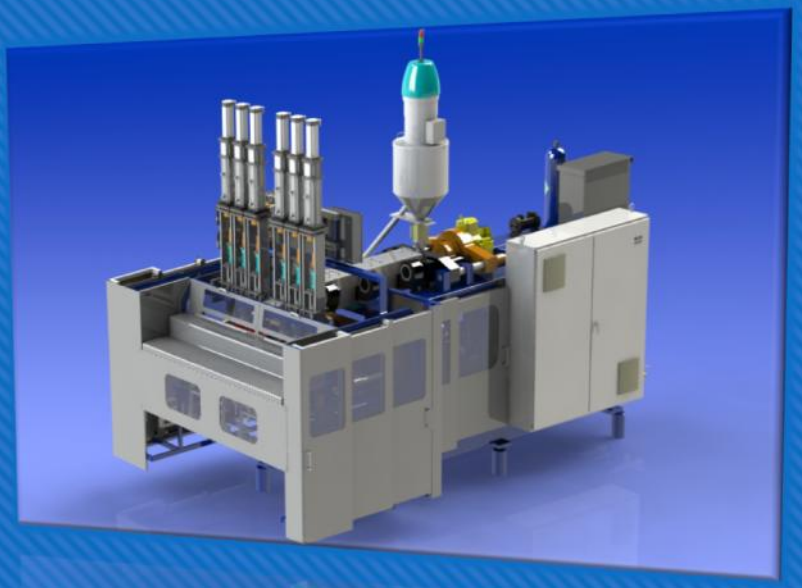


# NORDIC Blow Molder Overview

Models, Metrics, Features

# Models

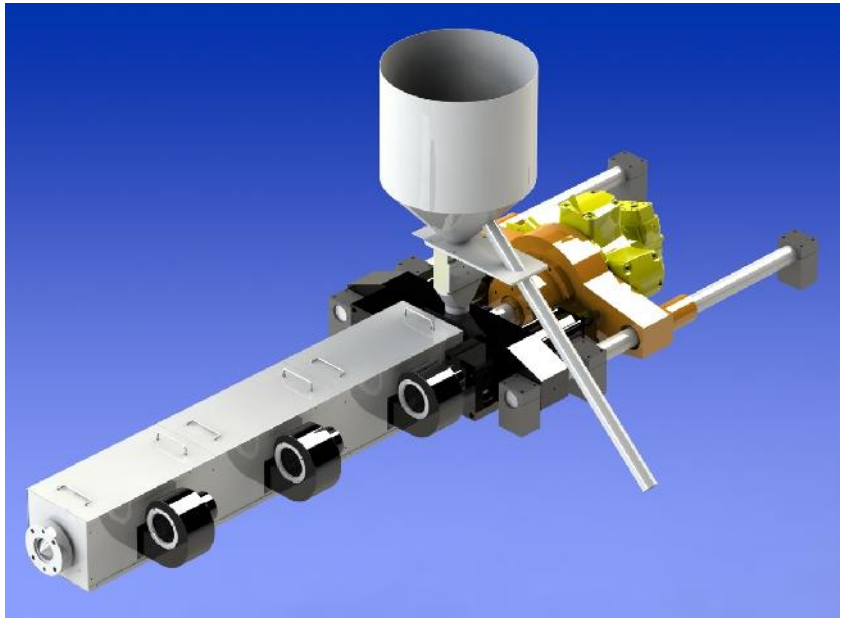
Nordic Sensors Industrial Inc. offers comprehensive line of blow molders customizable for wide range of applications

- Screw Diameter : from 2 to 4 inch
- Head Count : from 1 to 16 heads
- Head Size : Small, Medium, Large
- Neck Finish : Spin Trimmed, Pull-Up, Ram-Down
- Optional Downstream : Shuttle Conveyor, Cooling Bed, Trimmer, Leak Detector

