

NEWS

ISSUE #
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MUCH MORE POWER AND SPACE

The new DF 5 wet/330

TURBINE BLADES AND STREAM FINISHING

A perfect fit!



SMOOTH PROCESSING AT THE LIMITS

Rely on OTEC's EPAG FLEX for all filigree
and inner contours of gold and silver.



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EDITORIAL



Dear readers,

Customised solutions play an important part in OTEC's daily work; after all, the individual requirements of our customers and the challenges they present can vary drastically. It is all the more pleasing, therefore, when new approaches give rise to products and applications which represent milestones in our company's history and which may also be of benefit to other customers – as is the case with the new DF 5 wet/330, the biggest and most powerful DF machine we have built so far.

In addition, we introduce our stream finishing process, an innovative method of finishing turbine blades which enables workpieces to be selectively smoothed by controlling the stream of process media – with a greater accuracy, lower roughness values, larger batch sizes and shorter processing times.

Also of great benefit to our customers is our annual mass finishing workshop, which in 2016 took place for the first time in the new building of OTEC's corporate headquarters and which was accompanied by culinary specialties in our new VINOTECH event restaurant. In case you have not yet attended one of these workshops, why not join us next time? Or perhaps we will see you at one of the many trade fairs at which OTEC will be exhibiting in the first quarter of 2017.

We look forward to meeting you in person, wish you a successful 2017 and hope you enjoy reading this issue of OTEC NEWS.

Yours sincerely

Helmut Gegenheimer
Managing Director

OTEC NEWS
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The customer's requirements for finishing gear wheels presented a considerable challenge: a completely new machine concept for holding large and heavy workpieces needed to be developed. The result is the biggest and most powerful DF machine that OTEC has so far put on the market.

The task was the deburring of gear wheels, whereby two gear wheels had to be held in each workpiece holder. It was also necessary to observe a maximum processing time of four minutes and to keep the loading/unloading time down to four minutes, too, giving a throughput time of 16 seconds, corresponding to 225 workpieces per hour.

The initial test runs with sample workpieces pointed to drag finishing as the most suitable process; this is where the best results were obtained. Thanks to the independent rotation of the workpieces inside the process container, the gear wheels were deburred evenly.

The new DF 5 wet/330

MUCH MORE POWER AND SPACE



This made it clear that the DF 5 Standard would be used as a basis and that it would need to be equipped with a lot more space and much more power. The existing standard machine was redesigned to enable it to accommodate up to five workpiece holders with a minimum circumscribed circle of max. 330 mm.

» FROM CUSTOMISED SOLUTION TO SERIES PRODUCTION MODEL. «



The workpiece holder has now become bigger and more adaptable, and because of the weights involved, it is compatible with the new S9 adaptor. Up to five workpiece holders with three adaptors each can be used in the new DF 5 wet/330. The machine can now accommodate tool diameters of max. 330 mm, tool weights of up to 20 kg and tool lengths of 280 mm.

Each adaptor can hold two workpieces.

In order to achieve the tremendous forces and processing power required, a two-motor version of the planetary drive system was chosen so that the drag speed and holder rotary speed can be adjusted independently of one another.

Further special features are the spacious container with its large diameter and generous volume and the tailor-made lifting station. ■



Using a fork lift to change containers

Pump unit similar to that of SF machine



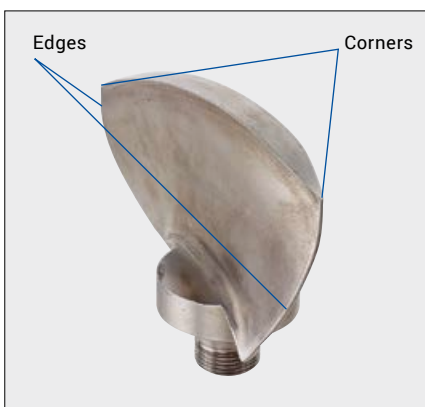
TURBINE BLADES AND STREAM FINISHING – A PERFECT FIT!



