

we redefine

# Forgings, Castings and Additive Manufactured Components



# We're the UK's leading experts in providing effective and efficient processes, and solutions, for the manufacturing industry.

## we redefine:

Vibratory Finishing

High Energy Finishing

Consumables

Precision Polishing

Subcontract Services

## Why Choose Us?

We're a family run business that pride ourselves on working as a strong, unified team of specialists.

### We believe in British

Born in the United Kingdom, we are unique in our product design and the manufacture of our specialist machines and consumables.

### We're here for you

Being based in the heart of the country means we have easy access to all of our clients.

### We have experience

With five decades of experience and knowledge in the finishing industry, we know what works for you.

### We provide options

We have an impressive range of media and compounds to choose from, including one of the best polishing compounds in the market. We also provide a wide range of machinery and subcontract services to meet all of your needs.

### We go the extra mile

We'll tailor our services to your needs, not the other way round. Our service is all about you.



# What is Mass Finishing?

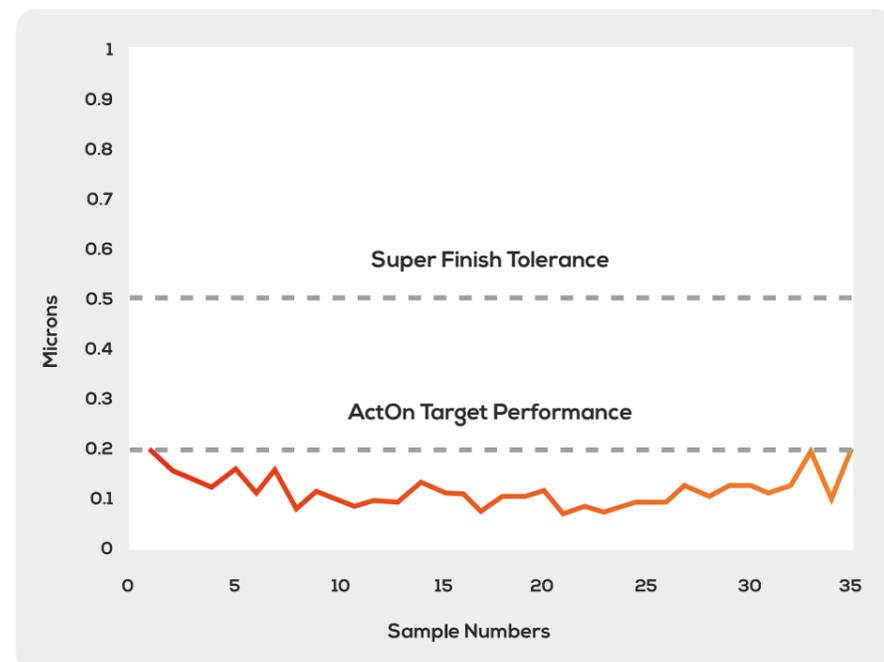
Mass finishing is a process that automates the mechanical and chemical finishing of various shaped parts. This is a stage in the manufacturing process of components, which allows large numbers of parts to be finished simultaneously.

The aim of this process can vary based on the type of application, which include:

- ✓ high stock removal
- ✓ deburring
- ✓ descaling
- ✓ removal of machining lines
- ✓ removal of surface defects
- ✓ radius formation
- ✓ super-finishing

The processes can be configured as a batch system or a continuous system. Parts that are processed using a batch system will be loaded into the machine, processed and unloaded before the next batch is ready. A continuous system is where the parts are loaded at one end, and come out at the other in the finished condition.

By combining our complete process knowledge with decades of experience, and our all-encompassing range of machinery, we can deliver the most optimum, cost-effective and environmentally friendly finishing solution for your needs.



$$\text{Man} \times \text{Machine} \times \text{Media} = M^3$$

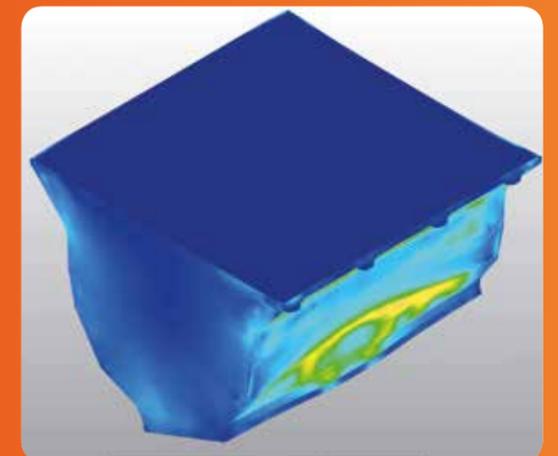
Almost all manufactured components have experienced some surface improvement, to ensure that these are in an acceptable condition for the end-user.

We understand the importance of surface finishing for additive manufactured parts, forgings and castings and have worked closely with major manufacturers in different industries to adapt and develop finishing solutions that meet their stringent requirements. It has been proven that the solutions we've developed have benefited the industry by reducing processing times and producing a repeatable and quality product.

