

Maul Technology

A DIVISION OF VHC Ltd

Serving the Needs of the
Glass Container Industry
Worldwide



Future Solutions Now



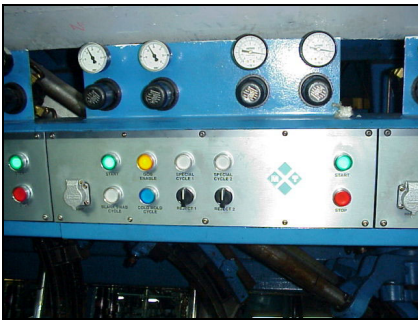
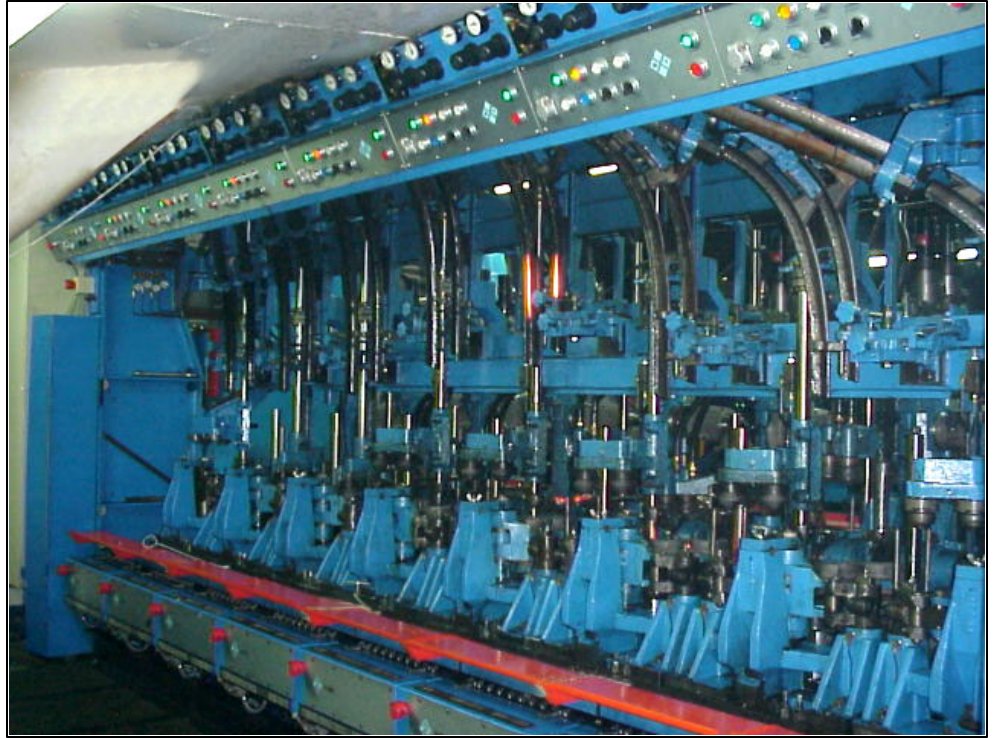
Presenting the M-2000 family of control systems for use in both hollow glass and press ware operations. The Integrated System is comprised of individual controllers networked together to effect comprehensive control of the various forming functions. Each sub-system is available as a Stand Alone product as well.

“ALL CLEAR” ON THE BACK SIDE!

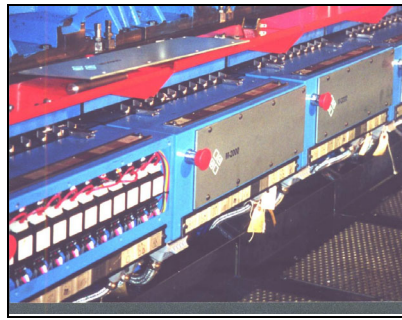
The open design concept along with the superb location of electronic and critical pneumatic controls allows machine operators full access to the Maul Technology M-2000 system and the forming process.



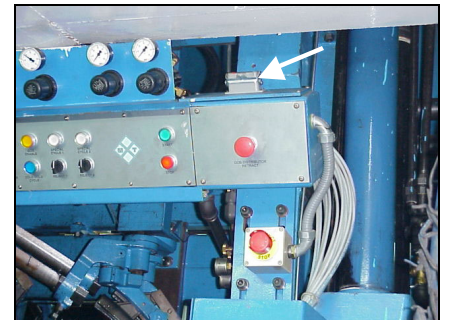
The Hot End Terminal can be optionally wall mounted or on a pedestal as shown above. All M-2000 Integrated controllers, i.e. Electronic Timing, Machine Drive and Electronic Pusher systems can be accessed via this one touch screen terminal with programmable security.