Turbine blades come in all shapes, sizes and materials. In some cases, turbine blades need to withstand extreme environmental conditions. In modern gas and aircraft turbine, combustion temperatures are often well over 1,000°C. This means that very strenuous demands are placed on the surfaces and materials used, as well as on the manufacturing and finishing processes.



The manufacture of turbine blades involves many different mechanical manufacturing processes. These include forging, milling, casting and increasingly also additive manufacturing processes such as 3D printing in laser sintering. Simply milling a single turbine blade on a five-axis machine takes at least about an hour. After manufacturing, all parts



require surface finishing before they can be used in an aircraft or for power generation, since either the initial roughness is too great or the edges are too sharp. There are two tasks involved here:

Homogeneous smoothing of the surfaces:

generally to $Ra < 0.4 \mu\text{m}$, often even less than $Ra 0.25 \mu\text{m}$. Here, it is especially important not to unduly affect the contour of the blade.

Rounding the edges to a defined measurement:

here it may be necessary to round the edges of the blade to different parameters. This rounding is traditionally carried out on CNC machines or done by hand. However, since the thickness of the blade may differ along the edge, this is no easy task. The main problem with this is that the blades might become too strongly rounded at the corners.

In the past, and for the most part still often today, smoothing has been carried out by hand. The main disadvantage of this, in addition to the high costs involved, is the fluctuation in the quality of the results. The use of robots for polishing reaches its limits as soon as the work-pieces take on a complex geometry, as is the case, for example, with blades made up of a number of guide vane segments.

In addition to the individual turbine blades, guide vane segments can also be smoothed. This can only be achieved with the stream finishing process.



» SELECTIVE SMOOTHING WITH STREAMFINISH «

Here, the stream finishing process offers a first-class alternative. In this process, the turbine blades are immersed in a rotating drum filled with a process medium (an abrasive medium). The stream of process medium generated by the rotation of the drum acting in combination with the setting of the immersion angle produces a defined stream of medium acting on the surfaces to be finished. The direction and angle of contact can be precisely defined in order to optimise the finishing process to the specific geometry of the workpiece. Generally speaking, wet processes are used for this, which means that in addition to the process medium, an additive is used together with water to carry away the particles removed by abrasion. The most suitable media for this are lightly flowing abrasives which provide the most homogeneous media stream at the workpiece.

OTEC manufactures a number of different versions of its stream finishing machines (SF machines) for the purpose of finishing turbine blades, and these can be customised and equipped to cater for specific requirements. Furthermore, the machines can be loaded and unloaded either manually or automatically by means of a standard robot cell.

Selective smoothing is possible

In addition to the option of automation, the machine offers the additional advantage that the selective direction of the process media stream ensures that neither the leading nor the trailing edges are rounded too strongly.

The blades are clamped in such a way that the corners are at the top during the finishing process and almost emerge from the process medium. The most commonly used medium is KM 6. Du-

ring the process, the blade is directed toward the stream and swings to and fro at a predefined angle (e.g. +/- 30°) in order to achieve a homogeneous surface finish. Processing times are usually about 2-30 minutes.

Depending on the process medium used, the surfaces can reach roughness values of up to Ra 0.1 µm. Processing times are between two and thirty minutes. A higher output can be guaranteed by clamping up to five workpieces at a time in a single machine.





MASS FINISHING WORKSHOP 2016

In November, this year's OTEC mass finishing workshop was held and this time a group of eleven participants took the opportunity to acquire in-depth knowledge of the topic. This was the first time that the workshop was held in our new building and the highlights of the workshop included not only the deep insights gained and the hands-on opportunity to finish sample workpieces in our Finishing Centre, but also a chance to taste the culinary delights of our VINOTEC event restaurant – all of which made this an excellent first at the new location. »»



KNOW-HOW

» PARTICIPANTS LEARN THE THEORY AND THEN TRY THEIR HAND AT PROCESSING SAMPLES IN THE FINISHING CENTRE «

At OTEC, different participants from vastly different industries can come together to broaden their knowledge of mass finishing in relation to their own workpieces and to enhance their theoretical expertise and practical skills.

The OTEC mass finishing workshop not only offers a solid grounding in the topic of mass finishing, but also illustrates this with theoretical and practical examples. The aim of the one-and-a-half day workshop is to provide a basic insight into the versatile technology of the mass finishing process.