# Features

Extrusion Assembly

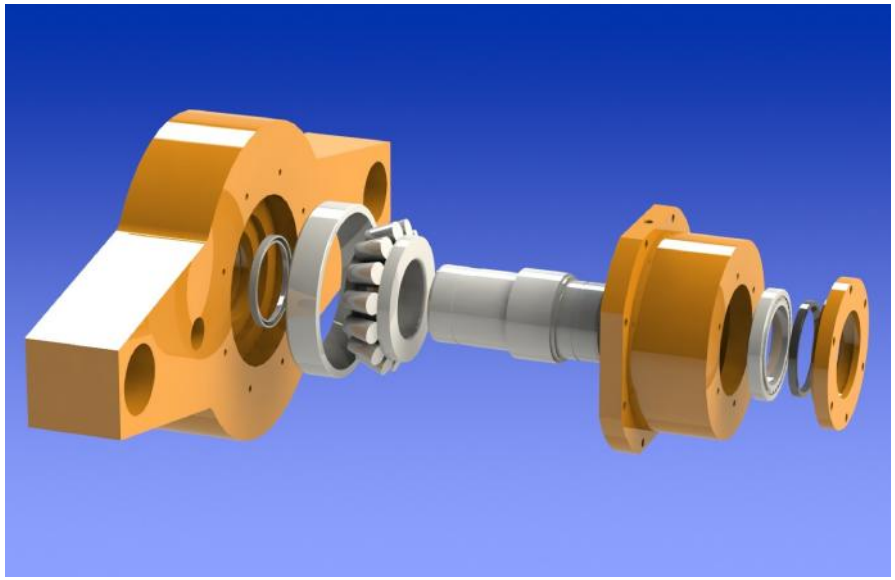
- Nordic reciprocating Blow Molders feature the free floating injection press type extruder
- No custom gear box
- No ball spline
- Requires little maintenance
- Wearing parts are standard, off-the-shelf products (Timken thrust bearings, KYB hydraulic motor, Parker shot cylinders)
- Stainless steel round hopper
- High-efficiency screw (higher throughput, lower energy consumption)



# Features

Thrust Bearing Assembly

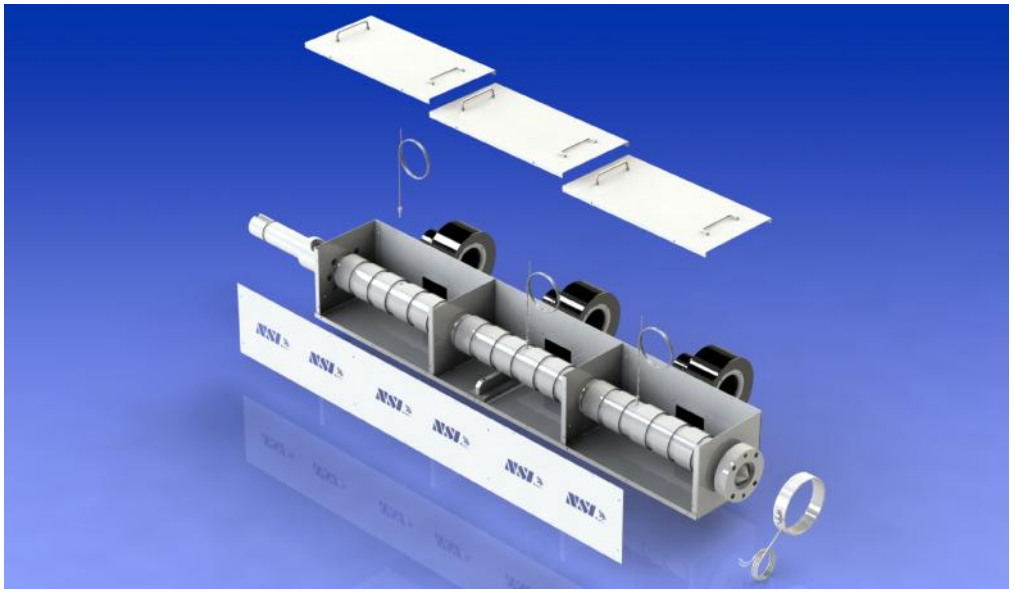
- Oil filled
- Consists of Timken conical bearings for improved alignment
- Maintenance : - oil change once a year; - change seals as required.



