

MACH 760up

**LARGE FORMAT
AUTO CUT SHEET
LAMINATOR**

Hakuto Co., Ltd.

June 2008



Mach 760up Design Considerations

- ◆ Meet the growing need for large panel manufacturing
- ◆ Improve quality by utilizing the newly developed Ultra-High Pressure (UP) lamination system
- ◆ Increase customer productivity
- ◆ Handle either extremely thick outer-layer or extremely thin inner-layer panels

Mach 760up

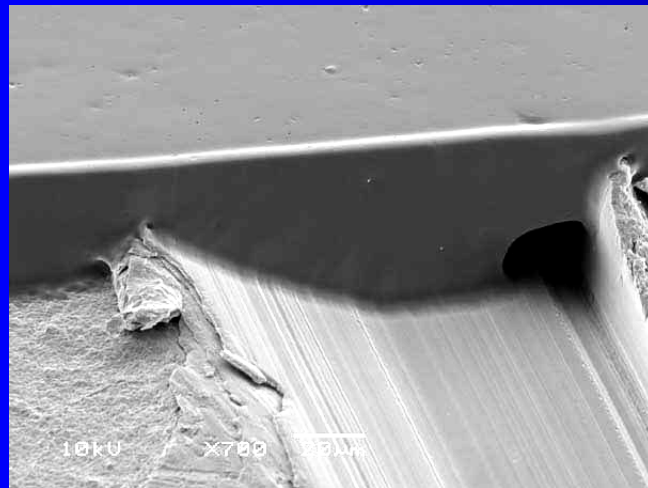
Design Considerations (cont.)

- ◆ Maintain +/- 1 mm film placement accuracy
- ◆ Create a cleaner machine
- ◆ Simplify operational controls
- ◆ Improve safety

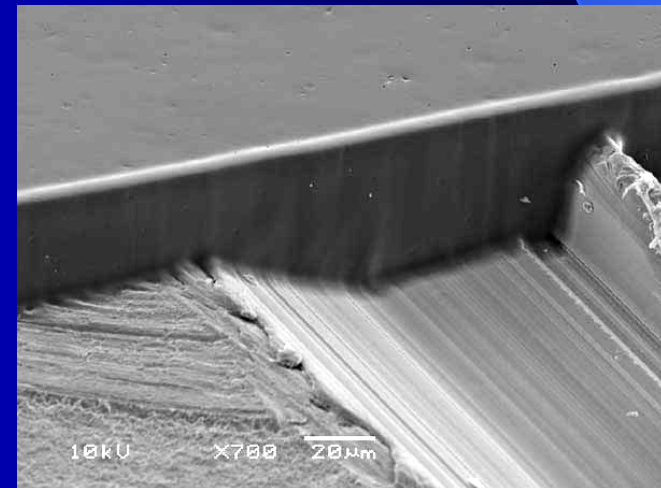
Superior Performance

Outperforming the leading competition, Hakuto's Mach series laminators can successfully laminate under even the toughest conditions.

Leading Competitor



“UP” Lamination





Mach 760up: Key Features ()

- ◆ New “UP Roll Mechanism” Increases Pressure for Better Lamination
- ◆ Capable of Handling Large Panel Sizes, as well as Very Thick OR Very Thin Panels
- ◆ Improved Roll Temperature Tracking
- ◆ New High-Performance Laminating Rolls with a Smaller Footprint Further Improves Lamination
- ◆ Redesigned DF Cutting System Creates Fewer Contaminants while Cutting Faster

