ENGINEERING

2EFFE

SURFACE TREATMENTS

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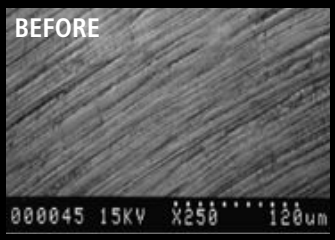

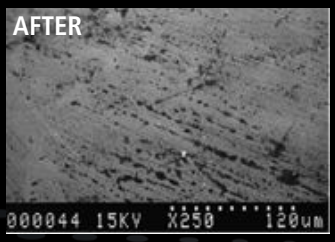

LAPPING

2EFFE ENGINEERING has developed a lapping method using diamond pastes that allows to obtain a very low roughness level (Ra < 0.02 µm) and to establish a high degree of compression on the surface (> -900 Mpa). The process consists in mechanically removing the machining ridges (generally ground) via abrasion by the flow of pastes in aqueous solutions, without the aid of acids.

Main applications: IMPELLERS, SPROCKET WHEELS, CRANKSHAFTS, TURBINE BLADES, NAUTICAL PROPELLERS, GEAR AND ENGINE COMPONENTS

HVOF METALLIZATION AND COLD SPRAY

High Velocity Oxy Fuel (HVOF) is a spray metallization technique that consists in making a thick coating of another material on the surface of metals, in order to improve its surface features (low porosity, low Ra values, elevated and controllable hardness, compressions exceeding 80Mpa) and to extend life also in highly corrosive environments.

Main applications: TURBINE BLADES, OIL AND GAS VALVES, GAS, STEAM AND WATER TURBINES.

Using the plants at its disposal **2EFFE ENGINEERING** can realise different types of coating, with various compositions, as for example:

COMPOSITION	HV300	POROSITY	MAX TEMPERATURE
WC-Co	900-1150	0,5%	530°
WC-Co-Cr	1050-1400	1,1%	750°
Wc-Cr3C2-Ni	900-1000	1,6%	750°
Wc-Ni	850-950	1%	540°
Cr3C2-Ni-Cr	700-800	1,5%	800°
Fe 17Cr 12Ni 2,5Mo 1Si 0,1C	300-320	<1%	350°

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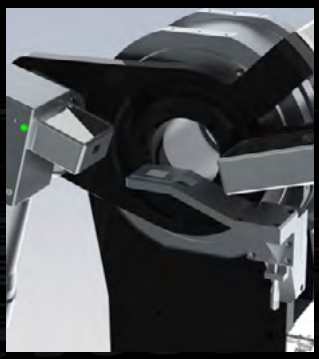
LABORATORY SERVICES

The laboratory can offer a wide range of highly technological analysis methods, less common in conventional laboratories, such as: XRD or BARKHAUSEN NOISE.
2Effe can also measure residual stress using "hole drilling" method, according to the ASTM E 837 Standard; this method allows measurement at a depth (up to approx. 2 millimetres) on large manufactured items, also on site.
Use of the Scanning Electron Microscope (SEM) on fracture surfaces allows to identify starting points of fatigue cracks; the analysis of the fatigue propagation lines can prove to be very useful for understanding the propagation of the crack.
2EFFE ENGINEERING can also measure the static and dynamic stress states applied using strain gauges and the measurements of vibration modes using accelerometers.
2EFFE can also perform checks using penetrating liquids.

X-RAY DIFFRACTION



X-ray diffraction is a technique that allows to measure residual stress and determine the structure of crystalline materials as well as identify the various phases that distinguish them.
Through one of its subsidiary company, TNX S.U.R.L., **2EFFE ENGINEERING** can construct diffractometers in compliance with the characteristics requested by the Customer.
Main applications: DETERMINATION OF THE AMOUNT OF RESIDUAL AUSTENITE; OPTIMIZATION OF OPERATING PARAMETERS, SEARCH FOR CRITICAL AREAS FOLLOWING THE APPLICATION OF WORK LOADS, MEASUREMENT OF RESIDUAL STRESS ON SPROCKET WHEELS, ENGINE PARTS, GAS PIPING, IRON AND ALUMINIUM CASTINGS, LIGHT ALLOY COMPONENTS, HELICOIDAL AND LEAF SPRINGS.
This technique also allows **2EFFE ENGINEERING** to check the correct composition of the HVOF coatings or the efficiency of the shot-peening treatments supplied.
Measurements on site are also available for large structures.

