Precision Shot Peening
Precision strikes or spray and pray

Precision peening or spray and pray?

Over the years I have seen many shot peening machines with multiple nozzles. Many of these machines were purchased with the extra nozzles so they could do a wide range of parts. The machine is turned on and the part moves thru the peening zone and is peened from many different angles. Some of the nozzles may not even have hit the part because they are pointed at a larger part. This is the spray and pray approach. Spray as much shot at the part and hope that it is peened to the proper intensity. So when doing this, what was the intensity? Since the angle of the nozzle is critical to the intensity value it would make sense to provide a saturation curve for every nozzle. Then the next issue is the need of movement of the nozzle to a different fixed position to accommodate a different part. This movement of the nozzle will require more intensity verification and coverage inspection. Sounds like a lot of work and a lot of cost and in many cases it is unnecessary. Consider the cost of operating a multiple nozzle machine like the one just described. One 3/8 inch nozzle at 60 pounds of air pressure requires 125 cfm of air. 125 CFM of air requires a 25 hp air compressor. Now consider how much compressed air it takes to run an eight nozzle machine! Over 1000 cfm and 200 hp! When you add additional cost like the use of the shot and the additional wear on the machine the cost can be substantial for many years. Another problem with multiple nozzle machines is the complexity of the shot delivery system. If the machine is not peening well then where is the problem? In an eight nozzle machine the problem could be in any one of 32 different valves needed to run such a system. So what can be done to reduce the cost for setup, consumables and maintenance? Let's consider replacing all of this cost in power and labor with a single nozzle machine with automation. The first problem to overcome is the additional automation cost. Once customers get beyond this stage the shot peening process gets easier, better and more efficient. The cost of robotic shot peen machine can be high but it is only an initial cost and when compared to large air compressor equipment and constant labor cost associated with machine set up times it can pay for itself very fast. The idea is take a single nozzle, automated the movement of the nozzle and the part with coordinated axes movement so the nozzle follows the contour of the area to be peened. This approach allows the shot peener to hit only the areas required and allows for a part motion program to be used for each part thus eliminating costly set up times. It also allows for one saturation curve to be used because it uses a single nozzle. If the motion program is correct, all the shot will strike the part at the proper angle allowing for proper intensity and proper coverage.

Another benefit to automation is the ability to peen at the highest specification level thus providing a more valuable service to customers. When purchasing single nozzle automated machinery consider how many axes are needed to move the nozzle and part to achieve the proper angle needed to peen all surfaces. Another key purchasing decision should be the type of controller. Buying a name brand that every knows who to program can be a wise choice. Purchasing self made motion programs may be cheap but are specific in nature to the machine and can be hard to understand and trouble shoot.

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