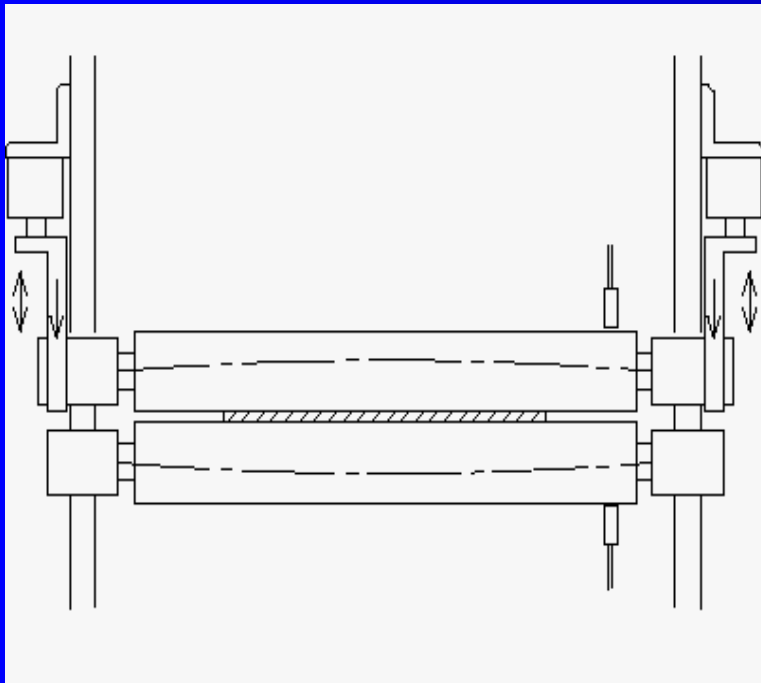
Mach 760up: Key Features ()

- ◆ Higher Throughput (**up to 5.0 m/min**)
- ◆ Easier DF Set-Up & Exchange
- ◆ Line Speed Synchronization
- ◆ Multiple Design Changes to Minimize Potential Contamination and Maximize Safety
- ◆ Improved System Controls

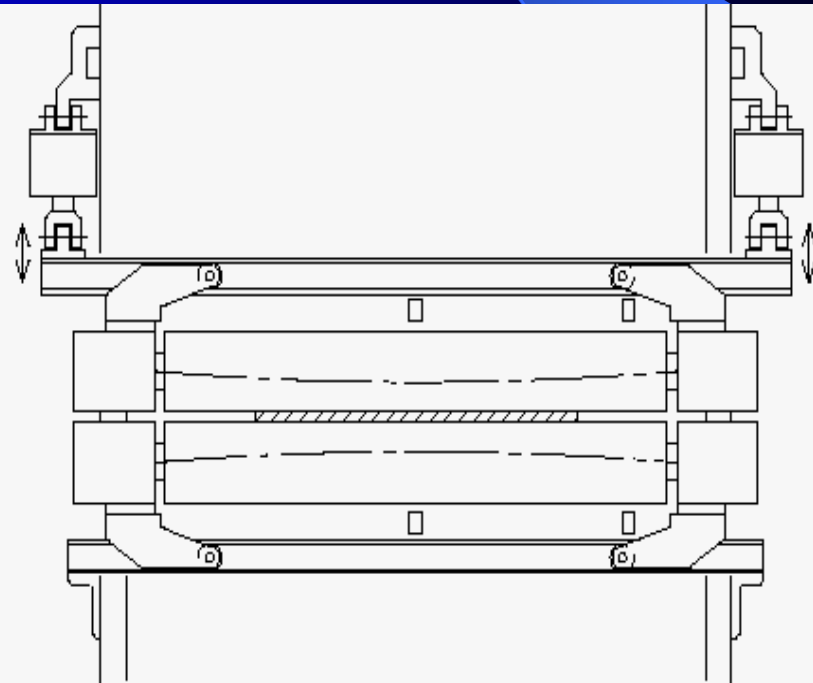
1. New Laminating Roll Pressure Mechanism

- ◆ Transfers force from the edge to the center of the rolls, resulting in better lamination.
- ◆ Larger Cylinder Provides Higher Pressure

