

# QUALITYMASTER

## CORRUGATOR PROCESS CONTROL

### Center-lined Consistency

Producing flat, well-bonded sheets with consistency can be a challenge for operators using manual adjustments alone. Even the most experienced crews will find it difficult to maintain quality throughout their shift due to grade variety, roll to roll moisture variation, and more often each time the machine slows down for a splice or slitter change.



CTC QualityMaster™ automation helps operators produce more consistent sheets which are flat and well bonded. The system continuously measures critical values such as paper temperature and starch settings, and when necessary, makes automatic adjustments to maintain the desired values.

QualityMaster makes use of "recipes" to center-line each unique grade combination. Each recipe contains numerous process values such as target paper temperatures, starch gap settings, required tension, and steam vessel pressures. Values automatically load into the system instantly, at the start of each order. This is faster than manual changes by an operator, and also removes variation between shifts.

### Process Control

The QualityMaster Process Control system regulates critical areas on the corrugator including:

- **Wrap Arms:** Preheaters / Preconditioners move automatically to maintain target paper temperatures.
- **Heating Section:** Control for all heating section types are supported, but the control method will vary. Machines with individual shoe sections will raise or lower automatically to maintain the exit temperature. Heating sections with wrap arms may be setup to move automatically with speed.
- **Starch Gaps with Curves:** Meter Roll gaps open or close to maintain the target value. Customizable curves increase starch at slower speeds and decrease starch at higher speeds.
- **Web Tension** (optional): Web Tension Systems may be controlled via a setpoint value interface.
- **Steam Vessel** (optional): On machines with adjustable valves, systems may be setup to change automatically when different paper grades are run.
- **Steam Showers** (optional): Turn steam showers on or off, or regulate the flow with adjustable valves.
- **Closed-loop Laser Warp Correction** (optional): Automatic warp correction when the finished product is measured out of tolerance at the stacker.

### Increased Production

Copar's Temperature Speed Control (TSC) helps increase production by analyzing a machine's heat utilization. When conditions are right, the system automatically accelerates the doublebacker, gradually, until a limit is reached (for example if a wrap hits 100%). The system also takes into account other circumstances such as impending splices, order changes, and knife curve limits.



# COPAR SOLUTIONS™

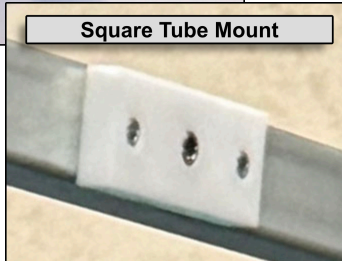
5744 W. 77th Street • Burbank, IL, USA • +1 708-496-1859 • [CoparSolutions.com](http://CoparSolutions.com)



# Durability

## Infrared Temperature Measurements

The QualityMaster measures paper temperatures at multiple points on the corrugator. The infrared sensors provide closed-loop feedback for wrap arms and the heating section control. Measurements are displayed on screen in real-time and are also recorded every few seconds. Temperature history may be used to investigate quality issues later discovered in the converting department or by a customer.



### Improved Accuracy Over the Entire Temperature Range

- The infrared sensors used by Copar have been upgraded for more accurate temperature measurements.
- The electronics are separated from the sensor head, which makes the sensor less prone to machine vibrations. Previous sensors had fixed calibrations that could drift with machine vibration over time.

### High Thermal Stability

- New digital technology found in these sensors can tolerate ambient temperatures as high as 248° F (120° C).

### Greater Mounting Flexibility

- A reduced 15:1 spot size ratio allows the sensor to be mounted further from the paper for locations with limited space. The smaller spot size makes it easier to avoid "seeing" machine frames or other obstacles.
- The hardware and installation method will vary based on the sensor's location and available space.

## Brackets, Mounting Hardware, DC Wires and Cables

### Included vs. Not Included

Copar supplies all parts, sensors, brackets, and cables needed to install our systems. Some vendors rely on the installer to make improvised field decisions using whatever is available to them, which inevitably results in variation between each system. The QualityMaster provides all items needed for a standardized product at each customer site.

### Powder Coating

Our steel brackets are powder coated to provide a professional appearance, excellent corrosion resistance, and to ensure many years of service.