## Surface Finishing is Critical in Keeping Manufactured Components Repeatable.

Manufacturing companies usually implement mass finishing techniques in their processes for the economic advantages, and the consistent results achieved. Manual finishing processes are known to be labour intensive, with the disadvantages of rework and high rejection rates, and inconsistent results. Having identified the issues, we offer a wide range of unique solutions that improve current processes, achieving the repeatability and quality desired by manufacturers.

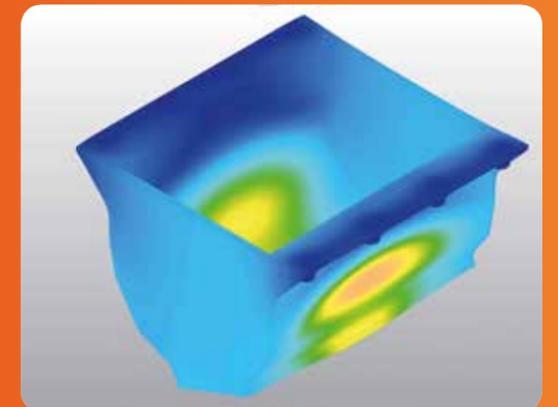
FEA Analysis



## ActOn Research and Development

We are continually evolving our processes and machines, making them more effective. We also have academic connections throughout the United Kingdom and around the world, who help facilitate our Research and Development department, where we house various metrological equipment to ensure that our customers' requirements are met and exceeded.

With projects involving modal and dynamic FEA analysis of our finishing machines, and the persistent gathering of empirical data on our various compounds, medias and machines, we strive to design and optimise everything we do to a high standard.



# Surface Finishing of Additive Manufactured Parts

**Additive Manufacturing is a process of joining material layer upon layer, as opposed to subtractive manufacturing techniques. The most common types of metal additive manufacturing are Laser Sintering and Electron Beam Welding.**

Metal parts that have been produced through additive manufacturing tend to have a textured surface with an average Roughness ( $R_a$ ) of approximately 30 microns. The values of  $R_a$  may increase at support locations and may decrease depending on the geometry profile. The base of components manufactured using the aforementioned processes generally present a considerably lower roughness.

High Energy finishing is a process that automates the mechanical and chemical finishing of various shaped parts. This is a stage in the manufacturing process of components that allows small or large numbers of parts to be finished simultaneously.

High Energy Machines are used to reduce surface roughness, deburr and polish processed parts. The action of these machines relies on the high force and speed at which the media chips come in contact with the processed components. The forces can be as great as 15-20 times the force of gravity, depending on the rotational speed and the turret size of the centrifugal machine.

In many cases, the results achieved via High Energy (HE) Finishing cannot be achieved in a standard vibratory process, particularly applications that include achieving a high surface finish, a mirror finish and the removal of manufacturing defects. HE finishing can be 10 times faster than traditional finishing methods, and produces superior finishes. It is one of the most efficient batch finishing methods.

Components can be processed wet or dry. In a wet process, parts are generally loaded as a batch with media and a solution made of a barrelling compound and water. When processing large or fragile components, divider plates may be fitted to form compartments within the barrel so that parts may be processed individually, ensuring no impingement.

# Surface Finishing of Forgings & Castings

**Forging and casting are manufacturing processes used across various industries to transform metal materials into a desired geometry.**

Generally, forgings and castings tend to have a rough surface finish and a dull appearance. Manual finishing is time consuming and does not deliver consistent results.

ActOn engineers recommend using vibratory finishing or high energy finishing machines to achieve a smooth surface and a polished finish. Over the years, we have developed and optimised processes on various forgings and castings with different finishing specifications, such as the removal of surface defects and flash lines or achieving a surface finish of  $R_a 0.03 \mu\text{m}$ .

## The process benefits of ActOn machinery and consumables include:

1. Significant reduction in roughness
2. Shorter processing time than traditional methods
3. Increased part cleanliness
4. Removal of surface defects and flash lines
5. Corrosion protection
6. Non-part specific
7. No major tooling required
8. No requirement of fixturing
9. Consistent and repeatable results





Man x Machine x Media = M<sup>3</sup>

# Products we redefine

Here are just a handful of forgings, castings and additive manufactured products that we can help to perfect.

Courtesy of the Manufacturing Technology Centre.

# Applications

Using both our Vibrota range and Centrifugal High Energy machines together with our bespoke media and compounds, we'll achieve a high standard finish.

