

POLISHING ROBOT PAYS FOR ITSELF QUICKLY

Cell flexibility allows reconfiguration for welding or machining

Polishing to remove imperfections from the surfaces of extruded aluminium shower rails that have been stretch-formed and bent is a dirty, messy job to do by hand. Aluminium oxide, dust from the polishing mop and the liquid medium combine to make an operator's hands and clothes as black as a coalminer's by the end of a shift.

It is so difficult to find people to do the job, and the results are so inconsistent, that subcontractor DJ Stanton Engineering has installed a 6-axis Motoman robot cell to automate the task at its Hook Norton works.

Owner Dave Stanton says that a large proportion of the polishing was previously subcontracted to a specialist firm. Bringing the work in-house amortised the £100,000 investment in the robot in little more than a year, based on single-shift working. The facility is now used for free, save for the cost of consumables and power.

Moreover, the consistency of the rails is much better in terms of dimensional accuracy and quality of finish. Twenty or so shower cubicle manufacturers around the UK reject only a few percent of bright anodised rails delivered by DJ Stanton, compared with up to a third from other suppliers.

Dave Stanton commented, "There was a wide variability in our formed and machined rails by the time we got them back from the polishers. Some were acceptable while others were absolutely dreadful and had to be repolished by us, or scrapped.

"Either the surface marks were not completely removed, or the grain of the polish was in different directions all over the surface. Such imperfections show up after anodising and render the component unacceptable for an application where cosmetic finish is important.

"As the rails were polished manually, which is an arduous job anyway, it was not practicable for an operator to use a heavy jig to hold the components during polishing. So they tended to distort under the heavy pressure that is needed to achieve a deep lustre in a short cycle time."

All of these problems have been solved by the Motoman robot. It presses a rotating denim mop, dosed with a liquid soap-based polishing medium, at a predetermined, fairly high pressure at right angles to the rail surface. The mop stays in this orientation as it follows the curves, so no variability or cross grain are visible anywhere on the polished surfaces.

The extruded rail, which can have a wall thickness as thin as 0.7 mm, is held in a jig to prevent movement or distortion while up to three faces are polished in a single clamping. A long reach is needed to access the side of the rail furthest from the robot, which was one reason that the standard Motoman ES165N was chosen for the application.

The robot path is programmed using the teach-in method in a couple of hours to polish even the most complex of shower rails, despite the operator having been trained in just two days at Motoman's technical centre in Banbury. Rails can measure up to 1,200 x 1,200 mm for

the luxury shower cubicles in which DJ Stanton tends to specialise these days, most of the mass production market now being served by Asian suppliers.

Two passes to cut and polish are normally sufficient to achieve the required finish, although the robot can easily be instructed to execute an extra pass before the rail is removed. When the polishing cycle is complete, a rotary turntable removes the part from the working area and swings the next fixtured rail into position, resulting in virtually continuous production.

Not only is the polishing better and more consistent by robot, but the cycle time is also three to four times faster for a two-pass cut and polish, compared with five minutes to do an inferior job by hand.

Other components that have been polished in the robot cell include curved handles for up-market cookers and railway carriage window frames.

There is a long history of working for the rail industry at DJ Stanton. It has undertaken projects for rolling stock on the Northern, Central and Jubilee underground lines as well as for the Channel Tunnel.

This highlights the need to consider flexibility of use when choosing plant for a modern production environment. Dave Stanton went from working flat-out on rail contracts to producing up to 15,000 shower rails per month by 2005, only to see throughput dwindle as high-volume production went overseas. Now he has set his sights on increasing the amount of robotic welding at Hook Norton and intends to reconfigure the Motoman robot accordingly during 2009.

Mr Stanton concluded, "Altering the robot's use is relatively easy, which is essential for OEMs and subcontractors alike in order to respond to changing demands from customers. I may well reconfigure the Motoman again in the future, perhaps for milling and drilling if the need arises.

"Macros for all common robotic tasks are permanently resident in the controller. I happen to know that the welding functions are there, as we already use the weave command. Intended for filling joints with weld metal, we often superimpose the macro onto a finishing cycle to intensify the polishing action and shorten the cycle time further."

Please see following photographs:-

1. The Motoman robotic polishing cell being programmed at DJ Stanton Engineering, Hook Norton.



2. Another view of the robot cell with the mop rotated through 90 degrees to polish the top surface of a shower rail.



3. Close-up of the polishing mop and part of the finished surface of an aluminium shower rail.



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