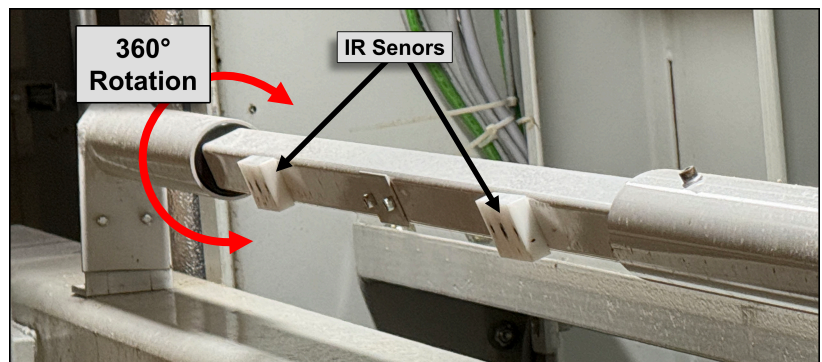
### Teflon/PVC Insulated Wires and Cables

Cables included with our systems have Teflon/PVC insulated jackets. This material provides extra protection for the conductors and are easier to pull through the wire way during installation.

### Custom Brackets

Copar designs, manufactures, and installs our brackets for each sensor location.

The IR sensor bracket shown to the right may be rotated 360° for precise alignment to the paper. Once the angle is chosen, the bracket is pinned in place.



## PLC Processing Power

### Designed for the Environment

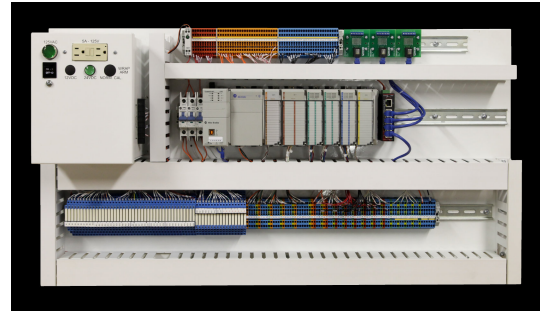
- Allen Bradley Compact Logix PLC processors and I/O modules are designed and tested for durability and longevity in industrial environments.

### Easy Software Updates

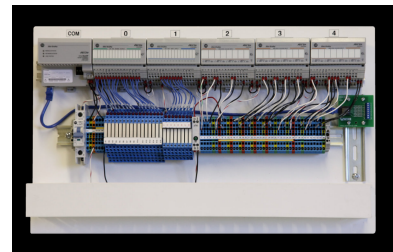
- Included with the system are free software updates for previously purchased options.
- Copar does not charge fees for performance updates for existing equipment.
- Updates can often be installed remotely via a VPN Network connection to avoid on-site service labor charges.

### “Off the Shelf” Parts

- The QualityMaster uses Allen Bradley PLCs, which are readily available worldwide.
- Copar maintains a full inventory of PLCs and other off the shelf components.
- The plant's spare part inventory can be kept to a minimum since these items are available for same day shipping and/or same day receiving if requested.



Doublebacker PLC



Singlefacer Flex I/O PLC

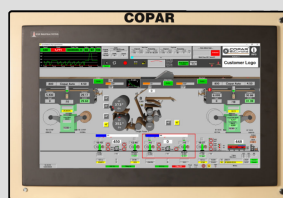
## Operator Stations

### Master Station



- Free-standing cabinet
- Internal tower computer

### Remote Station



Each remote operates independently and includes all operator functions of the Master Station  
(Is not a repeater screen)

- Remote Stations are compact for flexible mounting options
- Can be mounted to a walls, machine frame or post, or with optional stands.
- A pivot mount bracket is included which allows the screen to be tilted up or down for a better viewing angle.
- Each station includes an internal mini computer

Both the Master and Remote Stations include:

- 23" 1080p resistive touchscreens designed for industrial applications
- A Battery Backup and an internal outlet
- NEMA Type 4X sealed enclosures

# Laser Warp Correction AI™

**Minimize Warp  
with  
Laser Precision**

# Laser Warp Correction AI™ (Optional Feature)

Laser Warp Correction AI™ integrates with the Copar QualityMaster system for closed loop warp control. The warp correction system continually monitors corrugated sheets on the stacker conveyor and adjusts the machine until flat board is produced.

With only two lasers, 1200 individual measurements can be made across a 110 inch (2,9 m) machine.

## Inconsistent Roll Moisture

Laser Warp Correction AI helps combat roll moisture/temperature differences when splicing one roll into another or if the roll moisture/temperature changes as the paper is unrolled.

