

we redefine

# Finishing Solutions for Additive Manufactured Components

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**ACTON**<sup>®</sup>  
FINISHING

# About ActOn

- Family Business established since 1965 based in Coventry, UK
- Core Activities:
  - Machinery
  - Consumables
  - Subcontract
- ISO 9001 , AS9100 and ISO14001
- Leaders in the field of Surface Finishing with Global Presence.
- UK's leading experts in providing effective post processing solutions for the additive manufacturing industry.



# Our Customers



# Core Activities



## Machinery

We offer a complete end to end solution for mass finishing, shot blasting and waste water treatment for a wide range of industries.



## Consumables

Our consumables are an important aspect of finishing. From ceramic, plastic and drying media to liquid compounds, we ensure that you achieve the optimum results in the most cost-effective way.



## Subcontract

For customers that need a Mass Finishing solution and do not have the experience, the capacity required or are not ready to invest in Mass Finishing equipment, ActOn can offer specialist services.

# Subcontracting Services

**Vibratory & High Energy**



**Shot Blasting**



**Inspection**



**Precision Polishing**



# Finishing Consumables



Plastic Media



Ceramic Media



Finishing Compounds



Blasting Media



Water Treatment Consumables



Drying Media



Special Media

# AM Blasting Cabinets

## for Powder Removal & Smooth Finishing

Polymer & metal additive manufactured components require post-processing to remove the residue left from the 3D printing process and to achieve a smooth finish. While the AM Blasting Clean technology has been designed for the de-powder stage, the AM Blasting Smooth series is perfect for a homogenous & smooth surface.



### AM Blasting Clean Technology

The AM Blasting Clean Series includes 4 models: **Excel, Solid, Smart and Samba**. These machines are designed to de-powder the 3D printed parts using a glass bead media. De-powdering with this kind of abrasive media has the **advantage of achieving a deep de-powdering of the product. You will reach into corners where a round shot will not get.**

### AM Blasting Smooth Technology

The AM Blasting Smooth Series includes 4 models: **Excel, Solid, Smart and Samba**. These machines are designed to shoot peen the 3D printed parts using a round abrasive media. Further to this stage, **component's surface is homogeneous, smooth and porosity is reduced.**

# AM Blasting Cabinets for Powder Removal



## AM Blasting Excel

The AM Blasting Excel system is a perfect solution for processing big volumes of 3D printed parts, on a high frequent basis. This machine is PLC controlled and includes 20 different recipes.



## AM Blasting Solid

The AM Blasting Solid Series is the entry-level model for automatic blasting of powder bed printed parts. Suitable for finishing small print volumes on a regular basis. This blasting installation blasts small parts automatically and has the possibility for manual blasting of large parts.



## AM Blasting Smart

The AM Blasting Smart series is suitable for blasting large print volumes on a regular basis. The large basket with 2 blasting nozzles enables series production of up to 30 L at a time.



## AM Blasting Samba

The AM Blasting Samba Series is an automated system designed to process large batches of small and large additive manufactured components. The PLC control makes it easy to set up the process parameters and includes up to 20 recipes.

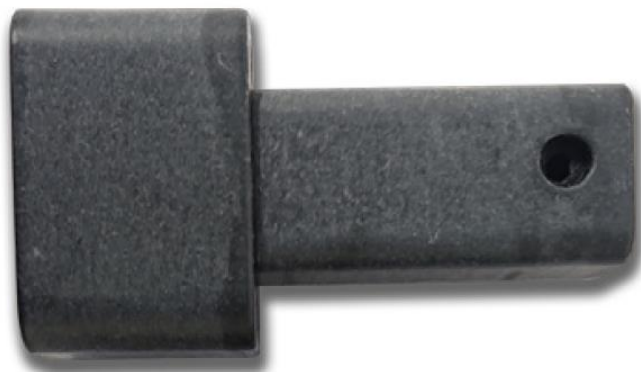


# Industry Challenges

- Surface finish varies by print technology and material
- Surface finish is not good enough.
- There is no one machine fits all.
- Geometry and design plays a critical role is the type of finish that can be achieved.
- Which technology do we use & when.
- Internal finishing
- Process time.



before



after



Ra Before: 13.25  $\mu\text{m}$



Ra After: 1.33  $\mu\text{m}$



before



after

# Surface Finishing & Polishing

Most additive manufactured components require some surface improvement to ensure that they are in an acceptable condition for the end-user. 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.