# Features

Barrel Thermal Management Assembly

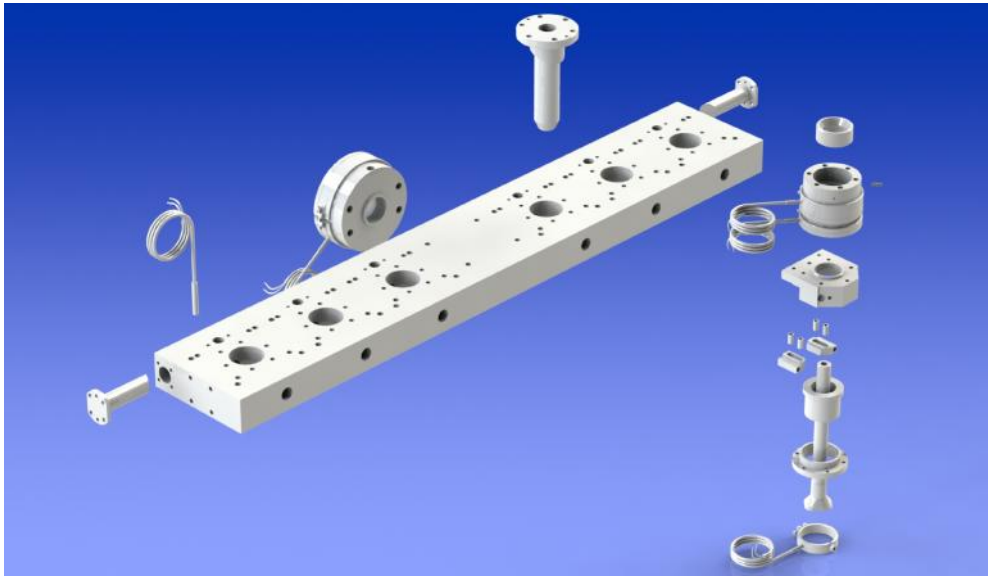
- Air cooling (no associated piping, no pump and motor, no coolant handling)
- Energy efficient “on-demand” cooling
- Low-maintenance
- High-volume blowers
- Independent access to each zone
- High-reliability heating bands
- Stainless steel shroud



# Features

Die Block Assembly

- Heads are fully compatible with Uniloy style tooling
- Front access to the die gap adjustment
- Adjustable pressure ring (medium and large size heads)
- Improved process monitoring with three temperature sensors per head (@ nozzle, feed throat, and die block)
- Tooling for the view strip insertion (optional)