Operator controls: Two button Section Start, Gob In/Out, Blank Mold Swab, Cold Mold Cycle, Programmable Stop, Emergency Stop, Hot Ware Reject by cavity (momentary and continuous), two (2) user programmable Special Cycles and Hand Held Terminal port. The programmable Hot Ware Reject system can be controlled by the Blank Swab Cycle, Gob In/Out, Cold Mold Cycle, Special Cycles or manually.

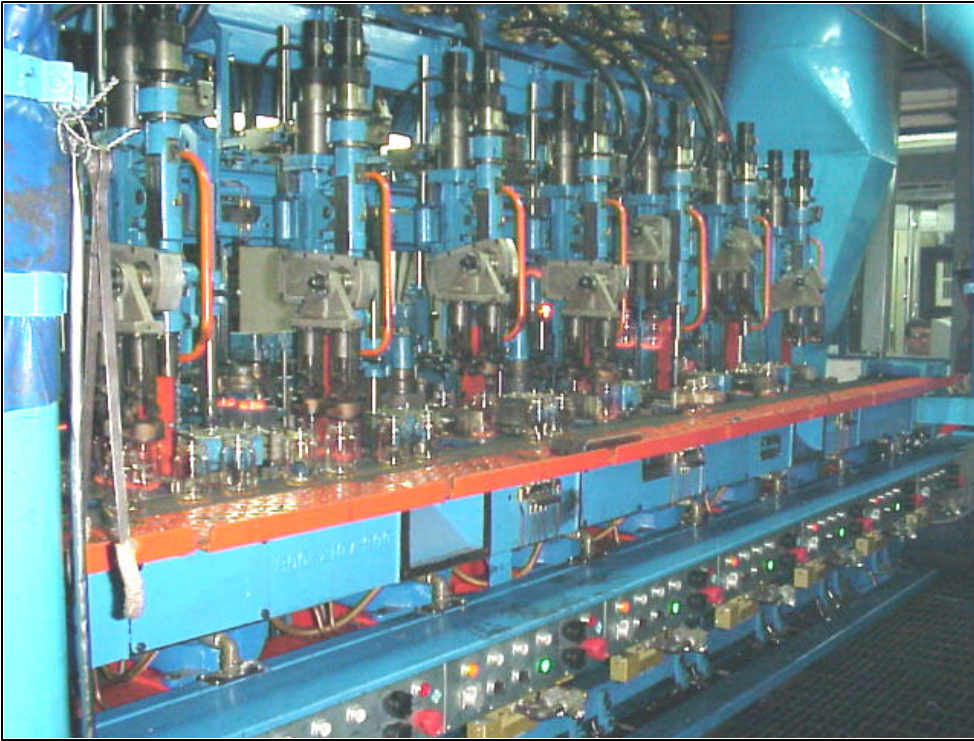


Maul Technology's application of multiplex technology to the Valve Block places the electronic driver control where the action is, right at the solenoid valves. This greatly reduces the number of cable conductors needed to control the Valve Block, thus lessening cable bulk and enhancing reliability through simplicity. Multiplexed drivers can be optionally located remotely. Built in resettable fuses protect electronic circuits without the need for replacement.

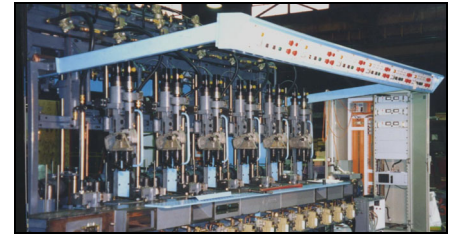


Safety is No. 1 in the M-2000 design, right behind reliability and functionality. Shown above are one set of Gob Distributor Retract and Master Emergency switches which can be custom located according to customer requirements. In addition, the M-2000 Integrated Machine Drive System can be configured to retract the Gob Distributor, lock out the shears etc. whenever certain axes are stopped. Note the connector for remote ware counter inputs at the arrow.

WORLD LEADING TECHNOLOGY AT WORK ON THE FRONT SIDE



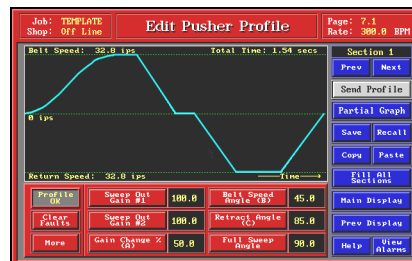
The full-featured front side M-2000 control panels can be custom mounted on the conveyor as shown at the left or overhead as depicted below.