# Vibratory Finishing Technology

Vibratory finishing is perhaps the most commonly used mass finishing method to help smoothen AM polymer parts. The gentle action in the machine allows for processing gentle and fragile parts, whilst still being able to achieve a good reduction in surface finish.

The advantage of the vibratory finishing machines is that although the process time can be quite long (2-8 hours depending on start condition and required finish), high volumes of parts can be processed which means these machines are ideal for anyone looking to finish medium/high volumes.

# Vibratory Finishing Technology



## Vibratory Finishing Bowl

These Vibratory Bowls have been manufactured to meet a wide range of applications such as deburring, descaling, radiusing, cleaning, polishing, burnishing & surface improvement.

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## Vibratory Finishing Trough

We offer Troughs in many different sizes and an infinite choice of length and width combinations, making them one of our most versatile. These Vibratory Troughs are perfect for mass finishing larger, longer and irregular-shaped components.



## CLM Series

This machine is suitable for achieving a highly polished finish on additive manufactured parts, without damaging the workpiece. The CLM machine has been designed to be simple to operate and produce excellent results.

# Centrifugal Disc Finishing Technology



## CFD Series

The CFD machine is perfect for processing small & thin components as well as larger parts with a length of up to 150mm.

Centrifugal disc finishing can allow for reduced processing times of polymer AM parts when compared with standard methods (reducing process times by over 50%). Naturally this is down to the more “aggressive” action in the machine.

It is worth noting that not all components will be suitable to the disc machine, namely fragile components or heavy/long components. However, for anyone with small/medium sized components, they may see a real benefit in throughput using this machine.

# Automated Vibratory Finishing Systems



## Finishing Solution for Low Volume Additive Manufactured Parts

Our SPU-1 is ideally suited for small batch works and delicate components, which can be used as either a batch or a continuous system. This vibratory finishing system is perfect for deburring, descaling, degreasing, cleaning, smoothing, radiusing, polishing and drying. This is both an excellent and economical finishing option.



