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Shot Peening Advances on the European Front

Next year, Vacu-Blast Ltd. celebrates 50 years in the UK and continues to grow vigorously. This success stems from pioneering work in the 1960's in the US with, for example, the world's first multi-axis peener for processing F11' components, which encouraged significant development in Europe. Vacu-Blast Ltd. and its French sister company in the BTR group, Matrasur SA, now lead the field in Europe in peening technology.

Over the past half century, both companies have been instrumental in establishing shot peening as an accepted production and maintenance technique in the European aerospace industry. Between them, they can claim to have manufactured and installed more precision shot peening machines than any other organization serving the world market. All European airlines and aerospace manufacturers, as well as many other aircraft companies throughout the world, use their advanced surface treatment equipment.

Two of Vacu-Blast's most recent customers, currently commissioning shot peening machines together worth $1.5 million, are Finnair and Air India. Already a large user of Vacu-Blast equipment at its base in Helsinki, Finland, Finnair had a special requirement in that because of site limitations, its machine had to be custom designed to fit into a limited space. Consequently, the multi-purpose system is installed on two levels. It is used to peen turbine blade roots and turbine disc slots of Pratt & Witney JT8 engines and for processing landing gear components. Like many other Vacu-Blast and Matrasur peening systems installed worldwide, it is programmable to ensure precise and consistent process repeatability and incorporates highly accurate component indexing, a multi-axis nozzle manipulator and sophisticated shot monitoring and recovery systems.

Air India's machine in Bombay, India has a similar operating system and is also multi-purpose, a growing trend today in order to minimize machine downtime, streamline throughput, save on space and provide the maximum investment value. It processes Pratt & Whitney JT8D and JT9D, as well as General Electric CF6 and GE/SNECMA CFM56 engine components. Its versatility is increased even more by the addition of an external operating position for the manual peening of small items.

"The World's Favorite Airline"

Another recent Vacu-Blast shot-peening installation is at the newly built $40 million British Airways Engine Overhaul plant in South Wales. Again multi-purpose, this system features an array of eight programmable shot delivery nozzles, a retractable lance for the internal peening of bores, and a purpose designed tool for processing the insides of disc slots. Specially developed shot recovery, classification and flow monitoring systems are also incorporated. These are viewed as particularly vital by British Airways, since the success of shot peening depends not just on the control and accuracy of the stream of shot being fired, but also, of course, on the integrity of the shot itself.

Peen Forming

In addition to the standard application of shot peening for improving fatigue resistance, the related technique of peen forming is also being used increasingly in the aerospace manufacturing sector for shaping components. Extremely accurate results can be achieved utilizing the control and delivery systems developed by Vacu-Blast and Matrasur.

One example is the saturation peen forming system supplied recently to Korean Airlines by Vacu-Blast for processing Boeing 747-400 winglets. This new machine is based on a similar plant built by Vacu-Blast for the Gulfstream IV aircraft and supplied to National Metal Finishers of Dallas, Texas. Wing skins on both machines are processed by means of multiple blast nozzles mounted on reciprocating manipulators. Wing sections pass automatically through the system which is numerically controlled so that critical design parameters which ensure optimum wing geometry can be strictly adhered to. Automatic shot flow monitoring is also incorporated.

Peen forming is also applied as a "high-tech hammer" by SABCA, the Belgian company which manufactures various "Ariane" components under license from Aerospatiale. SABCA uses the process to shape accurately the external panels of "Ariane IV" liquid fuel booster. In this instance, peen forming supersedes mechanical rolling and the use of a very noisy pneumatic needle gun. The process has reduced panel production time from 24 to 16 hours, reduced the number of operators needed and removed the danger of surface damage—totally eliminating rejects!

These are just some examples of the rapid progress being made in Europe on the peening front—and the advance continues with the current development and installation of new Vacu-Blast systems for all the latest European aircraft.