# Features

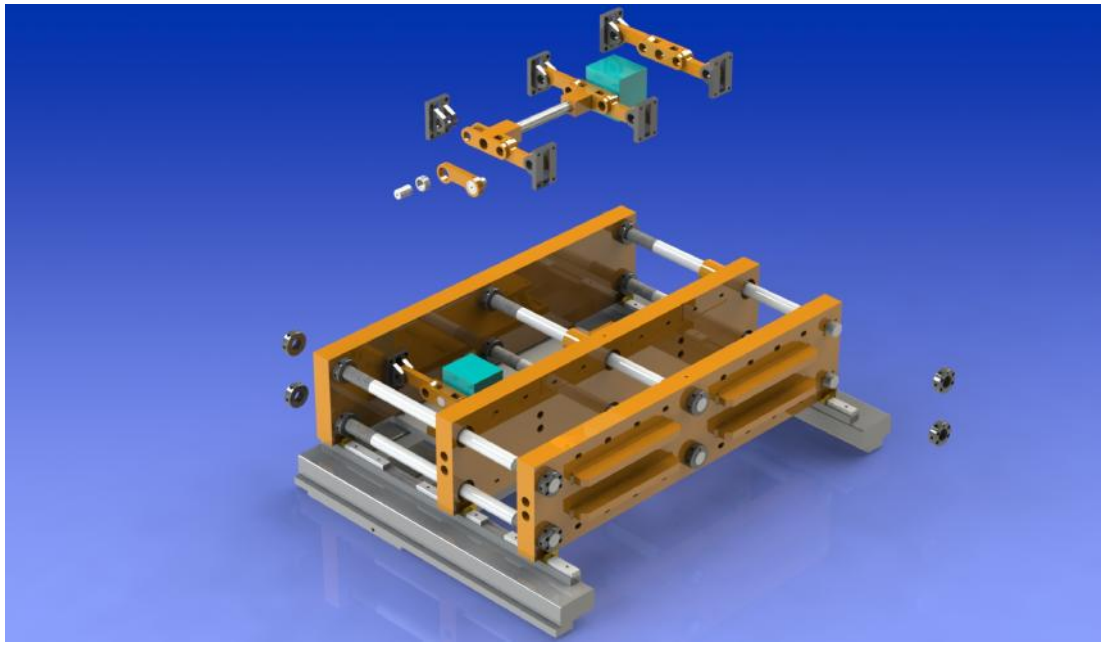
Servo Programmer

- Linear Accuracy : 0.001" per foot
- Linear speed : 7.9 inch per second
- Maximum force : 20'000 lb
- High stability / High repeatability
- Near-zero probability of oil leaks
- 10-point profiling with smooth interpolation of the rest of the profile
- Zero maintenance
- Plug-and-play installation
- Actuator prospected life time : 40 million cycles (>18 years @ 3 shifts x 5 days a week)

# Features

Clamp Assembly

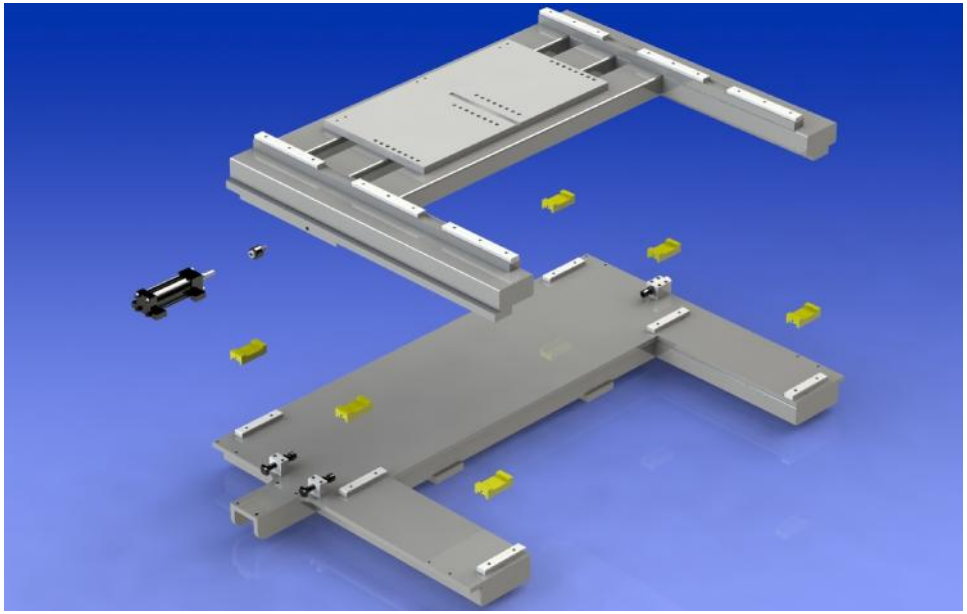
- Rotac actuated clamping system
- Through-platen water distribution for ease of maintenance (optional)



# Features

Side Shift Assembly

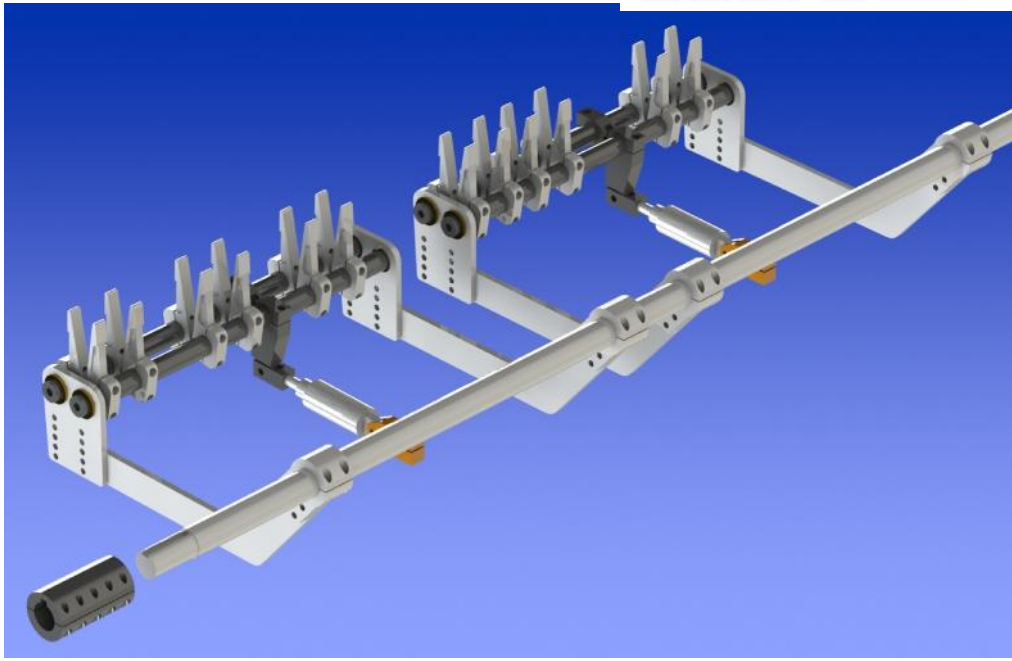
- Hydraulic actuated side shift table
- Adjustable stoppers on both sides
- Up to 4-inch travel
- Proportional valve for speed control