The closed loop process adds a temporary goal offset if it detects warp.

## Exceeds TAPPI Standards

The Laser Warp Correction AI system is capable of detecting warp less than the TAPPI warp standard, all the way down to 3/4 of an inch (19 mm) over a 98 inch (2,5 m) web width. Each installation is catered to specific plant standards.

## Variable Bridge Loading

Laser Warp Correction AI can be configured to communicate with the Copar Sync Master system. The system can automatically adjust bridge quantity levels to combat reverse warp issues.



## Customizable Corrections

Each site is configured to meet customer specifications. A site can choose which machines are included in the process, as well as the order in which the corrections are made. A typical system adjustment begins with the heating section because it is closest to the lasers.

Once the heating section reaches a limit (no more adjustments are possible), the system makes additional adjustments at the next machine section (if necessary). Typical correction order:

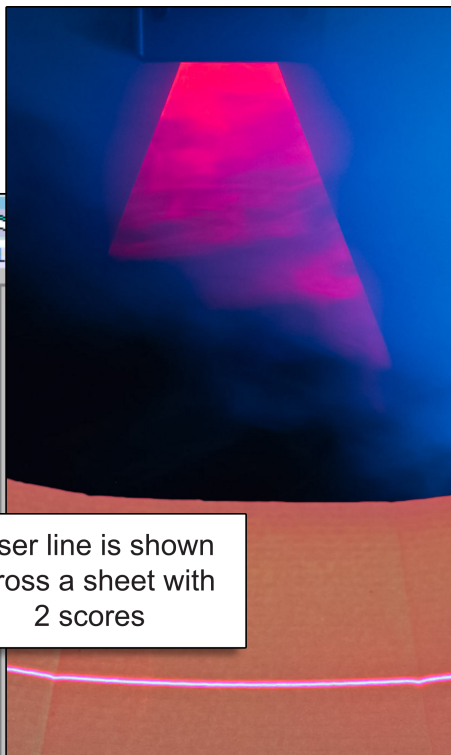
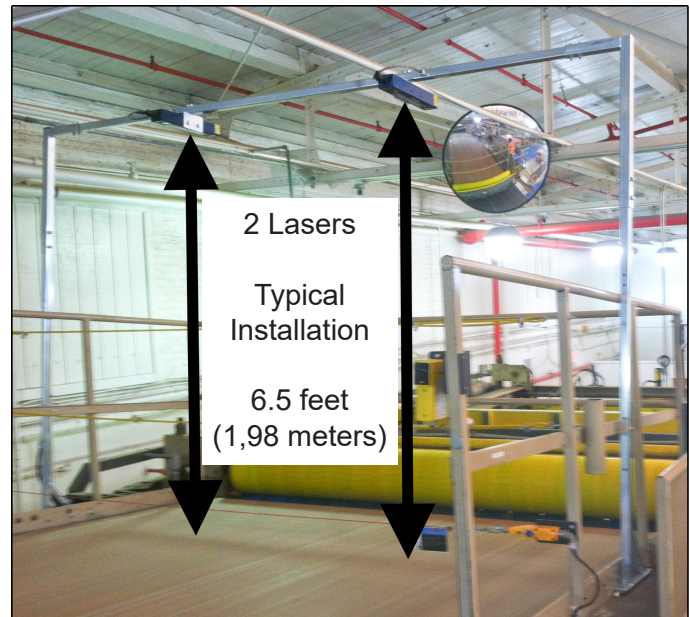
1. Heating Section
2. Doublebacker wrap arms
3. Singlefacers wrap arms (optional)
4. Variable Bridge Loading with Sync Master (optional)
5. Segmented Water Spray (optional)

# Laser Warp Correction AI™ (Optional)

## Laser Locations

The Laser Warp Correction AI lasers are installed just before the stacker elevator.

