

Case Study

ATM Automation cuts through Polypipe's flash problem

As a highly respected systems solution provider to the plastics industry, ATM has been involved in many diverse and challenging applications. However, when Polypipe asked ATM to devise an automated solution for the removal of flash from their range of blow moulded Ridgigully products, ATM were presented with a highly unusual combination of design, process and Health & Safety challenges.

Polypipe Civils is the UK's leading manufacturer of surface water drainage, sewerage, cable protection systems and water management solutions, serving the utilities, construction, civil engineering, agricultural and sports and leisure markets. As part of the Polypipe surface water drainage system, Ridgigully products are blow moulded in HDPE (High-density polyethylene) in 3 different sizes. The post moulded products incorporate



significant amounts of flash around the mould joint line, which traditionally has been removed manually. The largest of these parts weighs up to 12 kg and with some areas of flash being up to 12 mm thick, so as a manual process this was both time consuming and arduous.

Following a review of various flash removal processes and automation concepts by Polypipe, ATM were chosen to provide a fully automated flash removal system based upon a six axis robot and a laser. This laser - robot is not in itself new, and ATM already had previous experience of building systems of this type for automotive industry customers. Automotive laser cutting applications, by their very nature, are fine tolerance, and whilst this demands precise programming and robot path control, the fact that the components have clearly defined datum points means that the laser and robot together can easily meet the dimensional and profile tolerances

required. The major differences between this and the Polypipe application include the larger tolerance band of the blow moulded part and the material from which the part is produced.



Meeting the challenges

With three different sizes of product to be laser cut (300 mm, 750 mm and 900 mm) and a requirement to not only remove flash from the moulding but also to cut two 360 degree paths, ATM determined that the optimum solution would be for the robot to hold the part and manipulate it under a fixed laser cutting head. A six axis robot system with a horizontal reach of 2 m and a payload capacity of 50 kg, was chosen to provide the working range and handling capacity required for these large components.

ATM chose Rofin-Baasel UK Limited as the supplier of the laser system, based upon their extensive application experience and the excellent reputation for reliability of Rofin CO₂ lasers. A diffusion cooled slab laser with an output power of 2.5 kW was selected for the project. Detailed consideration also had to be given to fume extraction and filtration for this project: the parts being cut are produced from 100% regrind material and can contain a number of contaminants which could have a detrimental impact on the performance of any extraction and filtration system. Following a series of trials, a multi stage dosing filter system was developed, with the air extracted from the cell being dosed with Calcium Carbonate before reaching the filtration system. To minimise the time associated with cleaning filters and removing debris from the filtration system, two sets of filters were incorporated. This enables one set of filters to perform a self cleaning cycle, depositing any dust and debris in a bin, whilst the system continues to run using the second set of filters.

The work-cell incorporates two component fixtures at the operator load and un-load station. This enables the robot to deposit a completed part and immediately pick up a new part. With an internal safety door closed to pro-

tect the operator, the finished part can be manually removed and another part loaded for processing by the robot. The robot gripper system and the component location fixtures incorporate quick change tooling features to enable the system to handle the three different product sizes produced within the cell.

Focused on success

The Ridgigully components required flash to be removed from around the mould tool joint line, and in places this flash can be up to 12 mm thick. In addition, to enable the flash being removed to be re-processed more easily, the larger areas of waste material had to be cut into smaller pieces. This required intricate programming by the ATM engineers to achieve the balance between reducing the size of the waste material and maintaining target cycle time.

The major issue yet to be overcome in this application was the need to produce trimmed components with a minimum of excess material, on components that have potentially large part to part variations in size. The variation on each component meant that it was not possible to establish a consistent datum position, from which programme offsets could be generated.

ATM's solution was to use the laser "out of focus": more laser power would be required because of the larger spot size, making ATM's initial choice of a 2.5 kW laser a major contributing factor in developing this final solution. The larger spot size together with the higher power from the laser enabled the system to not only achieve the cut profiles required during flash removal, but to generate a sufficiently high temperatures during the trimming operation to partially melt the cut area, thereby providing a smooth aesthetic finish on the part.

Polypipe has achieved their objectives of turning a labour intensive and arduous task into a cost effective and highly reliable automated solution. ATM has also clearly demonstrated that difficult and unusual automation applications can become a reality using a combination of field proven hardware lateral thinking, and a determination to satisfy the customer's requirements..

Contact: Charles Sanders
E: sales@rofin-baasel.co.uk