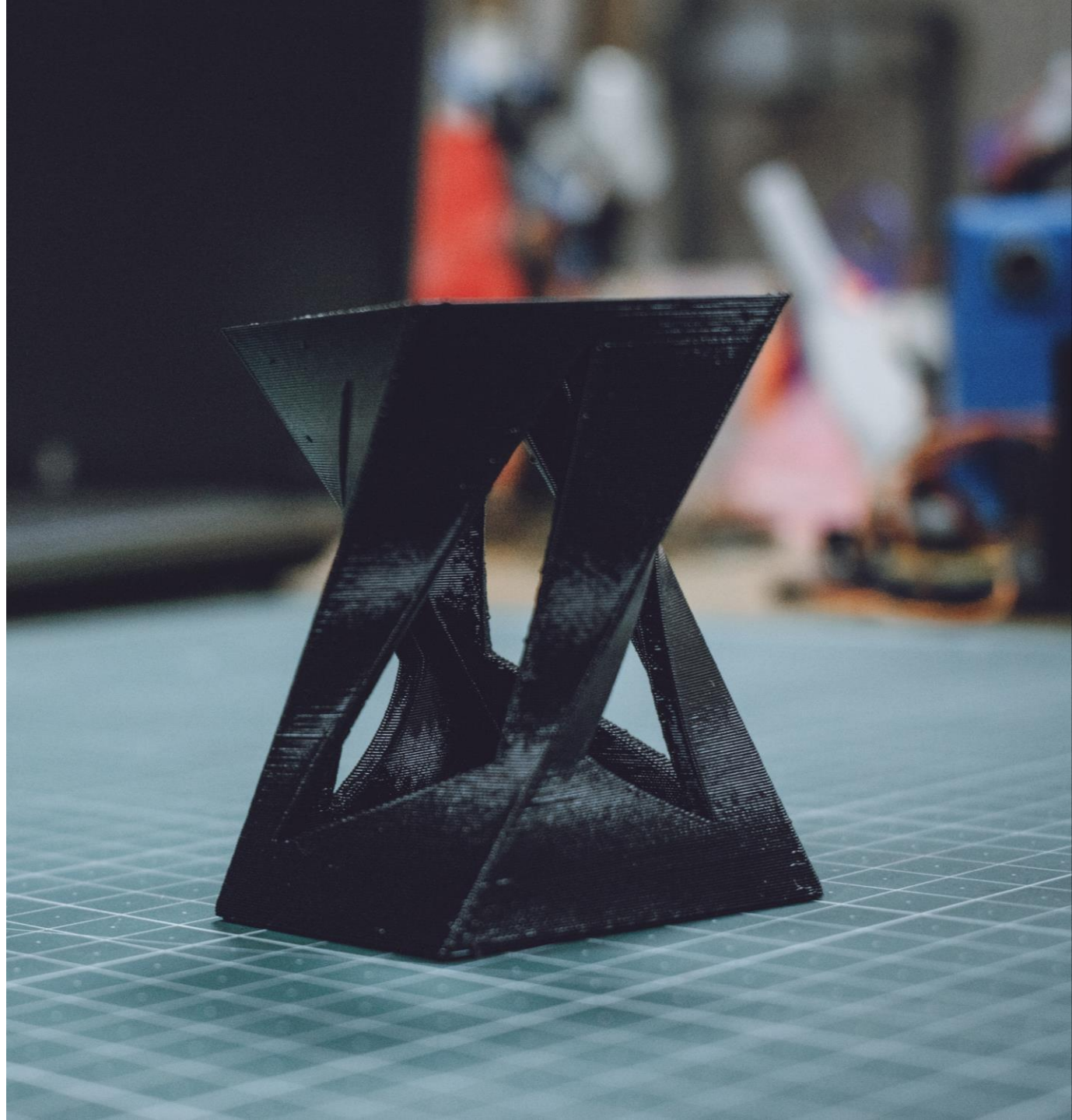
## VB10P Vibratory Finishing System

This Vibratory Finishing System has been designed to ensure 100% unload of media and components from the finishing machine, while reducing manual handling and achieving a consistent finish every time.

# Finishing Process Results

These results are based on the finishing processes we have developed for our clients, on various polymer additive manufactured parts.

	Average Ra before the finishing process ( $\mu\text{m}$ )	Average Ra after the finishing process ( $\mu\text{m}$ )	Average finishing process time (min)
Vibratory Finishing	6.97	1.16	480
Vibratory Finishing	13.05	2.46	480
Vibratory Finishing	13.25	1.33	480
CDF Machine	7.23	0.88	240
CDF Machine	7.56	1.23	240





# Case Study

## Cost Effective Vibratory Finishing Solution for Processing Selective Laser Sintering Parts

### About this project

ActOn developed a vibratory finishing solution to smooth 3D printed polypropylene parts, manufactured by Ricoh UK Products. These components are made via Selective Laser Sintering.

As the customer manufactures SLS parts in different shapes and sizes, they were interested in purchasing a Vibratory Finishing system that can accommodate these parts and which would help them achieve a smooth surface finish to offer added value to their customers.



# Case Study

## What we did

The polypropylene samples included rotary atomizer head, rotary atomizer hub, adhesion samples, tension rod, bumper components, wing mirrors and automotive exterior trim, with initial surface roughness ranging between 3.6 microns to 13 microns.

Further to the finishing trials we proved that Vibratory Finishing Trough is the way to process these SLS parts. As Ricoh also manufactures larger and longer parts, the Trough finishing machine would give them the flexibility to process all types of parts, due to the shape of the process chamber.

