TRM International
Motion Control & Automation Manufacturers

Case Studies
Window Sash Assembly Machine

Our client manufactures custom made machines for different industries, this time he had a request to build a machine to make Sash Windows faster therefore reducing production costs

The client wanted to speed up the assembly of Sash windows and to be able to assemble up to a 100 windows per hour.

Using a 3 axis TRM motion controller with MAP software, 3 servomotors of 1.2 Nm each with 1000 ppr encoder, a TRM electrical cabinet, pre-made cables between the electrical cabinet and controller, 3 proximity sensors for home position and 2 beam sensors to detect the edge and size of each window we were able to build a machine that exceeded the job requirements. The machine is now assembling 120 sash windows per hour which is 4 times faster than without the machine when the production was 30 sash windows per hour.

The great advantage of this machine is its automatic window size detection and automatic setup to assembly the different window sizes which avoids the manual setup of the machine.

Today the user is manufacturing sash windows with better quality than ever and still remains competitive with labour costs down and increased production.
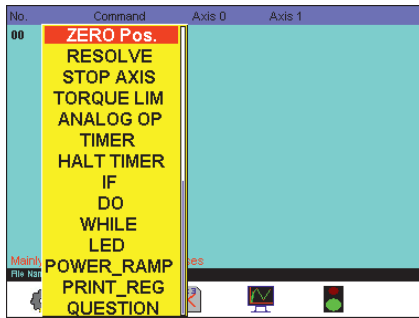

Photos courtesy of Bespoke Machines Ltd.
www.bespokemachines.com
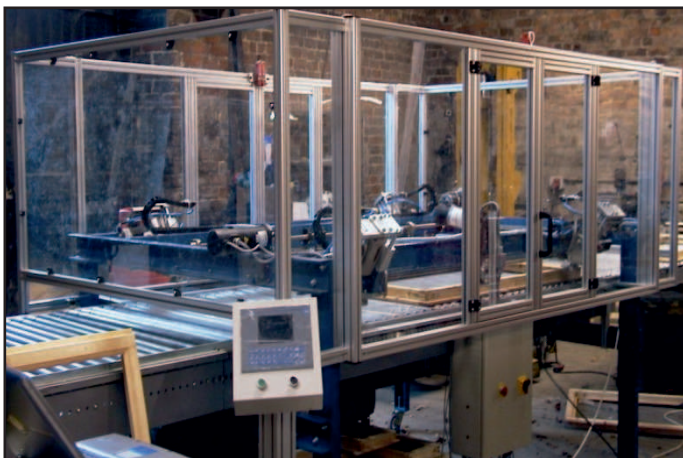
On the left, the Motion Controller operates the conveyor motor to feed the sash windows tand using beam sensors (right hand picture) to detect the edge and size of the window. The controller will stop the conveyor in the required position, then will operate the servomotors to compress the window at the desired pressure. After the window is compressed, the controller will activate the outputs to fire the nails at 45 degrees.
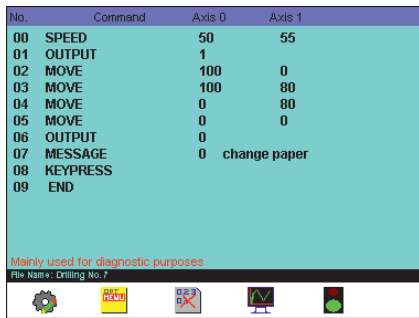
SOFTWARE

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.

No.	Command	Axis 0	Axis 1
00	ZERO Pos.		
	RESOLVE		
	STOP AXIS		
	TORQUE LIM		
	ANALOG OP		
	TIMER		
	HALT TIMER		
	IF		
	DO		
	WHILE		
	LED		
	POWER_RAMP		
	PRINT_REG		
	QUESTION		

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.

No.	Command	Axis 0	Axis 1
00	SPEED	50	55
01	OUTPUT	1	
02	MOVE	100	0
03	MOVE	100	80
04	MOVE	0	80
05	MOVE	0	0
06	OUTPUT	0	
07	MESSAGE	0	change paper
08	KEYPRESS		
09	END		

Mainly used for diagnostic purposes
File Name: Drilling No. 7

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
3 off Servomotors rated at 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 and 2 infrared beam sensors for detecting the size of the window.