Component	Output Required	Machine Type	Media Type			Compound Type		Typical Process Time	Manufacturing Method
			Deburring Media	Polishing Media	Drying Media	Deburring	Polishing		
ABS Housing	Smooth Finish		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	300 mins	Additive Manufactured
Ultem Plate	Clean and Smooth Finish		<input type="checkbox"/>			<input type="checkbox"/>		120 mins	Additive Manufactured
Titanium 3D Prototype	Smooth Finish and Ra Value Between 2µm and 3µm	 	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	150 mins	Additive Manufactured
Spoiler	Smooth Finish		<input type="checkbox"/>			<input type="checkbox"/>		120 mins	Additive Manufactured
Titanium Aerospace Prototype	Improve Surface Finish From 19.2µm to 3.2 µm		<input type="checkbox"/>			<input type="checkbox"/>		300 mins	Additive Manufactured
Titanium Bone Plate	Mirror Finish		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		300 mins	Additive Manufactured
Aluminium Latch Fitting	Improve Surface Finish From 6.1µm to 1.3 µm		<input type="checkbox"/>			<input type="checkbox"/>		240 mins	Casting
Brass Figurines	Deburring and Bright Finish	 	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		60 mins	Casting
Zinc Handle	Clean Prior to Plating		<input type="checkbox"/>			<input type="checkbox"/>		15 mins	Casting
Bronze Sculpture	Deburring		<input type="checkbox"/>			<input type="checkbox"/>		300 mins	Casting
Steel Land Base Turbine	Deburring		<input type="checkbox"/>			<input type="checkbox"/>		60 mins	Casting
Rocker Arm	Remove Flash		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		10 mins	Casting
Piston	Deburring and Bright Polished Finish		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	120 mins	Forging
Inconel Turbine Blade	Surface Improvement and Polishing		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	70 mins	Forging
Brass Stamping	Descaling, Removal of Graphite and Polishing			<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	250 mins	Forging
Key	Deburring, Cleaning and Polishing		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	30 mins	Forging
Femur	Removal of Machining Lines		<input type="checkbox"/>			<input type="checkbox"/>		35 mins	Forging
Hip Joint	Cleaning, Degreasing, Deburring and Mirror Finish		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	90 mins	Forging

# Bowls

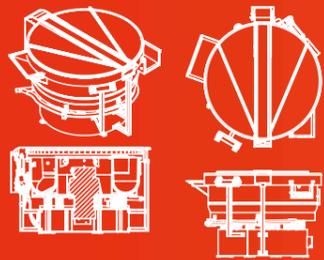
Each of our Bowls are simple to operate and highly efficient, manufactured in classic designs and sizes to meet your unique applications.

## Key Features

- ✓ Wear resistant casted hot cured polyurethane lining
- ✓ Acoustic lid for noise reduction
- ✓ Flap clearing system
- ✓ Inverse separation
- ✓ Undersized media separation
- ✓ Single and Variable speed motor
- ✓ Powerful drive system with sealed bearings for maintenance-free running
- ✓ Flyweights set for optimum action in bowl
- ✓ Bench top options available

## Key Benefits

- ✓ British high-quality product
- ✓ Durable machine due to design, good quality materials and workmanship knowledge
- ✓ Very quiet machine in operation due to the acoustic lid
- ✓ Wear-resistant lining
- ✓ Easy to operate
- ✓ Low maintenance
- ✓ Can be used as a continuous or batch system
- ✓ Suited to small and large volumes of parts
- ✓ Accessible process chamber
- ✓ Easily automated



# Troughs

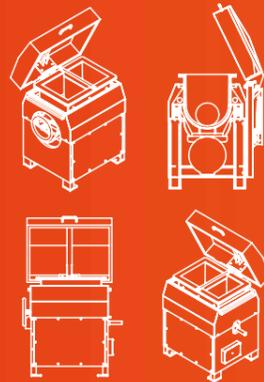
We offer Troughs in many different sizes and an infinite choice of length and width combinations, making them one of our most versatile. These are particularly useful for larger components.

## Key Features

- ✓ Wear resistant casted hot cured polyurethane lining
- ✓ Acoustic lid for noise reduction
- ✓ Single and variable speed drive
- ✓ Powerful drive system with sealed bearings for maintenance-free running
- ✓ Unload door for complete discharge of media and parts
- ✓ Compact design
- ✓ Divider plates to remove risk of impingement
- ✓ Painted or Stainless Steel side panels available
- ✓ Portable options available

## Key Benefits

- ✓ British high-quality product
- ✓ Simple to operate and highly efficient
- ✓ Durable machine due to design, good quality materials and workmanship knowledge
- ✓ Very quiet machine in operation due to the acoustic lid
- ✓ Wear-resistant lining
- ✓ Easy to operate
- ✓ Low maintenance
- ✓ Suited to small and large volumes of parts
- ✓ Accessible process chamber
- ✓ Large systems can be built for continuous operation
- ✓ Easily automated



# Duals

The orbital Dual finisher works to both deburr and dry in one single unit. This is both an excellent and economical finishing option.