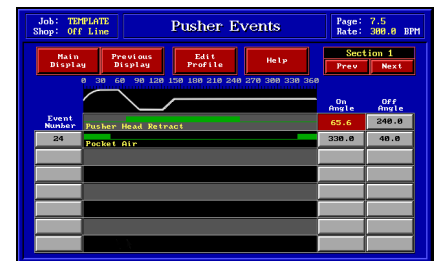
Of course, the pneumatic controls for the M-2000 Integrated Pusher System (retract, extend and air guide flow controls) round out the total control of front side tasks available to the operator. The programmable Hot Ware Reject system can be controlled by the Mold Swab Cycle, Gob In/Out, Special Cycles or manually.



The full compliment of controls and indicators include Gob In/Out, Blow Mold Swab, Programmable Stop, Emergency Stop, Section RUN lamp, Hot Ware Reject by cavity (momentary and continuous), two (2) user programmable Special Cycles, Mold and Blowhead Safety switches and Hand Held Terminal port.

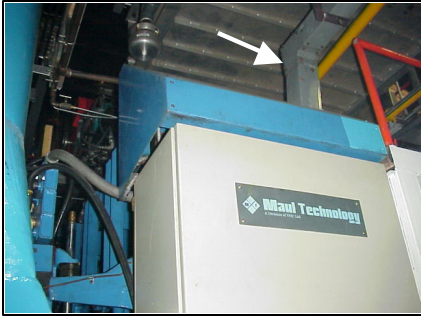


The M-2000 Integrated Pusher Option allows the user to program any number of detailed sweep out motion profiles into the system to match various job requirements. The profile used for each type of ware is stored in the system job history file along with all other pusher, timing system and machine drive parameters.

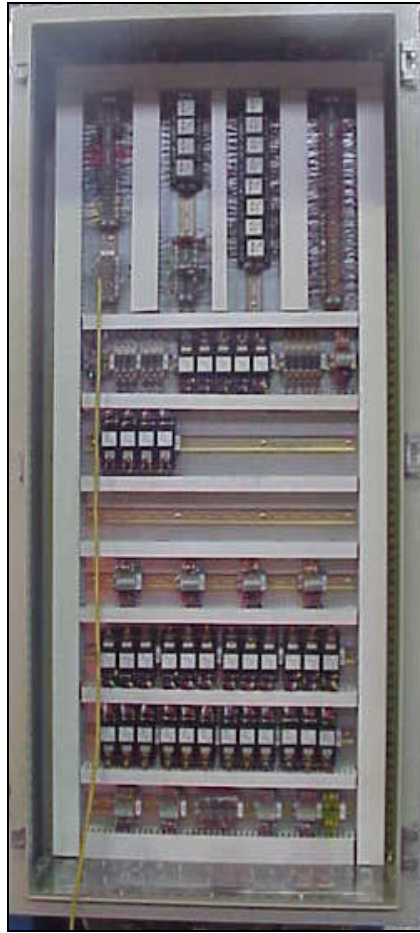


Events that relate to pusher timing can be selected and displayed on the Pusher Events screen. The timing of these events is depicted in relationship to the motion profile of the pusher sweep. This allows for accurate setup of timing for these events ahead of time rather than having to perform “trial and error” adjustments during a job change.

SIMPLICITY ENHANCES RELIABILITY AND EASE OF MAINTENANCE



All cables running between this 8 section M-2000 Electronic Timing System in the control room and the I.S. Machine are contained in the small wireway above the machine Junction Box (Note the arrow). Only five (5) small data cables and one power cable are required. This greatly reduces cable and wireway costs as well as the installation time and space requirements for large cable trays.



The Machine Junction Box at the left represents the simple, straightforward electrical hardware design used throughout the M-2000 system. All wiring, terminal blocks and components are clearly marked and documented for ease of circuit identification and maintenance. The system architecture is structured in a logical, easy to follow manner.

All cables that interface with the Junction Box do so via connectors, which greatly reduces installation time. All active components and major modules have connector interfaces to speed replacement and minimize downtime. Indicator LEDs on multiplex modules, relays and proximity detector terminal blocks aid in determining system performance.

All electronic, mechanical and pneumatic systems are made fully operational and “run in” at Maul Technology’s facility in Winchester, Indiana, USA prior to shipment to assure full functionality and reliability. Maul personnel believe that everyone wins when quality is assured at the point of origin. Customers are invited to visit Maul Technology’s production facility during the course of their equipment build to help assure that their requirements are being met.

M-2000 systems have an excellent track record of reliability with many controllers having run for several years without incurring a failure. This is the kind of “up time” required by 24/7 operations.



SIMPLICITY ASSURES EASE OF USE AND SHORT LEARNING CURVES

The control screens presented on M-2000 terminals are logically designed and use terminology familiar to glass container forming personnel. If you inadvertently get into a screen unexpectedly, simply press the Previous Screen button to safely return to the screen in which you were working previously. Are you really lost? Simply press the Main Display button found on every major screen and you will be returned to the home screen so you can start all over. Oops! You entered incorrect data. No problem! You can always “escape” and cancel the entry. The system carefully watches for illegal entries such as degree settings greater than 359.9 and asks if you are sure you want to go ahead with critical entries.