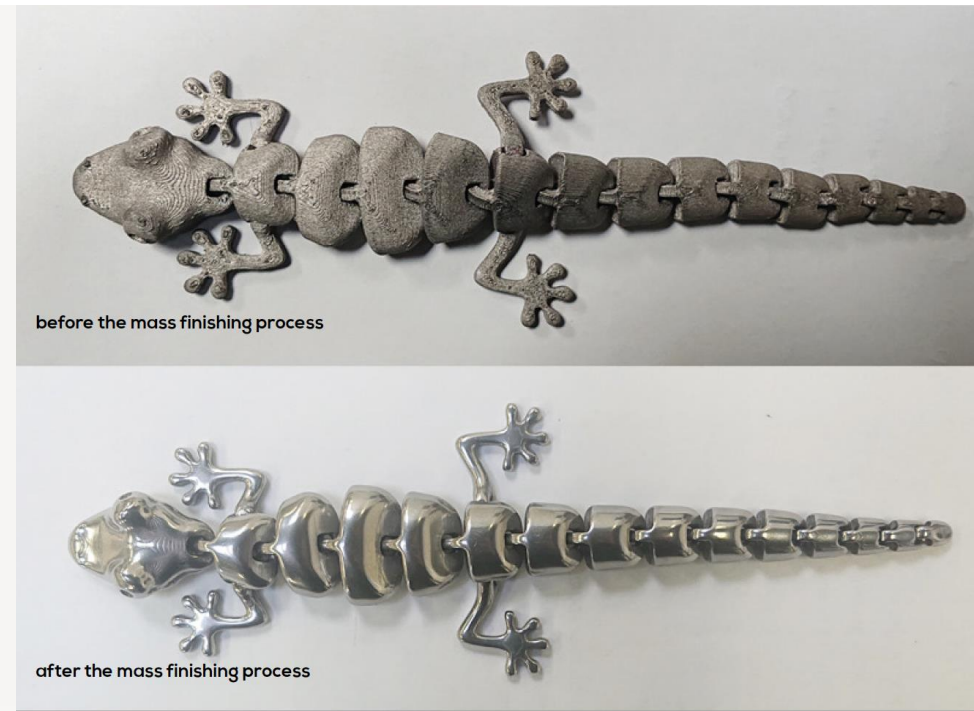
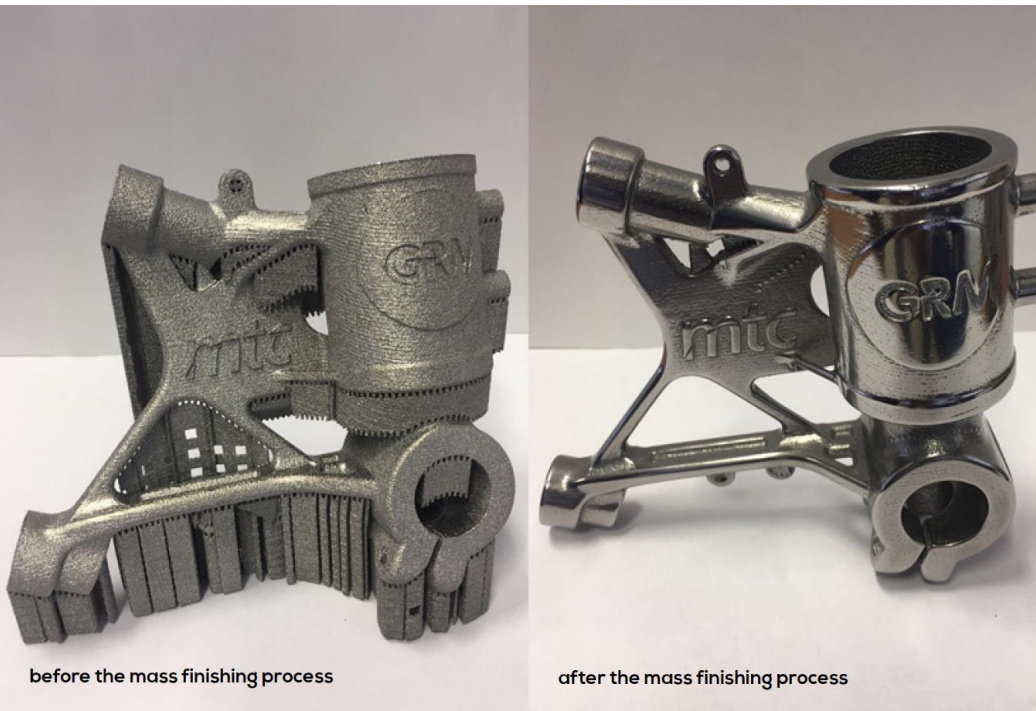
## Results

- In a 4 hour Vibratory Finishing process most of the SLS parts are smoothly finished.
- The process reduces the faceting caused by the printing process & could also be a method for reducing the orange peel..
- This is visually a good result, parts being smooth to touch.
- The solution offered by ActOn is cost effective as client can use only one finishing machine to process 3D printed parts of different shapes and sizes.
- The ROI for this project was 34 week.



# Industry Challenges

- Surface finish varies by print technology and material (SLM, EBM etc)
- Surface finish is not good enough.
- There is no one machine fits all.
- Geometry and design plays a critical role in the type of finish that can be achieved.
- Which technology do we use & when.
- Internal finishing
- Process time.



# Surface Finishing & Polishing

Most additive manufactured components require some surface improvement to ensure that they are in an acceptable condition for the end-user. 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.