## Key Features

- ✓ Wear resistant casted hot cured polyurethane lining
- ✓ Acoustic lid for noise reduction
- ✓ Flap clearing system
- ✓ Inverse separation
- ✓ Undersized media separation
- ✓ Single and variable speed motor
- ✓ Powerful drive system with sealed bearings for maintenance-free running
- ✓ Flyweights set for optimum action in bowl

## Key Benefits

- ✓ Option to carry out both wet and dry process in one machine
- ✓ Accessible process chamber
- ✓ British high-quality product
- ✓ Simple to operate and highly efficient
- ✓ Durable machine due to design, good quality materials and workmanship knowledge
- ✓ Low maintenance
- ✓ Suited to small and medium volumes of parts
- ✓ Can be automated if required
- ✓ Can be used as a continuous or batch system
- ✓ Space saving
- ✓ Energy efficient



# Dryers

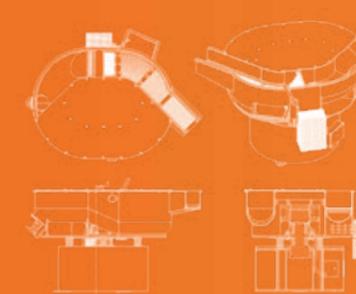
Our unique, elliptical-shaped Vibratory bowl drying machines suit a variety of finishing needs. Our machines are compact in size, and simple to operate.

## Key Features

- ✓ Vibratory dryers have an elliptical shape to produce 100% discharge of parts
- ✓ Side loading chute of parts from vibratory bowl machines
- ✓ Flap clearing system to avoid part and media entrapment
- ✓ Single and variable speed motor
- ✓ Powerful drive system with sealed bearings for maintenance-free running
- ✓ Flyweights set for optimum action in bowl
- ✓ Can also remove light grease on parts as the agro media absorbs it
- ✓ Effective as a 1 lap process
- ✓ Other dryers in our range include rotary and conveyerised ovens

## Key Benefits

- ✓ Suitable for in line or batch work
- ✓ Can be used for drying and/or fine polishing using agro media
- ✓ Takes less floor space due to the elliptical shape
- ✓ Ability to handle a wide range of parts with different shapes and sizes
- ✓ Accessible process chamber
- ✓ British high-quality product
- ✓ Simple to operate and highly efficient
- ✓ Durable machine due to design, good quality materials and workmanship knowledge
- ✓ Low maintenance
- ✓ Can be automated if required
- ✓ Energy efficient as a result of specially designed heating elements



Man x Machine x Media = M<sup>3</sup>

# Vibrota Finishing Range

We offer a range of Vibratory machines, including: Bowls, Troughs, Duals and Dryers. These machines are suited for processing both small and large parts.

## Automation for Vibratory Finishing Machines

The below system was designed to deburr components with 100% separation of the media and parts. The system is PLC operated, ensuring the least amount of operator intervention and guaranteeing consistent results. The main features of the system have been highlighted below.



