



Case Studies Tube Profiler Machine

Our client was in charge of upgrading the control system of a tube profiling machine including changing the stepping motors for new servo motors.

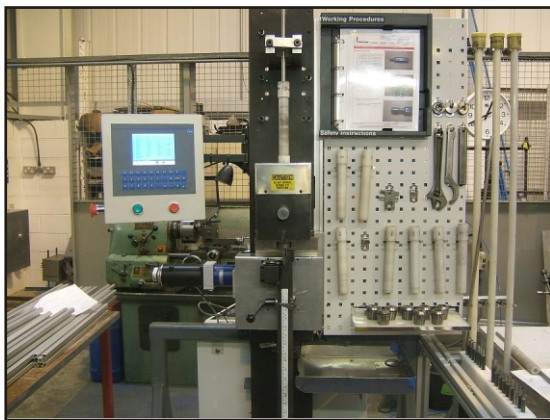


Photo of the dough depositor machine with the TRM 3 axis motion controller & HMI. Photo courtesy of Wolf Automation. www.wolfautomation.co.uk

This time our customer Wolf Automation was in charge of upgrading a machine. We asked him about the project and here is his answer:

“A multinational manufacturer of special purpose heaters and heating accessories had problems with their tube profiling machines and contacted us to see if we could help.

The profiling machine is fed with long lengths of stainless steel tube, many different sizes of tube and differing wall thicknesses have to be catered for. The machine profiles the tube in a multitude of patterns dependant on the end use of the product before cutting the finished product off.

The existing machines were built in the USA over 10 years ago and have served the company well. However, they had idiosyncrasies and were becoming more and more un-reliable, the ever increasing amount of products that needed to be made pushed the machines past the limit. The operators interface was not friendly for the operator and even worse for the

maintenance technician, it was time to see what could be done.

Various options were investigated by the company including replacement machines, but when quotes were gathered, the eye watering costs could not be justified. Wolf Automation was called in and found that all of the weaknesses of the machine existed in the control system.

The Old System

Stepper motors were used to drive the two ball screws, these were underpowered and created as well as being susceptible to electrical noise. The stepper drivers were also un-reliable, obsolete and therefore very expensive to maintain. The Control Unit often crashed and had to be reloaded with its operating system and user programs, the method of programming was not intuitive, real world units were not used so the operator had to enter vague numbers by trial and error until the desired action was produced. There were a lot of limitations on what new products could be entered.

The New System

We designed a control system that used DC brushed servo motors with amplifiers and a combined motion controller and HMI by TRM International. A gear ratio was also introduced on one of the axis to better match the motor to the load. Wolf installed the control system on site and also handled the mechanical interface of the new motors and gearheads to the machine.

Once the new system had been installed onto the refurbished mechanics, the TRM motion controller which also handled the logic control was ready to go within an hour. The basic setup process only involves telling the controller details about the motors and gear ratios.

The Outcome

We programmed the end users products into the controller and tested each one against the exacting standards. The result is that the machine is now more reliable, easy to program, flexible and above all produces products accurately and repeatable”.



Photos of some of the finished tubes. Courtesy of Wolf Automation: www.wolfautomation.co.uk

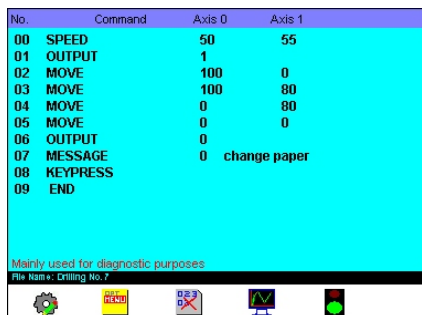
SOFTWARE

The controller was programmed using the Motion Application Programme 'MAP'. 'MAP' has been used in a vast variety of machines and applications giving the user a greater control of costs, saving money and time on software development.



MAP is an end user friendly language adaptable for the majority of applications with 28 commands to choose from.

One of the great advantages of MAP is that it allows end users to create their own programs with no need for a skilled programmer. MAP has been used in different applications from Sash Windows Machines, Bowling Ball Machines, Tube Bending Machines, XYZ tables, Pallet Manufacturing Robots, rotary axes and milling machines to pharmaceutical mixers among other applications.



Program example using MAP. The controller can store up to 100 end user programs in memory with up to 1000 lines each.

MOTION

Point to Point move:

Moves a single axis from point to point with no acceleration, or velocity parameters. This command is mainly used by the profile generator or for holding position.

Trapezoidal move:

Moves a single axis from point to point, using programmed acceleration and velocity parameters. If the velocity can not be reached the function will generate a triangular profile.

Linear Interpolation:

This function allows up to 4 axis to be linked together to produce a linear profile. Full use is made of the acceleration and velocity parameters.

Circular Interpolation

This function allows two axis to be linked together to produce a circular profile. Full use is made of the acceleration and velocity parameters.

TYPICAL APPLICATIONS

- XY Positioning Tables
- Conveyors
- Dosing
- Mixers
- General Motion Control
- Cutting Machines
- Automatic Drills
- Positioners
- Robotics
- Bending Machines
- Woodworking Machines

Items Provided by TRM for this Application

Professional Motion Controller

1 off 2 Axis stand alone motion controller with keypad and colour screen.



Electrical Cabinet

The TRM Electrical Cabinet is intended to simplify wiring The Electrical Cabinet provides:

- 24 Volts for the motion controller and the power supply for the DC servo amplifiers to run the motors using an external transformer.
- Screw connectors are used for connecting the Inputs/Outputs for a fast connection
- On-board filtering of power supplies and signals



Servomotor

2 off Servomotors rated at 1.2 Nm at 60 V



DC Servo-Amplifier

2 off compact current mode amplifier capable of driving brushed DC Servo motors continuously at up to 100 volts and up to 5, 10 or 20 amps depending on the model.



Encoder

2 off Digital rotary encoder with 1000 ppr.



Sensors

2 off Inductive Proximity sensors for home position.