Before  
Ra 21.02  $\mu\text{m}$



After  
Ra 3.03  $\mu\text{m}$



Before  
Ra 16  $\mu\text{m}$

After  
Ra 0.18  $\mu\text{m}$



Before the Surface  
Finishing Process

After the Surface  
Finishing Process



# CHEF Series

The CHEF Machines are the fastest finishing machines on the market to reduce surface roughness, deburr and polish 3D printed parts.

In many cases, the results achieved via CHEF systems cannot be achieved in a standard vibratory process, particularly applications that include achieving a high level of surface finish or a high rate of defect removal. CHEF machines can be 10 times faster than traditional finishing methods and produce superior finishes.

## 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 part impingement.
- Easy to maintain.
- Option to carry out different processes in each barrel.
- Easily customised to suit applications.
- British built, high-quality product.





# DLyte Technology

The DLyte® machine achieves high quality finishing for machined, sintered, casting and 3d printed parts, obtaining a mirror finish result. The polishing action reaches every corner of the piece, so it can process inner cavities which cannot be accessed mechanically.

Unlike traditional polishing, DLyte® Technology differentiates itself by its ability to preserve the initial shapes, even the cutting edges, and penetrate into all dead zones.



# Case Study

## CHEF Case Study



Process Time (Hrs)	Start Ra ( $\mu\text{m}$ )	Final Ra ( $\mu\text{m}$ )
2.5 hours	21.02	3.03

## DLyte Case Study



Start Ra ( $\mu\text{m}$ )	Final Ra ( $\mu\text{m}$ )	Start Rz ( $\mu\text{m}$ )	Final Rz ( $\mu\text{m}$ )
0.692	0.125	3.626	0.843

# Mass Finishing Technology



## CFD Series

The CFD machine is perfect for processing small and thin components as well as larger parts with a length of up to 150mm. These machines are recommended for processing small to medium batches of parts. One of the main advantages of CFD Series is the reduced processing times for most applications.



## CLM Series

This machine is suitable for achieving a highly polished finish on additive manufactured parts, without damaging the workpiece. The CLM machine has been designed to be simple to operate and produce excellent results.

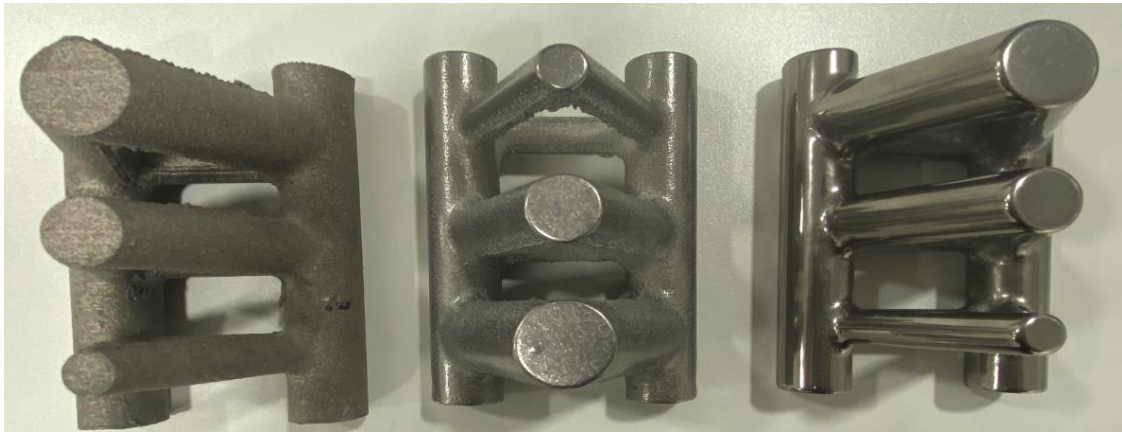
# Which Technology Works for My Part?

Criteria	Vibratory Finishing Machines	CDF Machine	CHEF Series	CLM Series	Dlyte Technology	AM Blasting	Precision Polishing (Manual)
Material Removal Rate	2	3	4	2	1	2	5
Maintain profile	4	3	3	4	5	4	3
Operational Cost	5	5	4	5	3	3	2
Intricate Finishing	1	2	2	2	4	4	4
Selective Finishing	3	3	3	3	3	4	4
Internal Finishing	1	1	1	2	2	1	3
High Gloss Finish	2	3	4	2	5	1	5
Process Consistency	5	5	5	5	5	4	3
Max Part Dimension/weight	5	3	3	3	1	3	3
	28	28	28	28	29	26	32