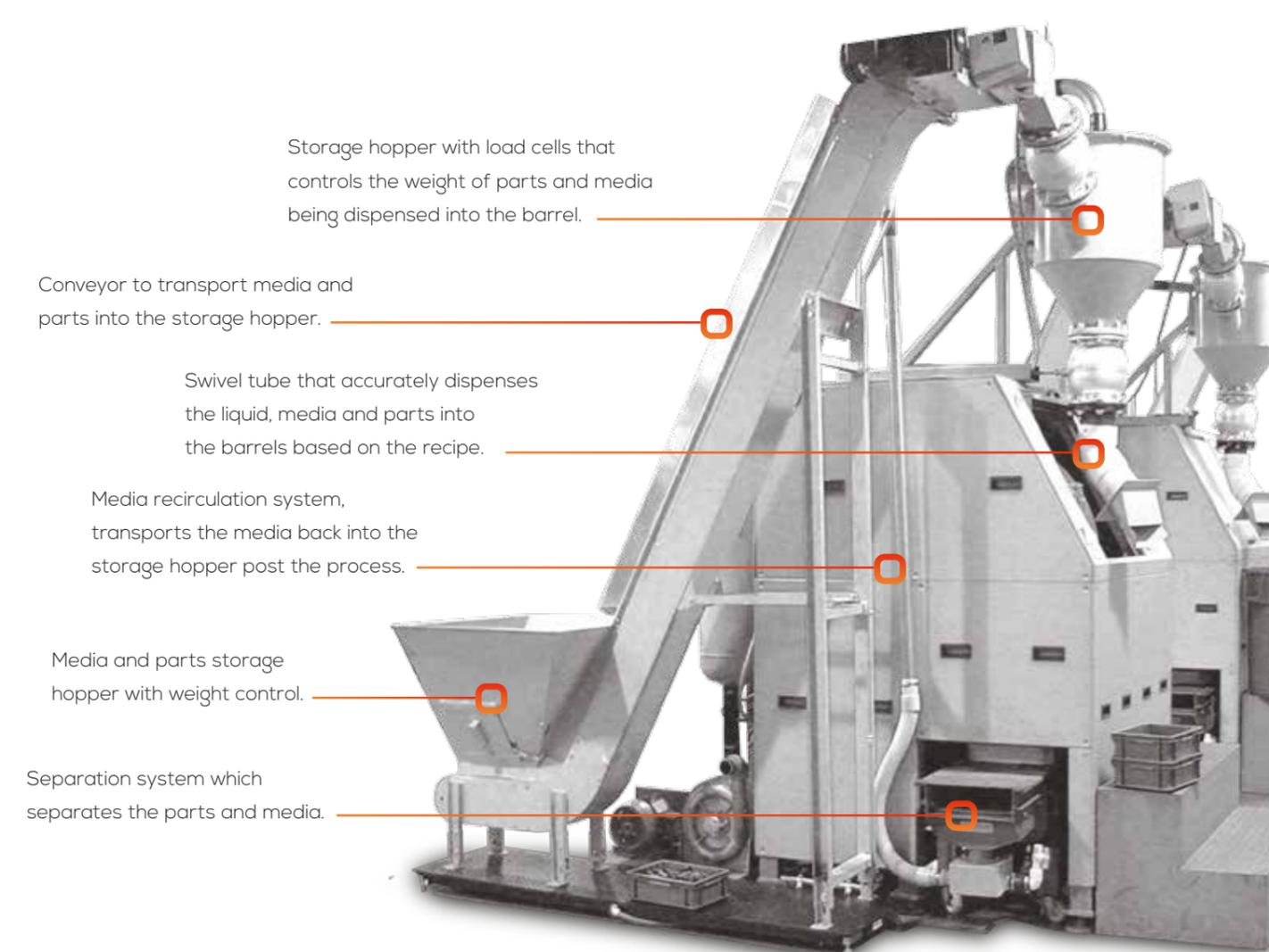
Man x Machine x Media = M<sup>3</sup>

# High Energy Finishing Range

Our Centrifugal High Energy machines are part of our High Energy (HE) series, which are made with the latest HE technology.

## Automation for High Energy Finishing Machines

The system is PLC controlled ensuring measurements of media, parts and compound are precise and accurate. The system delivers consistent results in short cycle times. The HMI allows the operator to choose the desired recipe and have access to the maintenance schedules.



# Centrifugal Barrel Machines

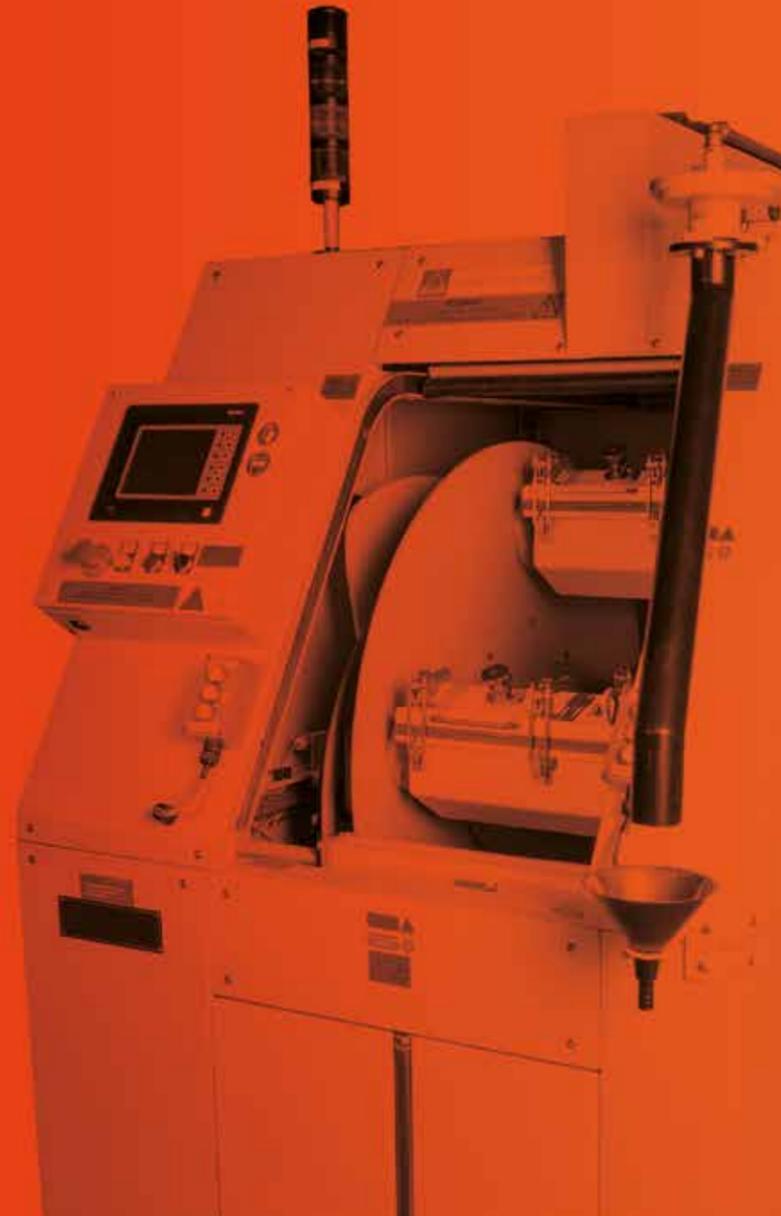
Built with the latest high energy technology, the drive mechanism is designed to produce high g-forces resulting in shorter process times.