HOT END TERMINAL.



Each Integrated M-2000 controller (i.e. Electronic Timing, Machine Drive, Electronic Pushers etc.) can be monitored and controlled via this one unit. Reliable touch screen technology eliminates the need for a keyboard and pointing device on the factory floor, thus making possible greater operator efficiency.

ON LINE HELP FACILITY



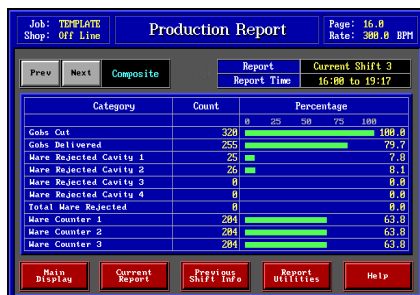
Forget the function of a button? Just press the Help button found on every major screen and then press the button in question and a pop-up message will appear with the explanation. No more searching for long lost manuals!

SHOP MASTER TERMINAL



This equipment sits at the top of the M-2000 hierarchy. Twenty shops can be supervised at this level. Production information from all shops is continuously collected and stored on the system hard disk for future use. Job history files contain operational parameters for the entire complement of M-2000 equipment on each line.

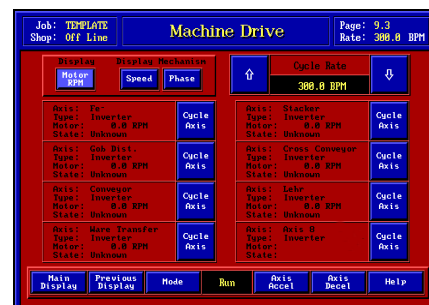
PRODUCTION REPORT



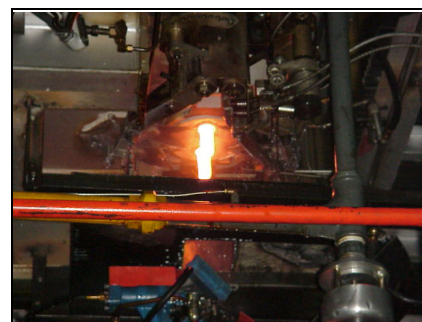
The Production Report graphically displays information generated within the M-2000 system (total gobs cut, gobs delivered and ware rejected by cavity) as well as from three optional user supplied ware counters. Reports are continuously generated for the current shift and the three preceding shifts. Historical reports can be generated from/to any date and

time with five-minute resolution. Hard copies can be printed as well.

MACHINE DRIVE CONTROL



The Integrated Machine Drive can control all axes from the Feeder



through the lehr belt and is accessible via both the Hot End Terminal and Shop Master. It features a servo controller system for extremely accurate speed and phasing control. Accumulative velocity and position data are used to maintain precise positional accuracy. Like all other M-2000 systems, the computers feature battery backed memory to retain setup parameters in the event of a power outage and the system fully synchronizes all axes upon startup per the current setup.

SECURITY AND ALARMS

For plants having system users with different levels of authority, each button on each screen can be set to one of six levels of security. Programmable electronic keys that store the operator's name and serial number can be issued to personnel. This information is reported on the Operator Log to track changes made to settings in the Electronic Timing System and can be used for training purposes. All security data is stored on the Shop Master hard disk for easy restoration if need be.

The M-2000 system has a comprehensive alarm system to assist in establishing the cause of abnormal operation. There is a current log screen as well as a historical file archived on the hard disk. All alarms are time and date stamped.

M-2000 <> TECHNOLOGY AT ITS BEST!

We hope you have enjoyed this brief tour of the M-2000 Integrated System. Maul Technology has satisfied customers around the globe that can attest to the integrity of its wide range of products and services. Maul is very conscious of the need to build and maintain close working relationships with its customer base to assure that both are successful in their respective business ventures. The people at Maul Technology feel that the best way to achieve long lasting partnerships with its customers is to provide superior products and excellent service. This philosophy has been applied to the M-2000 product line on an ongoing basis. These systems are tools, very large tools, which must enable glass manufacturers to produce higher quality ware more efficiently.

To that end, the staff at Maul Technology is constantly looking to improve these products by carefully considering customer requests for the incorporation of new features that will enhance their production processes. New software releases are offered on a continuing basis and as new technology is utilized, additional performance improvements can be realized from the installation of hardware upgrades that are made available from time to time. With Maul Technology still going strong after 50 years of service, its dedicated personnel look forward to "Serving the Needs of the Glass Container Industry Worldwide" to an even greater extent in the future.



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