

# 2M



AUTOMATION LTD

# FLOX Printing System

## Project Brief

### Key 2M Services Supplied:

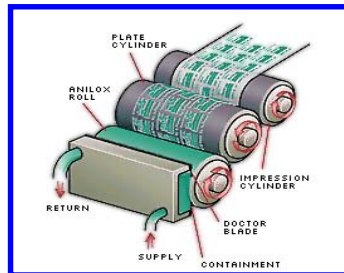
- Full design and development of the control system
- Advanced servo system design with print registration control
- Fast Ethernet and X2X communication
- Multi-axis stepper control for print impression with 1µm accuracy

### Key Components Used:

- B&R Integrated system
- Touch screen HMI
- HMK Stepper Motors
- B&R ACOPOS Multi Drive system
- Ethernet Powerlink and X20/X67 Communications systems

In the past the printing industry has been impeded by the very same trait that is vital to its survival, fashion. Indeed, machines designed to accommodate fashionable prints and printing methods often become outdated with the latest designs.

2M was asked by machine builders Converttech Machinery Ltd to develop the control system for a machine capable of printing multiple styles, with adaptability to new designs. The 3 methods used



were Flexographic, Surface and Flock printing.

**Flexographic** printing involves one or multiple (for multiple printing colours)

printing rolls all mechanically geared to an impression roller, where a pattern is printed onto the material with a repeating



pattern.

The **Surface** printing procedure has a similar basis but replaces the ink roller with a blanket applying an adhesive. **Flock** (nylon fibres) is then applied onto the adhesive.

In order to be truly adaptive a servo system was used to provide electronic gearing. This allowed flexographic and surface printing to run simultaneously on the same machine.

Furthermore, accurate print

and ink impression was achieved using a system of stepper motors.

Both the servo-controlled print registration and the stepper-controlled print impression systems have been designed to automatically recall the printing recipes. The advantages of this new type of positional control is varied but mainly increased pattern repeatability, reducing setup time and fine control of the print pattern.



The stepper-controlled print impression system is repeatable to 1µm.

The overall control of the machine and system was integrated into a touch screen system, reducing the space necessary for the multiple panels used in the past.

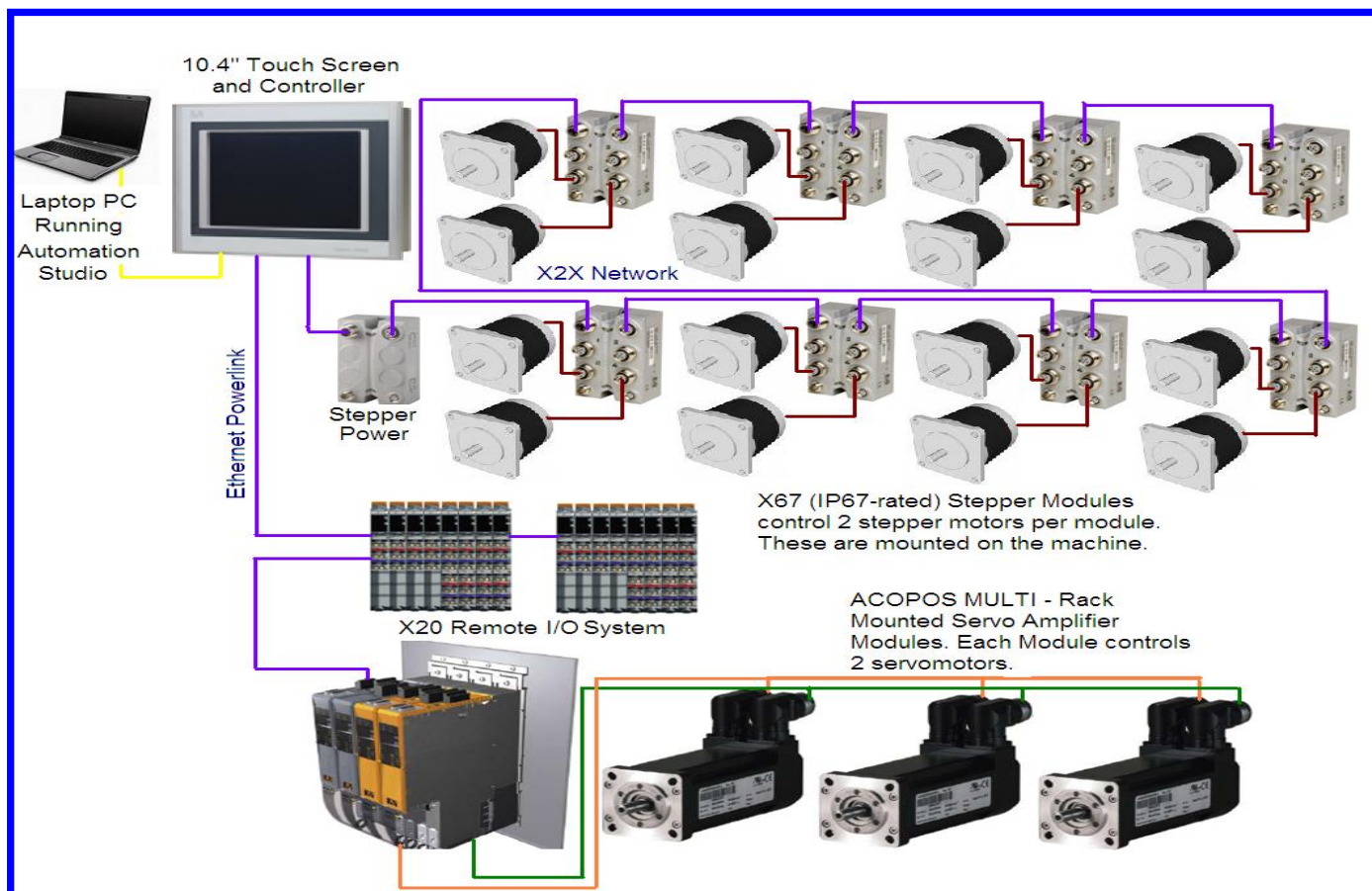
## Design Philosophy

The printing units were designed as modular units, each with identical programs. Additional printing stations will now require minimal additional development. Positional calculations and gearing systems are identical, with machine variables (i.e. dimensions, gear ratios etc) as user inputs, which are accessible to the engineers.

In addition, the print unit has also been designed to be as simple to work with and set up as possible. Furthermore, the overall line control programming was designed to be modular, allowing for further machine updates and changes to the layout of the line.



The Floxo Machine



## Control System Overview of Floxo Print Line

### Technical Risk Management

#### Accurate Positioning

- Positioning of steppers must be accurate in order to achieve impression control of about 1 $\mu$ m.
- Stepper positions must be repeatable.
- Positional and speed control of each servo axis needs to be very accurate in order to produce print registration better than 0.5mm between colours.

*“ Marvellous control system that is ergonomically constructed with ease of operation in mind. The whole system was developed in 3 months which was outstanding given the complexity. ”*

**Roy Melvin**  
Director of Converttech Machinery

#### Safety Concerns

- The movement of rollers into positions may cause a crushing effect on anything on the slide bracket.
- Proper control of the gas fired dryers is vital.
- Accurate speed control of servo axes.
- Protective guards covering all moving parts are interlocked with a safety circuit and monitored by the PLC control system.