## Key Features

- ✓ Automation capable
- ✓ Control through HMI or control panel
- ✓ Media recirculation
- ✓ Media separation system
- ✓ Compound and water dosing
- ✓ Over temperature detection
- ✓ Unbalanced weight detection
- ✓ Pressure release valves
- ✓ Reinforced liners
- ✓ Hinged lids
- ✓ Removable barrels
- ✓ Removable liners
- ✓ Programmable recipes
- ✓ Heavy duty steel frame
- ✓ Variable speed
- ✓ Heat treated components
- ✓ Maintenance alerts

## Key Benefits

- ✓ High polishing efficiency
- ✓ High or low rate of stock removal
- ✓ Gentle action on parts
- ✓ Greater control of the process
- ✓ No need for fixturing or tooling
- ✓ Fast processing times
- ✓ No impingement
- ✓ Easy to maintain



# Centrifugal Polishing Machines

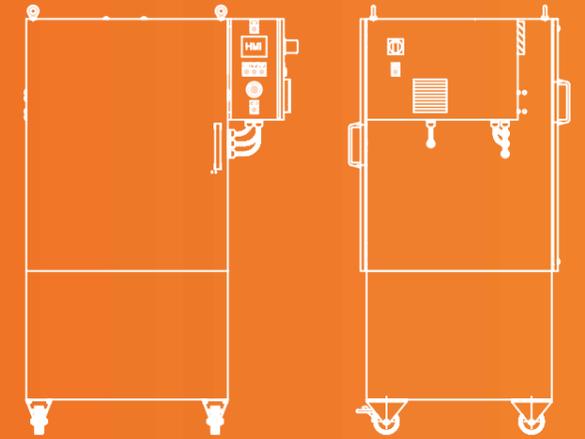
Built with the latest high energy technology, it has a direct drive system with counter rotating turrets and barrels. Typically used for small components, it can be aggressive enough to handle your toughest burr yet precise enough to process the most delicate piece.

## Key Features

- ✓ Removable barrels
- ✓ Removable liners
- ✓ Stainless steel barrels
- ✓ Circular or hexagonal barrels
- ✓ PLC operated with HMI
- ✓ Single Phase
- ✓ Portable
- ✓ Storage for additional barrels
- ✓ Variable speed

## Key Benefits

- ✓ High polishing efficiency
- ✓ High or low rate of stock removal
- ✓ Gentle action on parts
- ✓ Greater control of the process
- ✓ No need for fixturing or tooling
- ✓ Fast processing times
- ✓ No impingement
- ✓ Space saving
- ✓ Operator friendly
- ✓ Easy to maintain



Man x Machine x Media = M<sup>3</sup>

# Consumables

Over the years, we have been at the forefront of the industry, developing a range of specially formulated consumables approved by the manufacturing industry.

Working closely with highly skilled manufacturers, our engineers have understood the numerous challenges faced in the industry and developed suitable consumables.

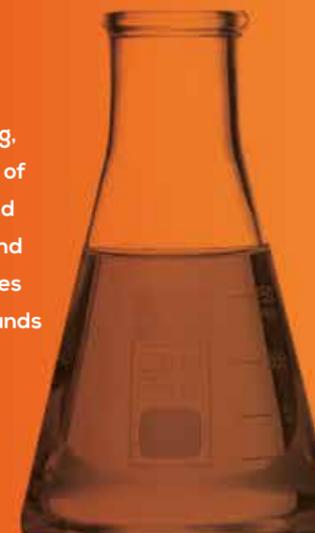
Choosing the right consumables is crucial in achieving your desired finish, and we endeavour to help you to select the correct media and compounds for your components.

Please refer to our consumables brochure for more information.



## Liquid Compounds

Compounds are very important to the mass finishing process. An extensive range of specially formulated compounds is manufactured on site, which suit almost any application. Compounds accomplish cleaning, inhibiting for rust and corrosion of parts, brightening, descaling and degreasing. Often, the compound reduces media costs and reduces process time. All of our compounds are biodegradable too.



## Powder & Pastes

A full range of powders and pastes are available, all of which complement the media and contribute to the grinding, cleaning and polishing of ferrous and non-ferrous materials. These products are suitable in freshwater operations.



## Plastic Media

Our range of plastic media comes in various grades, shapes and sizes and is specially designed for smoothing processes and removing light burrs. This media also reduces the risk of part damage, and gives us a consistent, bright, and matte finish.