# Case Study

## Case Study: The Perfect Part (STRUT – Supplied by MTC)

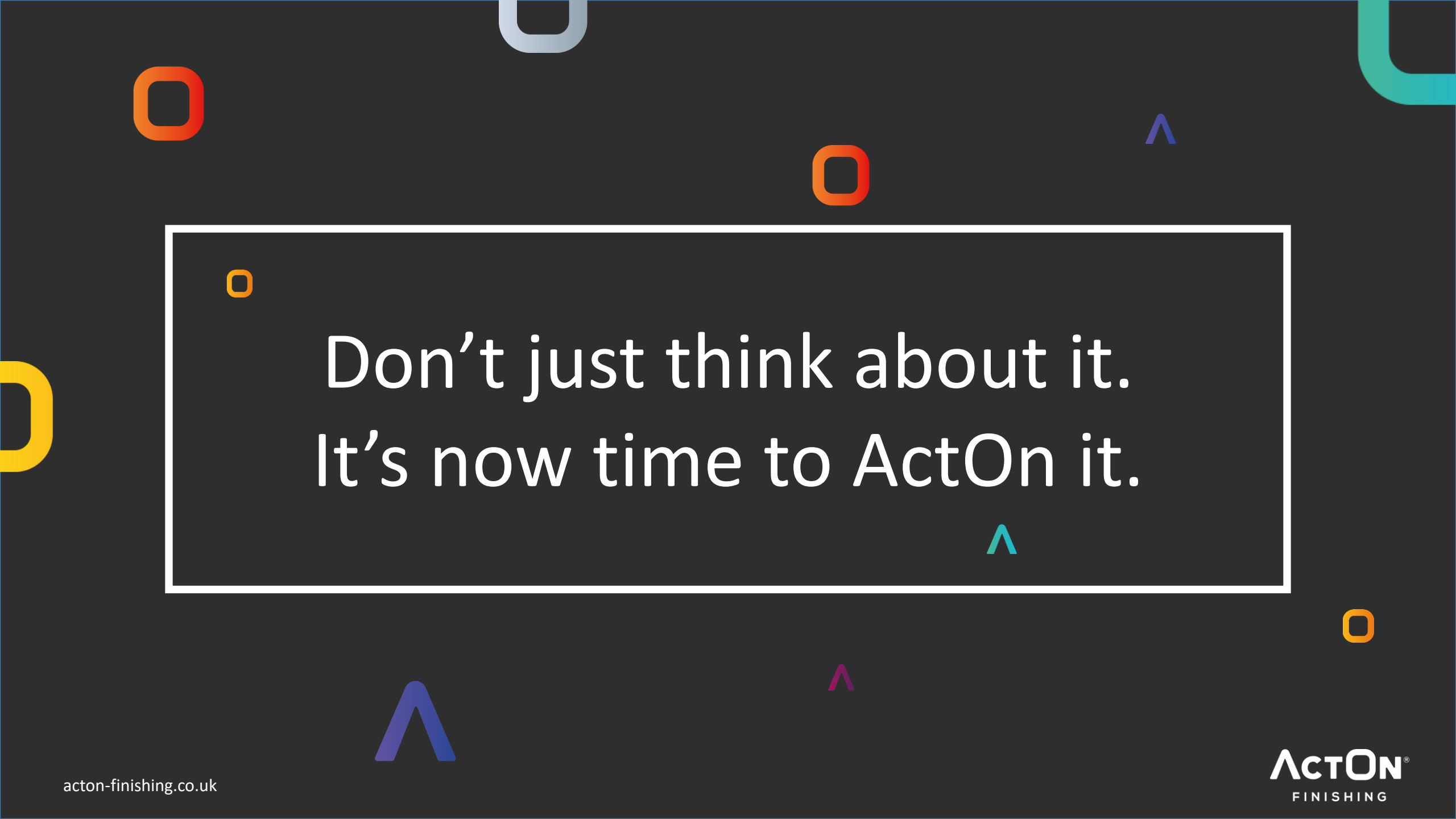


Technology	Start Ra ( $\mu\text{m}$ )	Final Ra ( $\mu\text{m}$ )
Multiple (including manual)	16.38	0.13
<b>Single</b>	16.83	2.74

## Case Study: Impeller Inconell 718



Process Time	Start Ra ( $\mu\text{m}$ )	Final Ra ( $\mu\text{m}$ )
3.5 hours	9.26	6.92



Don't just think about it.  
It's now time to ActOn it.