# Features

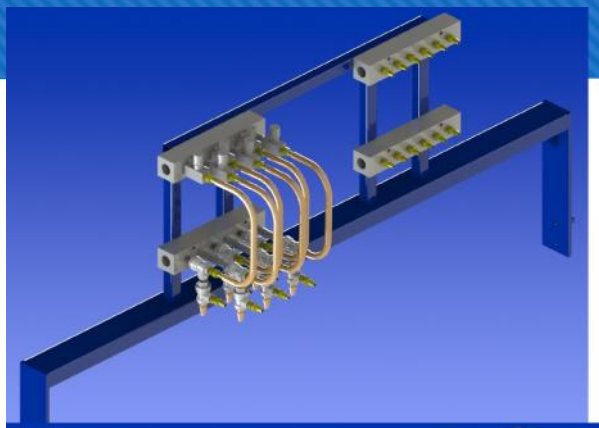
Swing Arm Assembly

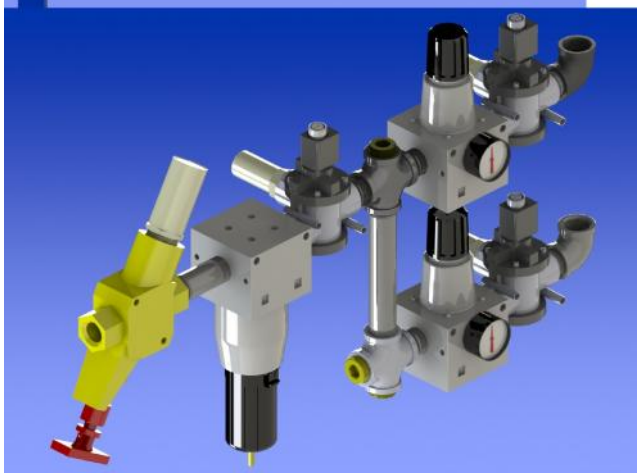
- Servo-driven swing arm for stable, more accurate positioning
- Aluminum construction to reduce weight and improve corrosion resistance
- Reduced weight implies reduced energy consumption
- Adjustable side plates
- Adjustable finger position and spread
- Water cooled fingers