## Ceramic Media

Our ceramic media comes in a variety of abrasive grades, starting from low abrasive to super finishing. This type of media is suitable for various deburring, radiusing and polishing processes, and is specially formulated to go hand-in-hand with ActOn's compounds.



## Agro Media

Part of our agro media range is corncob and walnut shell. Both products come in various grain sizes, which are carefully chosen to suit the specific parts. The corncob grains are known to have high abrasion resistance, good moisture absorption, low specific gravity and are employed mainly for drying in the Rotary Dryers and Vibratory Dryers. Walnut shell is a hard and fibrous material of medium abrasiveness, and is used in both the polishing and deburring processes as it leaves no scratches or pitting.

## Pre-treated Media

All of our agro media comes in a treated, bovine-free form, which is particularly suitable for high lustre or mirror finishes.



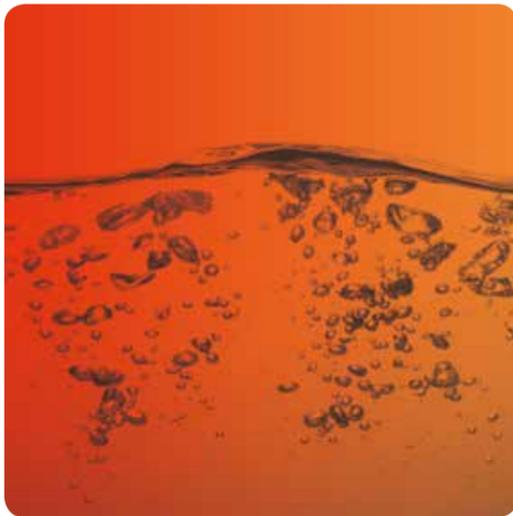
## Special Media

Our special media includes steel media, a separation ball media that keeps flat parts separate, ensuring they don't stick together.



# Value Added Service

On top of our waste water treatment and subcontract services, we also supply a range of after-sales support and training services for your operators.



## Waste Water Treatment

During the finishing operation, the effluent can be polluted with oil, media and metal fines. It is critical that the effluent is treated before going to drain, or if it is being recycled back into the system. Each area or district has its own discharge consent, hence the effluent must be analysed against this.

The effluent can be recycled, however, there are certain applications where it is not possible. In that case, the treated effluent can be transferred directly to the drain.

Recycling can save a significant amount of water and compounds (greater than 90%) used.

We offer a range of flocculants (powder and liquid) coupled with our Centrifugal technology. Please refer to our waste water treatment brochure for more details.

## Subcontract Services



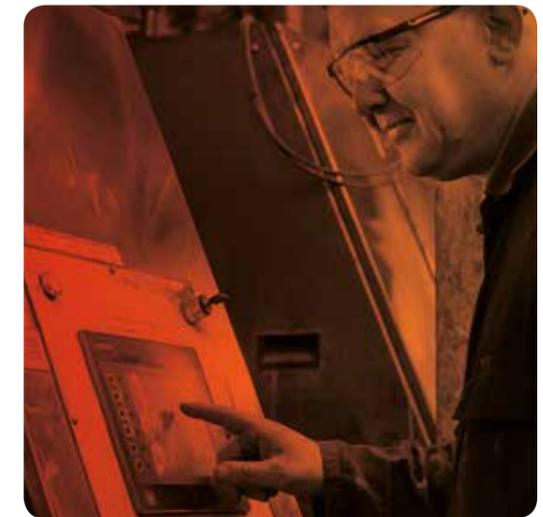
In order to provide you with complete surface finishing solutions, we offer a precision polishing service for components from various industry sectors. In combination with our barrelling capability, you'll benefit in terms of cost, delivery and quality. Our applications include removal of manufacturing defects, which are inherent in the casting and forging process.

### Inspection

Our trained inspectors ensure every component is inspected to the required specification prior to delivery. The inspections can include visual, dimensional and surface finish measurements. Our document controls ensure that all inspections are recorded for traceability purposes.

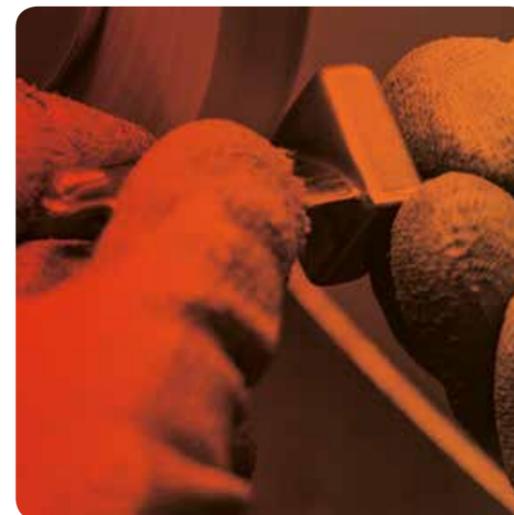
### High Energy and Vibratory Finishing Services

Here at ActOn, we have an exclusive facility, equipped with state-of-the-art finishing machinery, such as High Energy (HE) and Vibratory machines. The HE machines provide a speedy finishing solution, as well as a high quality finish to the parts, eliminating any need for fixturing and preventing their impingement. Along with the HE machines we also have Vibrota finishing equipment, which processes parts of variable sizes and batch quantities.