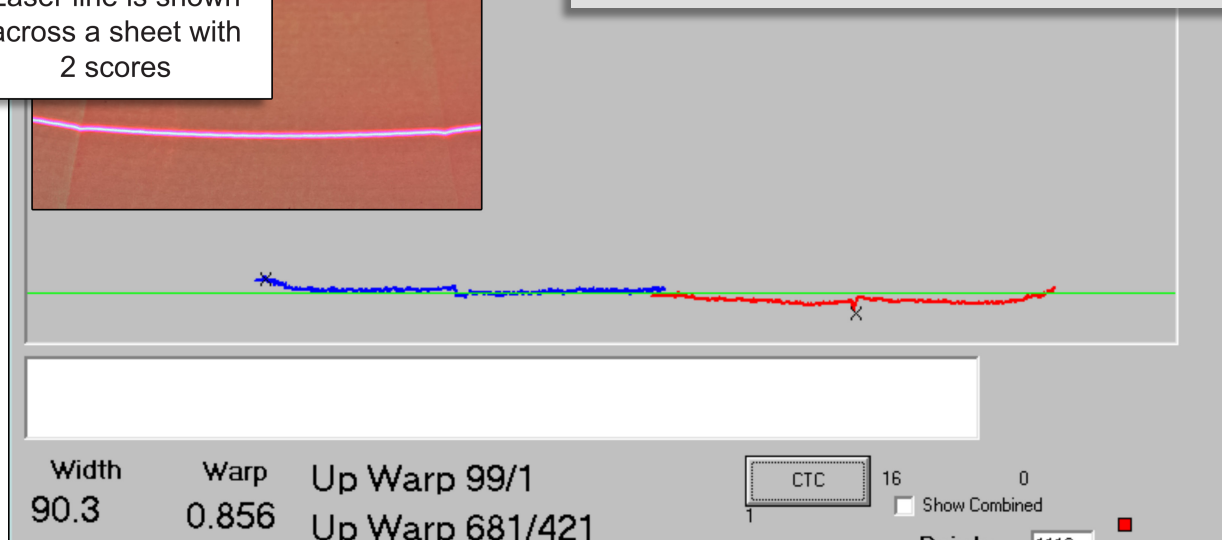
- Top knife level lasers are mounted overhead, well out of the way of the operators or board jam-ups.
- Lasers can also be mounted on lower knife levels where space is more limited.



Laser line is shown across a sheet with 2 scores

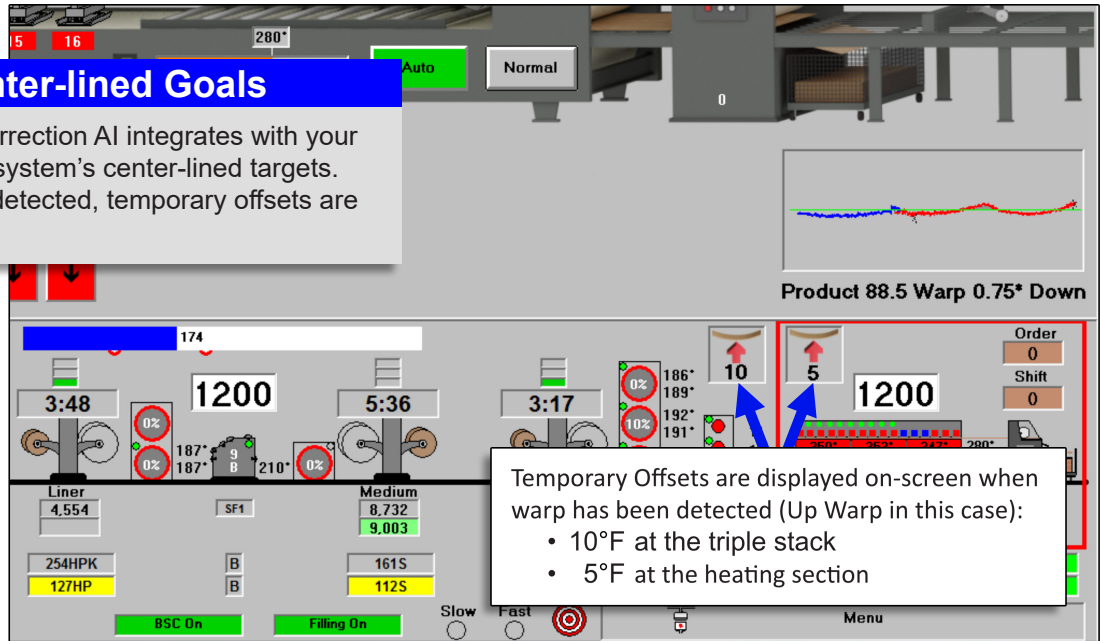
## Benefits and Features

- Provides full time, closed loop corrections
- Reduces waste due to warped board
- Reduces operator time needed to correct warp
- Increases production speed since flat board is easier to stack
- Increases finishing department output with fewer jam-ups on high speed equipment
- Real time laser measurements are displayed for troubleshooting
- 100% Solid State, **No Moving Parts** or Motors
- No onsite calibration needed, ever...



