heart of the system and feeds both the blast guns and the slurry conditioning system in blast station 1. The slurry is pumped through a series of abrasion resistant hoses and solid polyurethane components from the unique Vapormatt slurry pipework system. (Single blast station supplied with the option for a second station with a dedicated pump system.)
8	**Vapormatt blast guns** Each blast station is provided with up to 2 Vapormatt Mk3 blast guns, the blast guns are made from solid polyurethane and incorporates high consistency long life 10 or 12 mm (0.39 or 0.47") boron carbide nozzles, recessed air jets and air supply non-return valves. Air pressure to the guns is controlled via HMI and electro-pneumatic pressure regulator.
9	**Abrasive fines removal** The blast station is fitted with Vapormatt continuous S-tank abrasive filtration system. This system facilitates continuous accurate and controlled media size filtration 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 and collected in settling tanks at the end of the machine. The settling tanks are designed to allow their contents to be easily removed.
10	**Abrasive blow off (blast station 1&2 if fitted)** After blasting and before rinsing the tools will be passed through air nozzles to blow off most of the abrasive. The remaining abrasive will be washed off in the rinse station. Manual abrasive top up will be required to maintain the concentration.
11	**Abrasive level sight glass (blast station 1&2 if fitted)**
12	**Recirculated rinse station (blast station 1&2 if fitted)** A set of rinse spoon jet nozzles remove the abrasive from the tools. The tools are released in a holding fixture and rinsed all over.
13	**Drying station** Drying of the components is performed in the unload zone with an air blower.
14	**Cabinet exhaust system** Supplied with a 100mm (4") diameter ventilation/air extraction outlet on the roof of the machine. The machine needs to be ducted to external atmosphere if the filtered air extraction option is not taken.
15	**Programmable ANDON status beacon** Allows the progress of production/process of the unattended machine to be monitored at a distance from the unit itself.

Optional items

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

Feature	Cabinet enhancement
1	**Translation of operation manual, HMI screen and labels in non-English**
2	**Stainless steel cover panels** For increased aesthetic and cleanliness of the environment.
3	**Blast station 2** Should two different processes be required for the tools, it can be done consecutively in the same machine. A second blast station with the same pumping and slurry system is fitted to the machine. As an example, this would allow edge honing to be done in station 1 and a pre-coating polish (with a finer abrasive media) to be done in station 2. Two different recipes can be applied to the tools concurrently.

Feature	Loading and component handling
4	**Effector jaws for different shank diameters** A set of effector jaws for 3 to 15mm (0.19 - 0.59") tools or a set of effector jaws for 13.5 to 25.4mm (0.53 - 1") tools (please specify the required set). – This option is additional to the standard set fitted.
5	**Additional set of multiple row tool pallets** Shank diameters: 3 to 15mm (0.19 - 0.60"), capacity 32 tools Shank diameters: 15.5 to 25.4mm (0.61 - 1"), capacity 24 tools Please specify tool diameter at time of order.

Feature	Slurry system enhancement
6	**Slurry concentration sensor (SCS) (blast station 1 and/or 2)** Watchdog guards are provided to inhibit machine start and prevent blast processing should slurry concentration levels drift outside of predetermined control limits.
7	**Automatic abrasive dosing system (blast station 1 only)** 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.
8	**Automatic chemical dosing system (blast station 1 and/or 2)** A chemical dosing system is provided to maintain consistent chemical concentration within the blast process area; chemical is fed directly from a storage barrel. We recommend the use of Vacukleen TM in the blast station to provide improvement in surface cleaning and reduction / elimination of cobalt leaching effects. Storage locations for the chemical barrels are provided within the machine.
9	**Hydrocyclone (blast station 1 only)** A high-throughput gravity separation device used for separating slurry particles based on particle weight.
10	**Elutriation tower (blast station 1 only)** Upgrade options to utilise elutriation tower technology are available for use of media finer or equal to 280# and up to 320# or where a high level of abrasive consistency is required then an elutriation tower is fitted to obtain a high media size accuracy. Note: This option is required when the machine is used for edge honing.

Optional items continued

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

Feature	Filtration and re-circulation
11	**Ultrasonic cleaning tank** Depending on recipe parameters the tools are lowered into an ultrasonic cleaning tank. This has a resonator located in tank shaped to optimise the use of echoed ultrasound. The tools are released in a holding fixture and rinsed all over.
12	**Deionised water rinse** This final rinse is with deionised water which ensures a high purity cleaning. As for the first rinse the tools are released in a holding fixture whilst spoon jet nozzles remove the abrasive from the tools.
13	**Final rinse tank immersion heater** This can be used to maintain a consistent rinse water temperature. Elevated temperatures can promote faster drying.
14	**Pump to waste** When the settling tanks reservoir is full a diaphragm pump pumps the waste to the customer's drain, which can be located within 20m and up to 5m above the machine. The drain must incorporate a grit trap. The diaphragm pump is fitted with selector valves to allow the contents of any of the settling tanks to be pumped to drain as part of a regular maintenance routine.
15	**Exhaust extractor** Forced centrifugal extraction unit to maintain a negative pressure within the machine Exhaust needs ducting to the external atmosphere
16	**Exhaust extractor and filter unit** Forced centrifugal 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.
17	**Wet and dry vacuum cleaner** Allows for easy emptying of sediment filter tanks and other areas of the machine during cleaning and maintenance.