## After-sales, Training and Installation

We hire a number of highly trained staff, including engineers, who are on-call for all of your after-sales requirements. From installation and training, to maintenance and prompt professional advice, our finishing specialists are here for you every step of the way.



## Results

## 3D Printed Titanium Prototypes

## Smoothing and obtaining a Ra value lower than 3µm

## The Aim

To achieve a smooth and bright finish with a Ra value less than 3µm.

## What we did

We achieved this with our three-stage process, using the ActOn High Energy machine and Vibratory machine, which combines deburring, smoothing and polishing.

Components' Ra value prior to processing:

<b>Component 1</b>	7.761 µm
<b>Component 2</b>	6.234 µm

## Stage 1

The first stage was carried out in the High Energy machine with a highly abrasive media. The purpose of this stage was to remove the burrs and reduce the roughness of the parts. Due to the prototypes' shape, a mix of media in different sizes were used to ensure all areas of the components were processed.

The Ra value reading has been taken in three locations after each processing stage.

Components' Ra value after stage 1:

	Component 1	Component 2
<b>Location 1</b>	0.639 µm	0.886 µm
<b>Location 2</b>	0.659 µm	0.889 µm
<b>Location 3</b>	0.661 µm	0.897 µm

## Stage 2

The purpose of second stage was to smooth the parts' surface; these have been processed in the High Energy machine with a lower abrasive media and a concentrated

compound which is a good polisher. The components' surface was smoothed without affecting the dimensional integrity of the parts.

Components' Ra value after stage 2:

	Component 1	Component 2
<b>Location 1</b>	0.603 µm	0.451 µm
<b>Location 2</b>	0.557 µm	0.463 µm
<b>Location 3</b>	0.579 µm	0.463 µm

## Stage 3

Our team carried out the final stage to improve the surface finish and to achieve a bright surface. The prototypes were processed in the vibratory bowl finishing machine using a mix of polishing media and LQ9 compound.

Components' Ra value after stage 3:

	Component 1	Component 2
<b>Location 1</b>	0.250 µm	0.288 µm
<b>Location 2</b>	0.255 µm	0.301 µm
<b>Location 3</b>	0.260 µm	0.304 µm

## Result

The total process time took 1 hour and 45 minutes and exceeded the expectations of the customer.

The unique design of the high energy barrels eliminates the need for fixturing, whilst removing the risk of impingement. The flexibility of both types of machines allows the processing of different components, at different stages, using different media simultaneously. The process delivered a superior surface finish in a considerably reduced time. The dimensional integrity of the prototypes was maintained.

## 3D Printed Titanium Bone Plate

## Mirror finish

## The Aim

To smooth the surface and achieve a mirror finish.

## What we did

We achieved this with our three-stage process, using the ActOn High Energy machine, which combines grinding, smoothing and polishing.

Due to the rough surface of the part, a highly abrasive ceramic media and LQ30 compound were used in the 1st stage.

The second stage was carried out using a super finish media and a compound, which is a good cleaner, polisher and corrosion inhibitor. The aim of the second stage was to smooth the part surface without affecting the dimensional integrity of the component. Careful consideration to the media shape and size was given to ensure all areas of the component were processed.

Lastly, the component was processed with a pre-treated agro media. This media is pre-treated with polishing agents and it is used to impart a very high lustre on components. The pre-treated media is also a bovine free product.

## Result

The total process time took 5 hours which was less than what the customer expected. The process delivered a superior mirror finish while the dimensional integrity of the bone plate was maintained.

Due to confidentiality, pictures cannot be displayed.

## What Our Customers Say

**“ Whilst working with ActOn, we’ve consistently received a service that’s excellent, prompt and attentive. ”**

**“ ActOn are incredibly skilled, and are very good at designing specialist equipment. ”**

**“ Regardless of day or time, their response to all technical enquiries is excellent. ”**

## Quality You Can See

We pride ourselves on our excellence, and over the years we have successfully demonstrated an ongoing compliance with ISO quality and environmental standards. We’re also an approved supplier for many of our industries, including medical and aerospace.

For ISO, we currently hold:



We're proud members of the 'Made in Britain' campaign.

**“ The bitterness of poor quality remains long after the sweetness of low price is forgotten. ”**

Benjamin Franklin

**we redefine**

**ActOn Finishing Limited**  
**213 Torrington Avenue**  
**Tile Hill, Coventry, CV4 9HN.**  
**United Kingdom.**

**+44 (0) 24 7646 6914**

**[enquiries@acton-finishing.co.uk](mailto:enquiries@acton-finishing.co.uk)**

**[www.acton-finishing.co.uk](http://www.acton-finishing.co.uk)**