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Optional practical evening classes

MFN Shot Peening
Workshop in Germany
17-19 March, 2020
(see page 5)



Optional practical evening classes

MFN Shot Peening &
Flap peening
Workshop in Singapore
12-14 May, 2020
(see page 5)

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FerroECOBlast®
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Leading The Evolution Of Aerospace
Surface Treatment Solutions (p. 20-22)

Vol. 20, November Issue, Year 2019

**Interview With Frederic CHATEAU,
process manager, and Cédric PILARD,
international sales engineer from SONATS**

**Flexible, Portable and Automated:
Shot Peening at its best**



SONATS

Europe Technologies group

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Flexible, Portable and Automated: Shot Peening at its best

Because high value components continuously require more controlled, cleaner and more efficient shot-peening solutions, SONATS ultrasonic shot-peening solutions have become more and more relevant and bring about new benefits, from in situ shot-peening services to customer-dedicated machine. MFN was able to get arrange an interview with both Frederic CHATEAU, process manager, and Cédric PILARD, international sales engineer from SONATS.



Frederic CHATEAU (right), process manager, and Cédric PILARD (left), international sales engineer from SONATS

(?) MFN: Could you please quickly introduce SONATS to our readers?

(!) C. P.: Founded in 1991, SONATS, as part of the Europe Technologies Group, ensures its growth thanks to its expertise in metal surface treatment and its ultrasonic shot peening process also called Stressonic® technology.

Since SONATS began, our success and growth has always been based on high skills and a global expertise level from residual stress measurements to dedicated shot peening solutions.

After collaborating with leading partnerships worldwide to develop and qualify the ultrasonic process, SONATS is now a global shot-peening solution provider for a wide range of industries including aircraft manufacturers, aircraft engine major companies and gas turbine makers to the automotive transmission and motor industries.

In 2019, our customers and markets are global, and we are expanding our

service capacity via the creation of our subsidiaries: Empowering Technologies Inc. (since 2010 in the USA) and Empowering Technologies China (since 2018).

(?) MFN: Most of our readers understand shot-peening technologies and principles, but are not necessarily familiar with ultrasonic shot-peening solutions. Can you explain how these differ from other technologies?

(!) F. C.: Conventional Shot Peening (CSP) is conducted using large machines where the shot is directed through nozzles at the target component in a controlled chamber and recycled through the machine where it is cleaned and sorted to remove debris and broken shot before being re-used by the system.

Our STRESSONIC® technology is significantly different in that the peening chamber is very small, and contains all the media within the chamber on the order of a few cubic centimeters, to peen an area of the original component. This provides the ability to use a very small quantity of media that is excited by the ultrasonic sonotrode and continuously activated within the chamber. The media can then be visually inspected after each peening activity.

(?) MFN: What are the benefits of your technology?

(!) C. P.: One of the major benefits of using USP is the significant increase in quality assurance obtained by the system's computer-controlled processes. The STRESSONIC® technology controls the process. The peening time is also automatically controlled to insure that the coverage time is accurate. All parameters are automatically monitored and recorded for each cycle, and an electronic record is produced to fully document shot-peening operations on a serialized part basis as required by our customers.

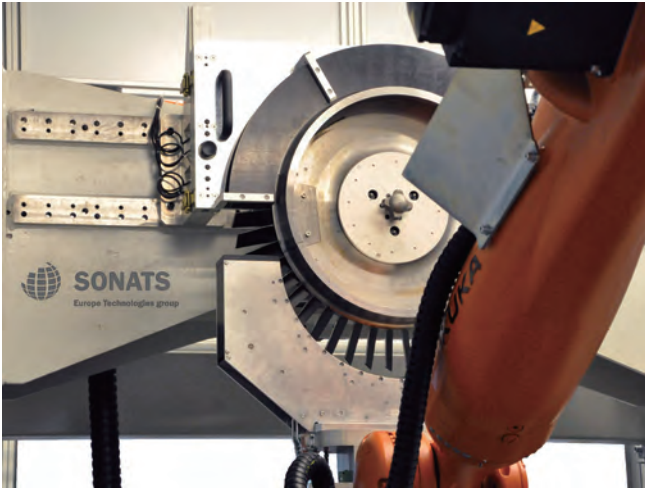
(!) F. C.: Surface roughness is an important characteristic for dynamic aerospace components as well, which influences the fatigue strength. A higher surface roughness indicates a higher probability for micro-cracks to form



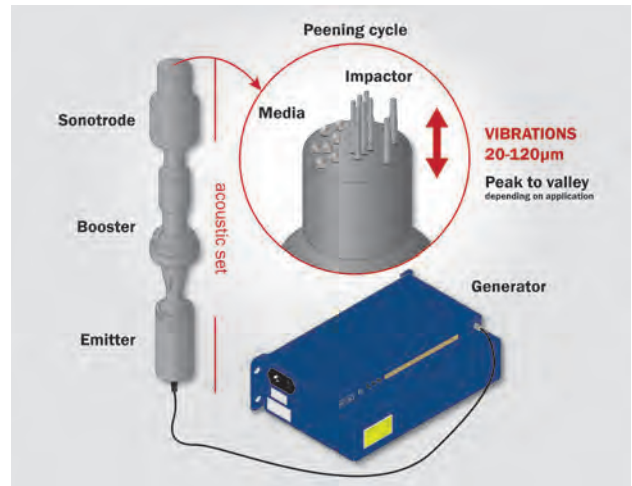
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Frederic CHATEAU, process manager of Sonats



Acoustic element with hermetical chamber mounted on a robotic arm for shot peening on aeronautic blisks



STRESSONIC® Technology - Ultrasonic impact treatment principles

that in turn increases the likelihood of premature fatigue failure; therefore, a lower surface roughness post-peening is desirable. While manufacturing and aerospace design engineers seek to minimize the surface roughness of a component, shot peening tends to increase surface roughness. Results throughout our studies on aluminium, titanium, Inconel or steel components have shown a lower surface roughness for USP conditions versus CSP conditions at the same peening intensity.