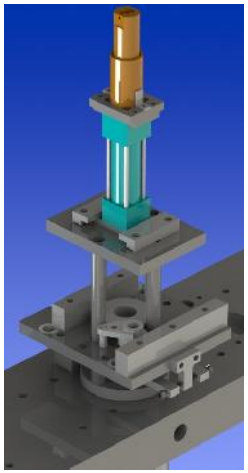


# Features

Blow and Pre-Blow Assembly



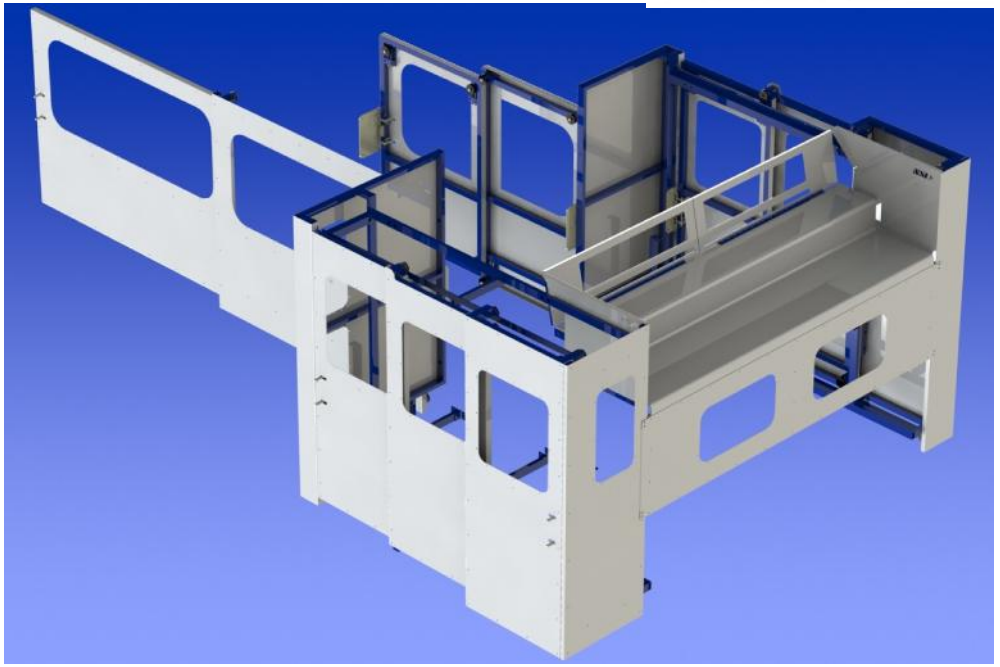




- Quick exhaust valve for faster air evacuation
- Individually adjustable pre-blow circuits
- 3" pneumatic or 1.5" hydraulic blow pin cylinder to comply with requirements of diverse applications
- High-quality pneumatic components

# Features

Safety Enclosure



- Sliding safety doors allow smaller foot print
- Ease of access for maintenance
- Big windows allow visual access without opening doors
- Low-maintenance stainless steel surface (no corrosion, easy cleaning)