TNX
X-Ray Technologies

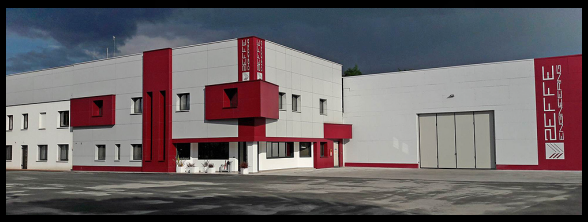
SHOT-PEENING

Shot-peening increases resistance to fatigue and corrosion of organic parts. This process essentially consists in subjecting the most stressed areas of a mechanical part to the bombardment of steel or ceramic spheres of a suitable diameter. The X-ray diffraction control of the stress induced, allows to optimize the process parameters, thus improving performance.
2EFFE ENGINEERING uses 6-axis anthropomorphic robots to perform the shot-peening process.
2EFFE can also carry out the shot-peening treatment of large parts on site.
Main applications: DRIVE SHAFTS, GAS AND STEAM TURBINE BLADES, GAS TURBINE DISKS, ENGINE SHAFTS, CONNECTING RODS, ROCKER ARMS, SPRINGS, WHEEL RIMS.

RESEARCH AND TECHNOLOGICAL INNOVATION

2 EFFE ENGINEERING was founded in 1997 from years of experience by Ing. Gianpaolo Marconi in the field of diffractometric detection of residual stresses making research, experimentation and technological innovation his raison d'etre.
The Company began operating in the field of material analysis and the experience matured over the years led them to develop several types of surface treatments.
Research, combined with *Production*, has made it possible to exploit interesting synergies allowing **2 EFFE ENGINEERING** to reach a position of excellence in its field.
At present, in the laboratories of *Analysis, Control* and *Research*, as well as proven metallurgical equipment some of the most advanced devices in the world are operational such as: two scanning electron microscopes, six X-ray diffractometers as well as tools for the detection of "Barkhausen noise".
This makes it possible to perform *Failure Analyses*, non-destructive detection of residual stress and retained austenite, grinding burn detection, identification of crystalline phases of metals and many other investigations.
At the production plant in Soiano Del Lago, which is spread over an area of about 10,000 square meters of which 2,600 indoor, *Shot Peening* treatments are carried out through the use of six-axis anthropomorphic robots and *Lapping*, a method of polishing with diamond paste that allows you to obtain very low surface roughness. These processes increase resistance to fatigue and corrosion creating compression tension and, from a functional and aesthetic point of view, make it possible to enhance the degree of surface finish.

As of 2004 new metallization departments have been active using *HVOF* and *Cold Spray* technology, the most advanced and effective currently available.
In 2003, as a natural consequence of its quality policies, **2 EFFE ENGINEERING** was awarded the UNI EN ISO 9001:2000 certification and, in October 2005, it achieved the important goal of integrating new instruments for process control that have allowed us to obtain certification according to the automotive industry scheme ISO-TS 16949:2002.
2 EFFE ENGINEERING is now being certified in accordance with EN 9100:2009 which will enable it to operate in the aerospace and defence industries.
In order to achieve even greater expertise in the field, **2 EFFE ENGINEERING** has recently taken over the whole of TNX Srl, a company based in Riva del Garda (TN), which specializes in the construction of X-ray diffractometers.
Another partner company of **2 EFFE ENGINEERING** is 2 Effe Lab Srl, based in the Veneto region, which deals with the analysis of stresses through the use of the strain gauge technique.
2 EFFE ENGINEERING also looks to the future and, at this moment, is closing new business relationships and partnerships with international companies paying particular interest to developing countries, especially India and Asian countries.
In 2011, **2 EFFE ENGINEERING** was awarded the Prize *OK ITALIA, Aggregation and Internationalization*, sponsored by Unicredit and dedicated to companies who, thanks to networks, can rise to the challenge of international markets.



CERTIFICATIONS: ISO 9001, IATF 16949, EN 9100
COMPANY ACCREDITED NADCAP FOR AUTOMATED PEENING

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