Working in small groups, the participants are given an introduction to the individual processes. The focus of the first day is on fundamental aspects of the topic and the processes of mass finishing, as well as the various parameters and different fields of application.

The theoretical session is followed by a tour of the OTEC production facility with the opportunity to witness first-hand how the various OTEC machines are constructed and manufactured.

The different process media, such as grinding chips and abrasives, grinding and polishing granulates, grinding and polishing pastes and compounds, are among the main process parameters and are dealt with the second theory session. The pros and cons of the various process media and how to select the right media are explained in discussion with the participants, providing a sound basis for a further highlight of this workshop: the hands-on finishing of sample workpieces in the spacious Finishing Centre.

First of all, the workpieces brought along by the participants are evaluated and prepared for the subsequent live tests. This gives all participants a chance to put what they have learned into practice right away.





The participants then finish their own workpieces under the supervision of our experienced applications engineers. This gives them a deep practical insight into the evaluation phase, the selection process and the implementation of the finishing process, as well as into developing the best process on the most suitable machine.

The first day is then rounded off with an exciting culinary experience in the VINOTEC: participants and instructors can share their initial experience of and insights into the theory and practice of mass finishing technology in a relaxed setting – and enjoy the delicacies prepared by the top-class catering team headed by Dietmar Rübener.

Selecting the right machine, process and media in the right combination for the various sample workpieces takes time, and this workshop allows for this, so that on the second day of the workshop, the participants can once again put the theoretical knowledge they have acquired into practical use in the OTEC Finishing Centre.

An OTEC mass finishing workshop gives participants a wealth of insights and experience: we enjoy passing on our knowledge – in a practical and hands-on way. ■



INTRODUCING OUR PURCHASING DEPARTMENT

Buying by experts

They provide our company with all the essentials: Marko Bäuerle, Marita Lutz and Jessica Schiffer of the purchasing department place and process orders, among other things. Whether it is a matter of machinery, orders for spare parts, process media or simply daily consumables, they are responsible for soliciting offers, tracking orders and accepting deliveries in order to ensure that everything is on hand when it is needed and that it is obtained at the right time and on the best terms. They negotiate prices, draft framework contracts with suppliers and implement the contracts. And finally, they evaluate service providers and suppliers – as a basis for future business relationships.

This wide range of tasks necessarily requires these three team members to work closely together and in confidence with colleagues from other departments. For example, they are in regular contact with goods inwards, warehouse management, engineering design and of course, the production department.

+++ ISSUE #02 OF OTEC NEWS
WILL APPEAR IN AUGUST 2017 +++

PREVIEW



Presenting OTEC solutions – trade fairs in spring 2017

In spring 2017, we will be exhibiting nationally and internationally at a number of different trade fairs. We will be pleased to show you our machine highlights and discuss OTEC processes and solutions specially tailored to meet your challenges – or visit us at one of the fairs listed below.

WE LOOK FORWARD TO WELCOMING YOU!

	Vicenzaoro T-Gold 20.01.- 25.01.2017	Vicenza Italy
	Swiss Plastics 24.01.-26.01.2017	Lucerne Switzerland
	IMTEX Show 26.01.- 01.02.2017	Bangalore India
	IGJME Signature 07.02.-09.02.2017	Mumbai India
	WIN Eurasia 09.02.- 12.02.2017	Istanbul Turkey
	Turning Days 14.02.- 17.02.2017	Friedrichshafen Germany
	TECMA 07.03.- 10.03.2017	Mexico City Mexico
	Wernesgrüner Werkzeugsymposium 15.03.- 17.03.2017	Wernesgrün Germany
	Istanbul Jewelry Show 16.03.- 19.03.2017	Istanbul Turkey
	MECSPE 23.03.- 25.03.2017	Parma Italy
	MEDTEC 04.04.- 06.04.2017	Stuttgart Germany

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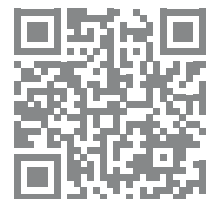
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