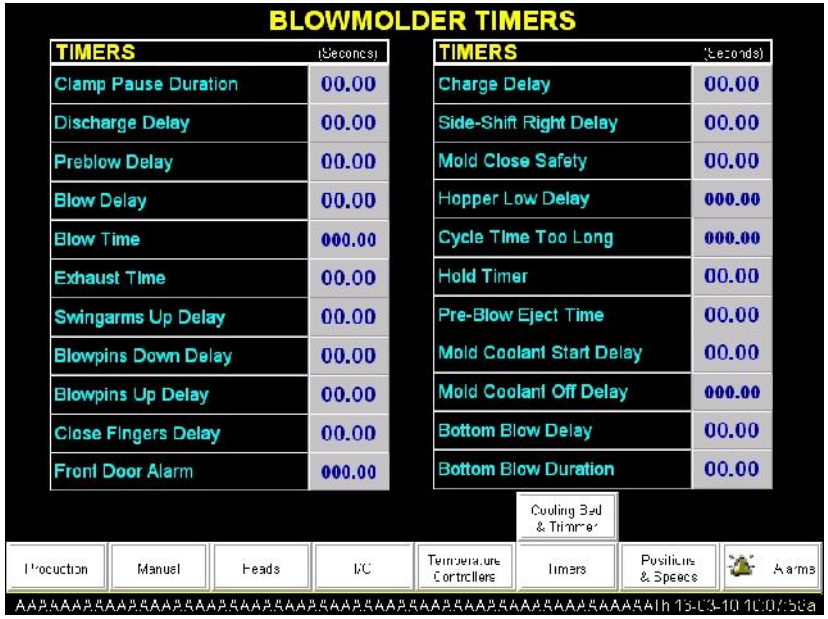
# Features

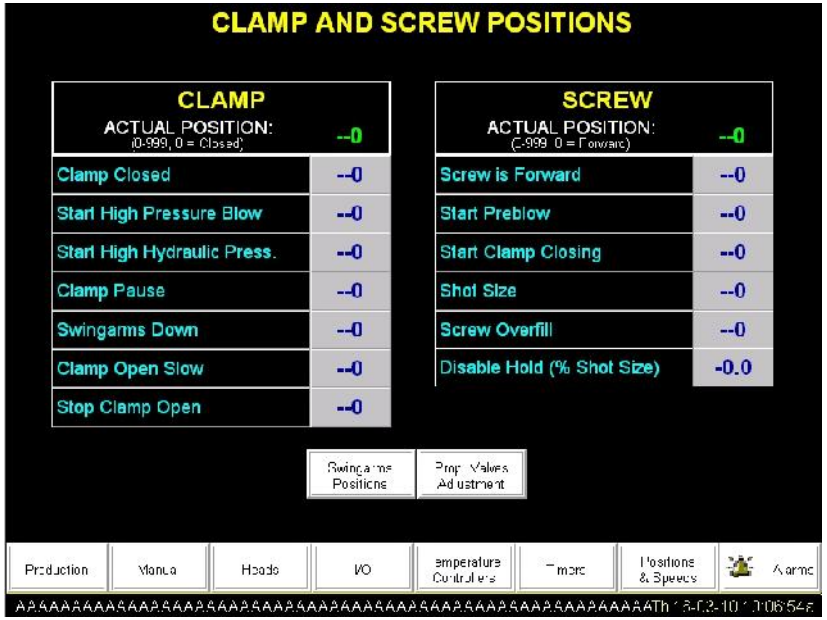
User Interface

- Master interface implemented on easy-to-relocate stainless steel pedestal
- 10-inch color touchscreen interface
- Easy to navigate control and info screens
- Fast and easy adjustments
- Maximum availability of process information
- All vital functions have a dedicated push button for manual control
- All push buttons are duplicated on an auxiliary panel for ease of access from machine's opposite side