## Center-lined Goals

Laser Warp Correction AI integrates with your QualityMaster system's center-lined targets. When warp is detected, temporary offsets are applied.



## Easy to Maintain

The system has been designed for simplicity and is maintenance free.

- No moving parts or motors.
- No field calibration needed



Only two lasers are needed to monitor the entire width on the top knife level.

## Customizable

### Mechanical:

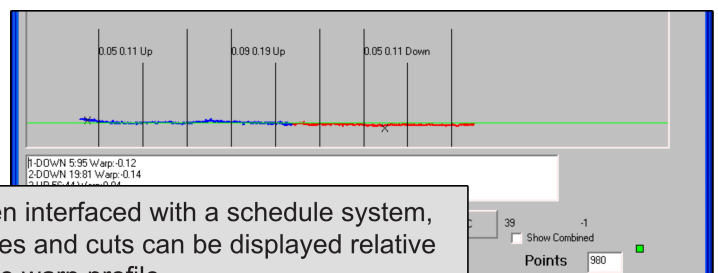
Laser Warp Correction AI can be installed on all knife levels.

### Process:

The plant may choose a custom warp correction strategy. Changing a procedure typically takes less than 3 minutes, and can be done remotely from Copar's home office.

### Software:

May be customized to display schedule information.



# QualityMaster Options

## Web Tension Interface

This option adds a web tension control interface to your E+L or BHS Bridge Brake system.

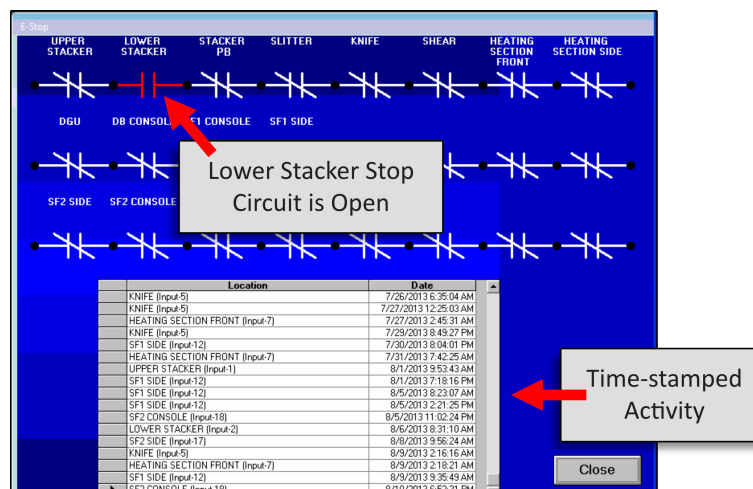
- Web Tension may be changed from any Copar screen.
- During a grade or width change, the web tension automatically changes when the splice reaches the tensioner.
- Web tension targets are saved for each paper combination, otherwise a default value will be used.



## E-Stop Monitor

Issues arising after weekly shutdowns or midweek preventive maintenance are often attributed to a stop button needing to be reset. Copar's E-Stop Monitor option displays which buttons on the machine are currently pressed down. This feature also logs, and time stamps, each time the button is pressed which can be useful to determine problems after all monitored buttons have been reset.

- The E-Stop screen is viewable from any Copar touchscreen.
- May be connected to E-Stop, Normal Stop or "Jam" Stop push buttons.
- May be connected to other devices such as whisker switches, run relays, or safety cords.
- May be connected to any other isolated (dry) contacts such as a starch kitchen alarm for data logging purposes.



## Steam Valve Throttling

This option provides setpoint values for heating section PID controllers. Steam is regulated by the controllers via adjustable valves that opens or close based on the setpoint value.

- Lowering vessel temperature for light weight and pre-print orders provides more flexible shoe/ballast control, while providing enough pressure on the combined board.
- Each section is individually controllable which provides the ability to ramp temperature up or down in stages as the board moves towards the dry end.
- Lowering steam values not only improves product quality, but also saves boiler energy.
- Can be configured for pressure or temperature value entry depending on the controller.