The other benefit of our solution in the aerospace industry is the ability to repair many components that have been, to date, not considered as repairable at the typical Part 145 repair facility. Many times, minor damage to components

during the reassembly and installation on the aircraft causes the re-removal, disassembly and repair process to be duplicated. In some cases, our portable STRESSVOYAGER® is used to perform "on wing" repairs that have eliminated the costly removal, disassembly and repair of damaged items.

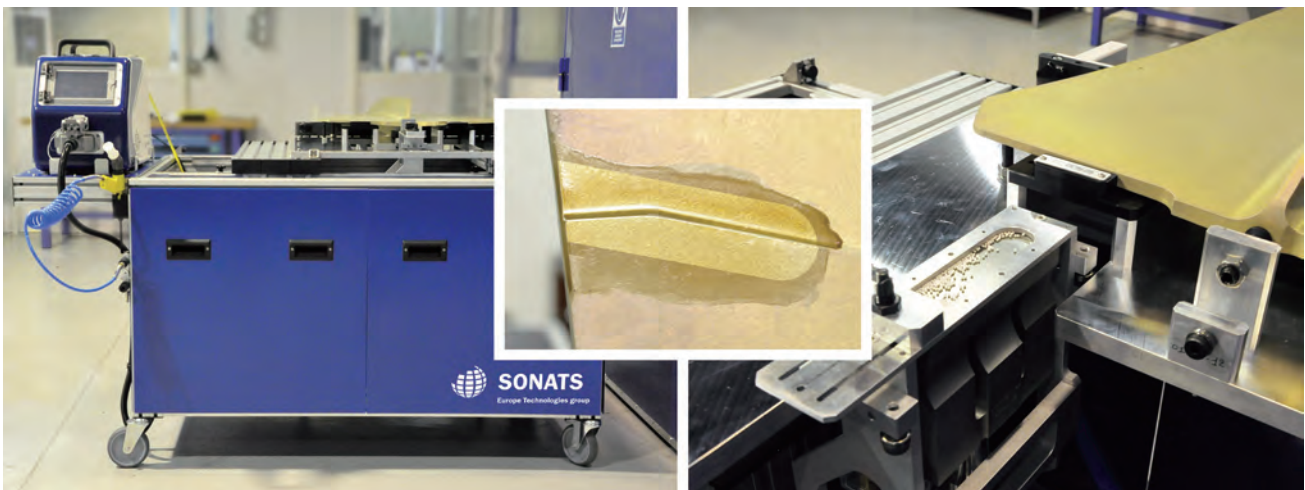
(?) **MFN:** Can you give us some examples concerning the portable equipment?

(!) **C. P.:** Yes we can: typical applications of this localized shot peening are: Fan disk-blended areas, without engine extraction, leading to an 80% reduction of repair cycle time, gas turbine fir-tree peening with reduced dismantling and

complete media containment throughout the peening operation, and *in situ* peening of damaged helicopter blades that saved \$220,000 per blade spar.

(?) **MFN:** How easily can this technology be integrated to fully automatic manufacturing processes?

(!) **C. P.:** Automotive gear manufacturers have to maintain high productivity while insuring an efficient and repeatable process for critical transmission parts. In this framework, major OEMs are utilizing USP-automated machine integration in specific part-production lines, thereby ensuring lean manufacturing preservation. Specifically, in USP machines for gear peening, treatment is



Localized shot peening with a bench and dedicated tooling

performed in dynamic mode to reach a pre-determined takt time. For example, a 40s takt time with a 4-station machine will produce 500,000 parts/year.

(!) **F. C.:** Moreover, USP machines have the following automated functions: robotized handling directly from the previous process operation, media counting (in units or in grams), sonotrodes and media wear-out monitoring, operator warning when lifetime is reached, automated media loading/unloading for each independent workstation, and global supervision and periodic quality report issuance.

(?) **MFN:** You seem to have different setups for different uses, but how flexible can a machine be?

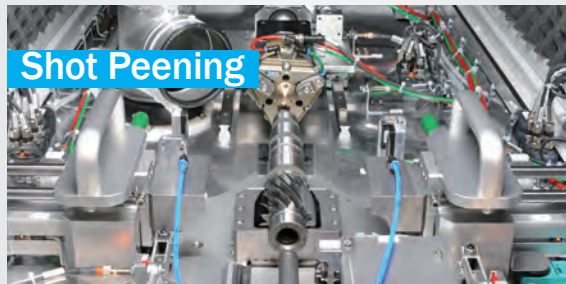
(!) **C. P.:** The tooling systems are modular. They can be set up in any machine station, independently from the part reference group. The highest automated solution for USP process is the complete handling of the process by 6-axis robots. For the treatment of aerospace blisks, for example, a recent USP implementation included the global handling of the part and robotized enclosure positioning to perform treatment on blades, the disc central bore and disc holes.

MFN would like to thank Frederic CHATEAU and Cédric PILARD for this interview!

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