TRM International

Motion Control & Automation Manufacturers

Case Studies

Automatic Tube Drilling Machine

The task was to make a completely new tube processing machine to suit the needs of a scaffolding pole manufacturer

Our Client "Bespoke Machines" designed all of the mechanics for the machine in house and requested a semi-custom solution from TRM for the control systems.

The requirements of the job were to:

- Increase throughput
- Simplify production
- Improve quality
- Reduce manufacturing costs

Using a 3 axis TRM motion controller with MAP software, two servomotors of 4.1 Nm and one servomotor of 1.2 Nm, each with a 1000 PPR encoder, one TRM electrical cabinet, a set of pre-made cables between the electrical cabinet and controller and 3 proximity sensors for home position sensing, our client was able to build and control the machine to meet the desired specifications.

By using the **M**otion **A**pplication **P**rogramme "MAP" our client was able to save money and time in software development. MAP can store many user programs in memory and each program can have a large number of lines (commands). The flexibility of MAP means that very complex programs can be created, in this case the program was 250 lines long.

Photo of the 13 metres long machine and TRM 3 axis motion controller. Photos courtesy of Bespoke Machines Ltd. www.bespokemachines.com

Photo of the 13 metre long tube drilling machine

Photo of the drilling operation

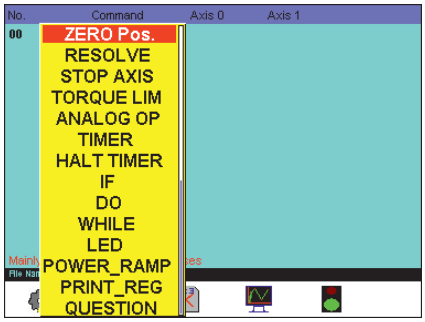
Photo of the finished product

How the machine works

The number of holes, the angle and the length of the finished product can be programmed by the user. Using the servomotors, the machine starts gripping the 8.2 meter long tube and takes it to position. The end is sawn square and then repositioned to drill the first hole. After executing one hole, the tube is moved to position in order to drill the second hole. By using the servomotors the tube can be rotated a number of degrees in order to make holes at a different angle. Once all the holes have been drilled, the saw is activated and the tube is cut to length. The machine is run 24/7 and production is higher than expected.

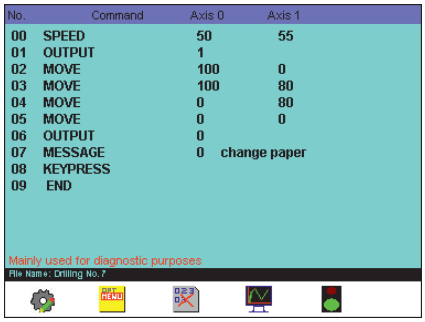
SOFTWARE

The controller was programmed using the **M**otion **A**pplication **P**rogramme '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
- ✓ Robotics
- ✓ Bending Machines
- ✓ Woodworking Machines

Items Provided by TRM for this Application

Professional Motion Controller
1 off 3 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 4.1 Nm and 1 off servomotor of 1.2 Nm and at 60 V

DC Servo-Amplifier
3 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
4 off Digital rotary encoder with 1000 ppr.

Sensors
3 off Inductive Proximity sensors for home position.

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