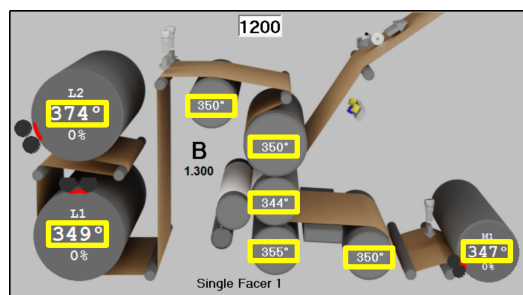


## Steam Vessel Monitor

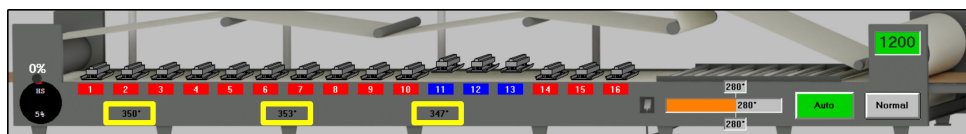
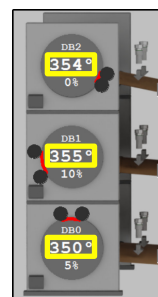
This option uses thermocouples to monitor vessel temperatures along the corrugator.

- The locations monitored will vary based on the machine type and plant specifications.
- The system is capable monitoring up to 16 points at the doublebacker and 16 points at each singlefacer.
- When low vessel temperatures are detected, an on-screen “Low Steam” warning will be displayed on all screens. Low temperatures are often caused by trap failures, siphon problems, boiler issues, or a closed valve.
- Measured temperatures are logged to help pinpoint when a problem started and to identify which orders were affected.

Singlefacer



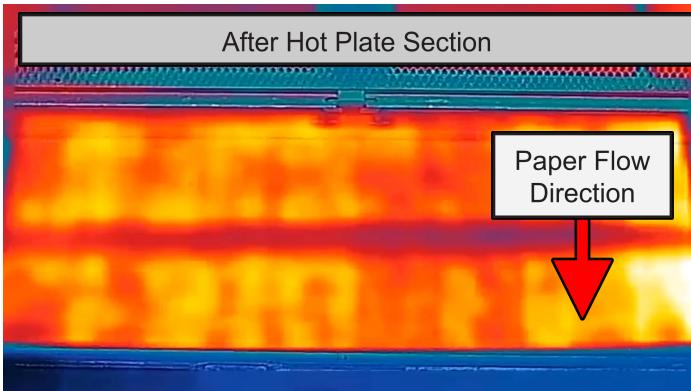
Triplestack



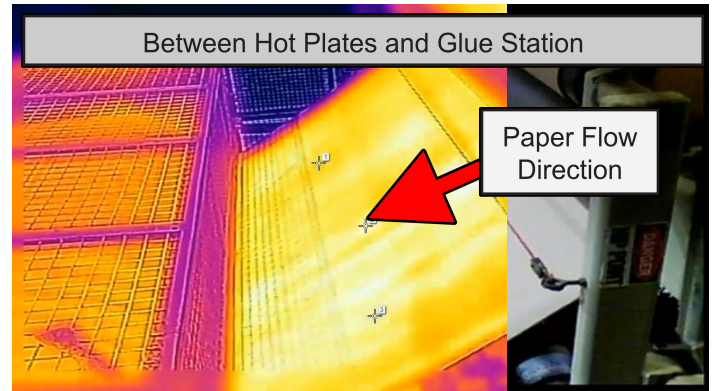
Heating Section Chests

# Thermal Imaging (optional)

The Thermal Image camera system helps operators identify hidden temperature/moisture problems quickly. Dedicated HDTVs showing the paper characteristics facilitates viewing multiple critical process locations simultaneously, leading to better manufacturing awareness and product consistency.

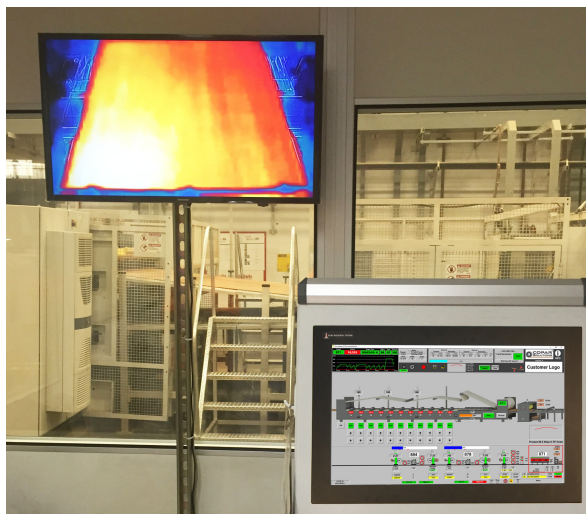


Cold Festoon Folds (bridge was over-loaded)



Infrared Spectrum

Visible Light Spectrum



Dedicated displays makes operators more aware of changing paper temperature conditions.