# Features

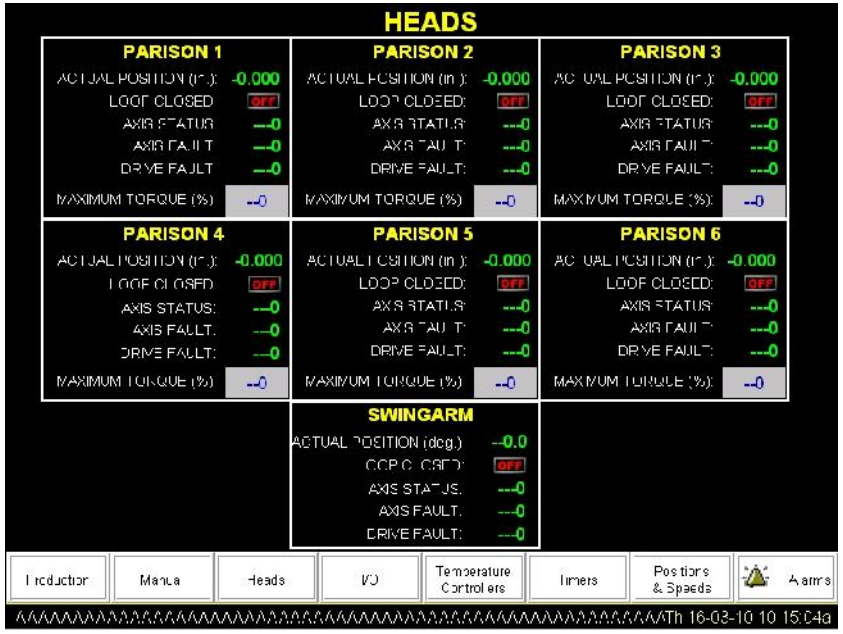
User Interface - Screen Examples

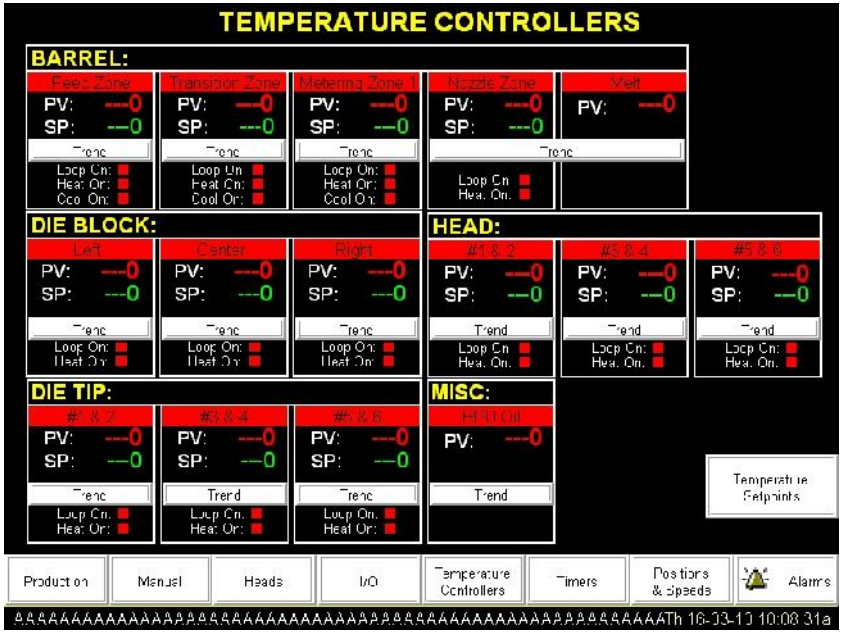


# Features

User Interface - Screen Examples (Cont'd)



# Features

Energy Efficiency

- High-efficiency AC drives
- High-efficiency main pump
- Use of electrical actuators instead of hydraulic ones for programmer and swing arm (higher efficiency)
- High-efficiency screw (more efficient plasticization)
- “On-demand” air cooling system replaces a liquid cooling system with continuous circulation
- Low thermal mass heaters imply faster reaction time and less heat losses
- Removable thermal insulation of the die block assembly can be supplied on request

# Features

Cycle Time Improvement

- High-efficiency screw increases achievable extruder throughput
- Servo programmers allow accurate parison profiling at higher shot speed
- Oil accumulator delivers sufficient pressure to shot cylinders at higher shot speeds
- Independent cooling loop at the main hydraulic unit improves stability of hydraulic system operation
- Reduced impedance of the pneumatic circuits allows faster blow and air evacuation operations to shorten the cycle time
- Allen-Bradley PLC with high speed I/O cards ensures stability of the process at shorter cycle times

# Features

Other Advantages

- Single-pump 30HP main hydraulic unit
- Off-line, continuous-circulation cooling loop at main hydraulic unit
- Vertically mounted accumulator (longer bladder life)
- Access to program code can be granted for ease of troubleshooting and process tweaking (warranty waiving may imply)
- Remote access to the machine's control system by Nordic Sensors' technical personnel for fast support and troubleshooting
- Wide use of standard, off-the-shelf parts available from multiple suppliers worldwide

# Sample of Metrics

| MODEL | 38DL |
|---|---|
| CONTAINER WEIGHT (g) as per sample | 45 |
| (*) FLASH FACTOR | 1.5 |
| ASSUMED MELT DENSITY (g/cc) | 0.86 |
| SCREW DIAMETER (in) | 4 |
| EXTRUDER STROKE (in) | 12 |
| MAXIMUM CHARGE CAPACITY (g) | 2125 |
| MAX EXTRUDER THROUGHPUT WITH GP SCREW (lb/hour) | 850 |
| NUMBER OF HEADS (ea.) | 8 |
| (**) CYCLE TIME (sec) | 8 |
| REQUIRED DISCHARGE WEIGHT WITH FLASH (g) | 540 |
| MAXIMUM CHARGE CAPACITY USAGE (%) | 25 |
| REQUIRED EXTRUDER THROUGHPUT (lb/hour) | 509 |
| EXTRUDER THROUGHPUT USAGE (%) | 60 |
| PRODUCTION EFFICIENCY (%) | 95 |
| (*) PRODUCTION VOLUME (container/min) | **57** |
| (*) PRODUCTION VOLUME (container/hour) | **3420** |
| ANNUAL PRODUCTION TIME (hours/year) | 6000 |
| (*) ANNUAL PRODUCTION VOLUME (container/year) | **20,520,000** |

Target Cycle Time : 8 sec

Target Efficiency : 95%

**(*) – The Flash Factor was assumed. All production volumes estimation should be revised when an actual flash factor is determined.**
**(**) – The cycle time may vary depending on customer's process and equipment capacity. Use as a guideline only! Guarantied cycle time is 9 sec.**