Feature	Process functionality
18	**Tool coolant channel rinse and dry** Tool specific rinse and blow off nozzles are fitted, to force water and air through the coolant channels.
19	**Helical tool profile program (blast station 1 only)** When the micro nozzle option is selected, this option can be added where the machine is programmed with the aid of a laser system to allow the blast nozzle to follow the profile of the tool being processed.
20	**Micro nozzles (blast station 1 and/or 2)** For more efficient blasting of tools with diameter under 6mm (0.24") or helical profile following.

Feature	Process monitoring
21	**Barcode scanner** This enables the reading of data from any batch card for the automatic loading of recipes.
22	**Manufacturing execution system (MES)** Allows for data logging of machine status during the wet blasting process.

Services to be provided by the customer

The following services are required for the machine to be run correctly.

Service	Requirement
Electricity supply	Operating voltage; 400/480V 3 phase frequency; 50/60Hz Basic specification 32A at 400V 50Hz Options may require extra. (e.g. immersion heater = + 4.5kW (6.5A))
Air supply	Pressure 6 - 7 bar (90 – 100 psi) 2 x Mk3 guns: 1.4 Nm3/min (50 SCFM) at 4 bar (60 psi) 2 x micro-nozzle guns: 0.68 Nm3/min (24 SCFM) at 4 bar (60 psi) 4 x Mk3 guns: 2.8 Nm3/min (100 SCFM) at 4 bar (60 psi) (Higher blast pressures will require additional air) Connection: DN25 (1" BSP) Quality DIN ISO 8573-1: class 4
Town water supply	For machine fill, top-up and rinsing Pressure 2 - 7 bar (30 - 100psi) Volume; 13 L/min (3 gpm) intermittent flow Connection: DN15 (½" BSP) Drinking quality required
Drain	Floor level with grit trap
Extraction	Ø100 mm (3.94") connection that can be extended to the outside of the building by the end user. (See option: extraction and filter unit)
Foundations	A waterproof flat and level floor is required to take a point load of 500kg (1102lbs)
Networking	The machine runs on a closed Ethernet network, and connection to the internet is required prior to commissioning to allow program changes and machine diagnosis to be carried out. Vapormatt uses a dedicated platform for its remote access services, with connection methods being cellular, Wi-Fi and Ethernet. The machine is fitted with Vapormatt preferred platform provider as standard.

Dedicated project management and the Vapormatt Promise

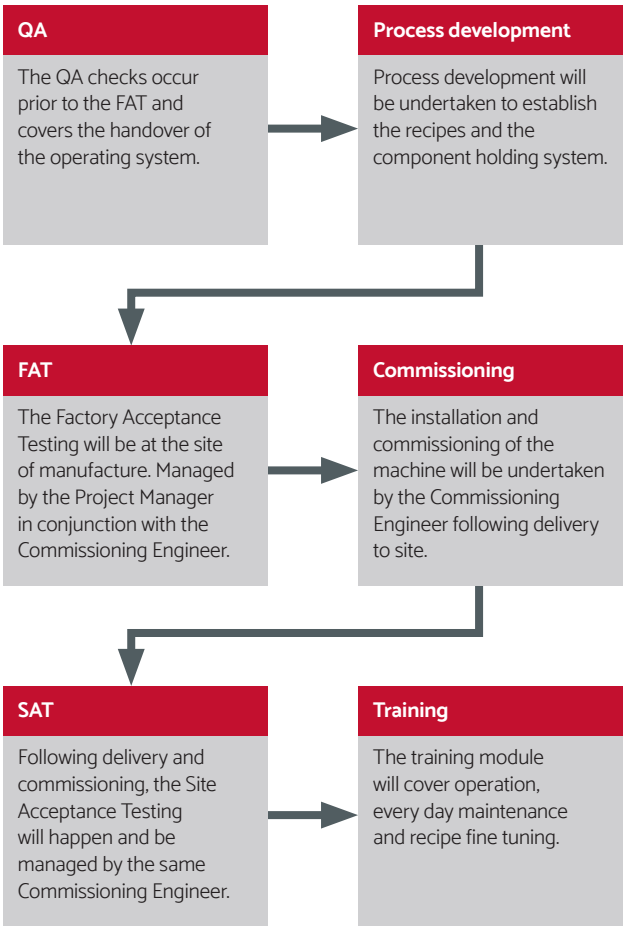
We always ensure our machines operate to the specification agreed with the customer, that's the Vapormatt Promise.

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 up-time.

Technical acceptance process



Vapormatt, Robins Drive, Bridgwater, TA6 4DL, UK
t +44 (0) 1823 257976 e sales@vapormatt.com