## Real-Time Temperature Displays

Each Camera's display overlay includes production information such as:

- Order Number / Grade Info
- Machine Speed
- Lineal Remaining/Elapsed

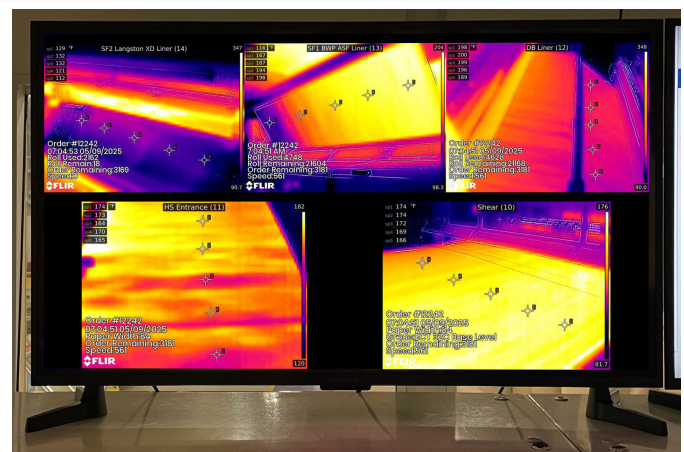
Visually Detect:

- Roll Parallel Issues
- Uneven Pressure from Heating Section Shoes
- Preheater water rimming
- Preheater siphon / trap malfunctions
- Sheets damage due to dirty a doublebacker belt
- Cold festoon folds due to an over-loaded bridge

## Flexible Mounting Locations

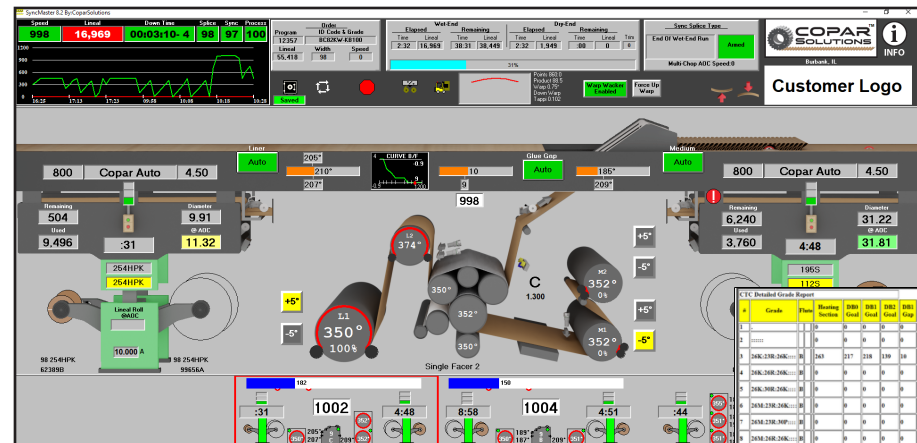
Visually Inspect:

- Liner, Medium, or Combined Papers
- After Preheaters / Preconditioners
- After DB Multi-stack (double/triple/quad)
- After Glue Station
- After Heating / Traction Section
- After Shear



Screens may be configured to show multiple locations at once.

## Advanced Diagnostics and Data Logging

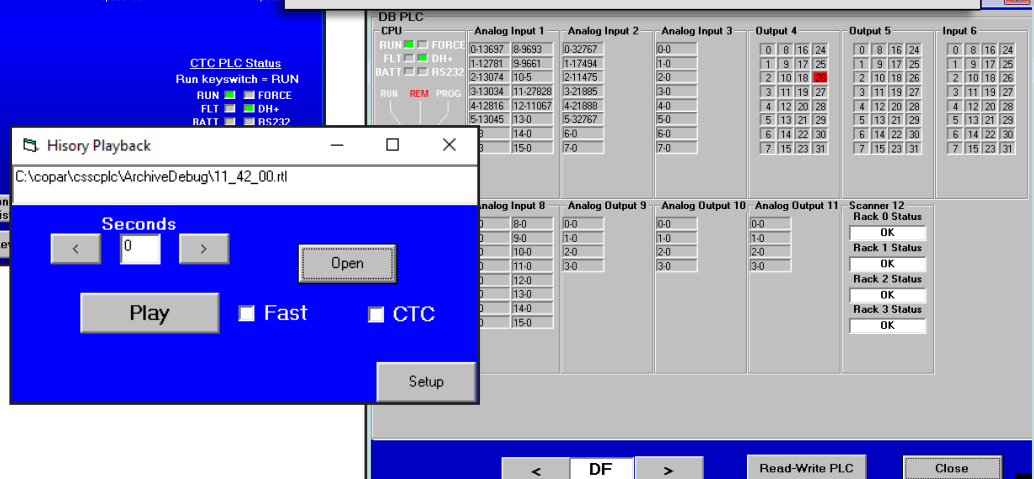
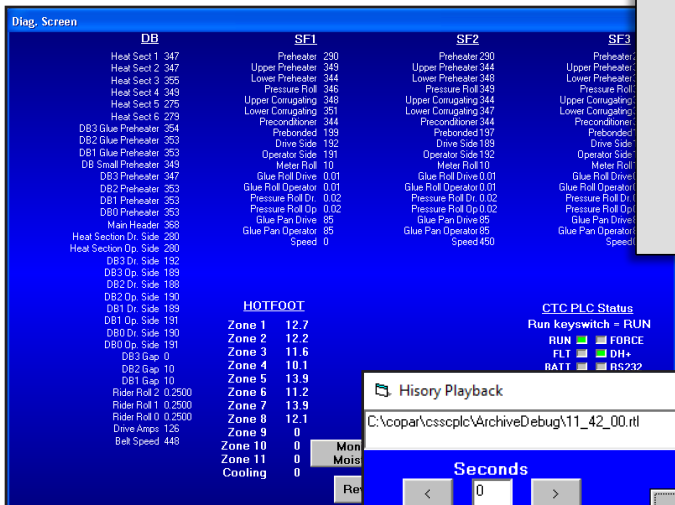


Paper temperatures and starch settings can be changed by adjusting wrap arms, heating sections, and meter gap positions from any Copar operator touchscreen.

[illegible]

- Temperatures and machine positions are recorded and saved at regular intervals, usually once every five minutes.
- This data tracks production history or can be utilized by maintenance for troubleshooting various machine issues.

- PLC inputs and outputs can be viewed in real-time from the Master Station.
- The **COPAR Black Box Feature** records PLC inputs, outputs, and all computer screens every 1/4 second for a useful diagnostic history.
  - Events can be “replayed” weeks after they occur
  - **Problems that seem to occur only when no one is looking can be found by essentially turning back time, and seeing a slow motion view of past events.**



# Seamless Transition with Results

## Ease of Use

The QualityMaster is easy and intuitive to use. Computer screens are laid out in a simplified manner with easy to read values and indicators.

Indicators from the overview screen turn green if that part of the machine is in automatic mode, allowing a quick audit of all parts of the system. Additionally, all temperature and starch settings are displayed for quick checking of process readings.

Operator training is simplified with integrated help screens and diagnostics at the touch screen.



## Automatic Email Reports

Optional daily, weekly, and monthly reports are automatically emailed to key personnel. These reports save managers time since they are delivered automatically. These reports can be used to verify the system is being used to its full potential.

## Practical for the Operator

Operators are pleased to use the system as it actually reduces their workload.

Manually controlled machines require dry end operators to inform wet end operators when heat and starch adjustments are needed. With a Copar automatic system, the dry end can make adjustments directly, so the wet end can focus on hanging rolls and other important tasks.

Center-lined recipes help operators by adjusting heat and starch settings automatically at grade or width changes.



## Return on Investment

Reductions in waste and increased throughput make the investment in a QualityMaster system easily worthwhile. The investment costs of a QualityMaster system are typically repaid in less than one year.

## 2 Year Limited Warranty

**Buy With Confidence.** Copar is proud of the products we produce, and we stand behind them.

- A standard 2 Year Limited Warranty on parts is included with the QualityMaster system.