MACH-720i



MACH-760UP



Laminating Roll Mechanism

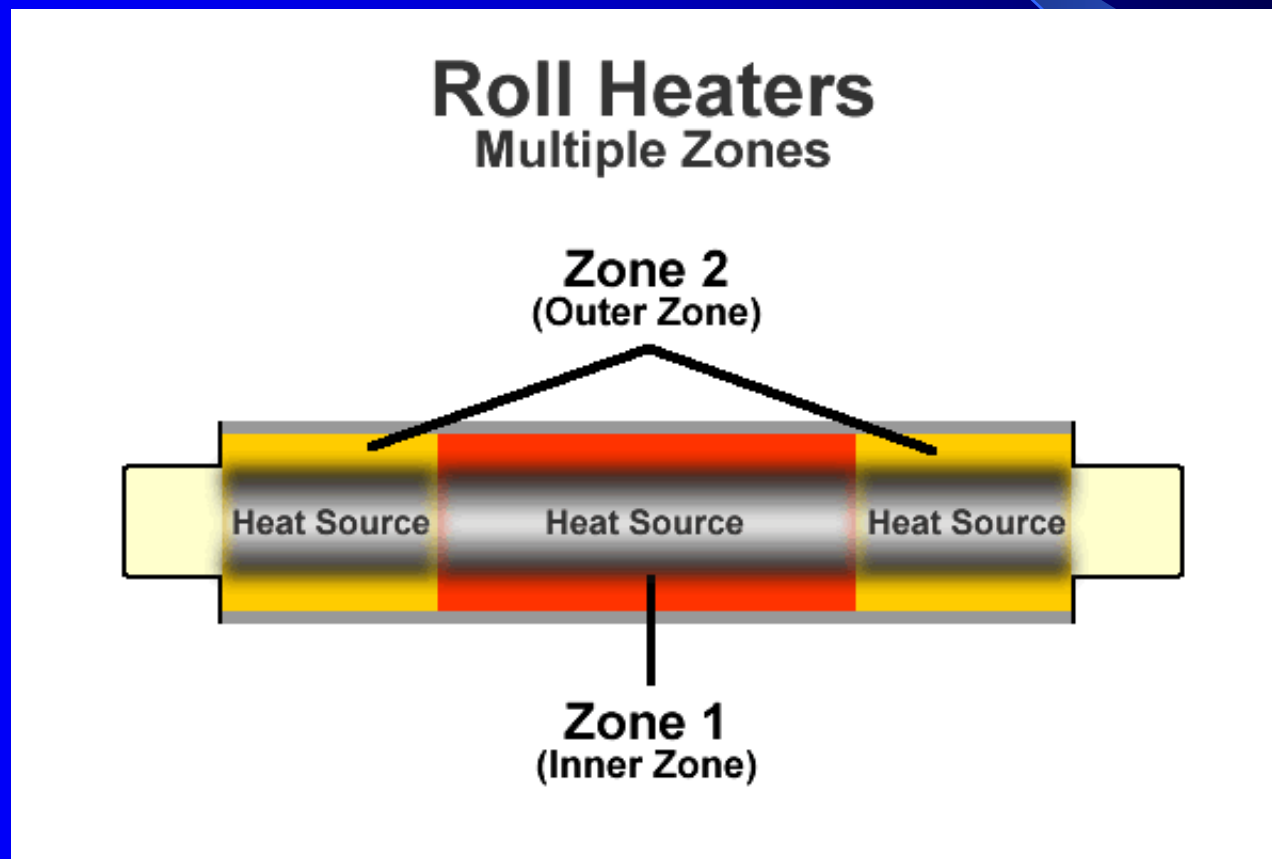
| | MACH 720i | MACH 760UP |
|--------------------|--|---|
| Pressure Cylinder | Ø50 | Ø63 |
| Pressure Mechanism | | |
| 1. Upper Roll | 1. Edge slide system | 1. Edge arm beam pinch system |
| 2. Lower Roll | 2. Sides fixed to frame | 2. Edge arm with fixed beam |
| Roll Heater | 2-line heaters (1.0 KW, ø16) | 3-line heaters (1.5 KW, ø20) |
| Heat Sensors | 1 at each roll edge (total 2 sensors) | 1 at center & edge of each roll (total 4 sensors) |

2. Laminates Large PWB

- Standard Panel Dimensions
 - Width: up to 770 mm
 - Length: up to 820 mm
- Standard Panel Thickness
 - Min: 0.10 mm
 - Max: 12.0 mm
- Thickness with Thin Panel Option
 - Min: 0.06 mm
 - Max: 2.0 mm
 - (12.0mm if remove upper guide)

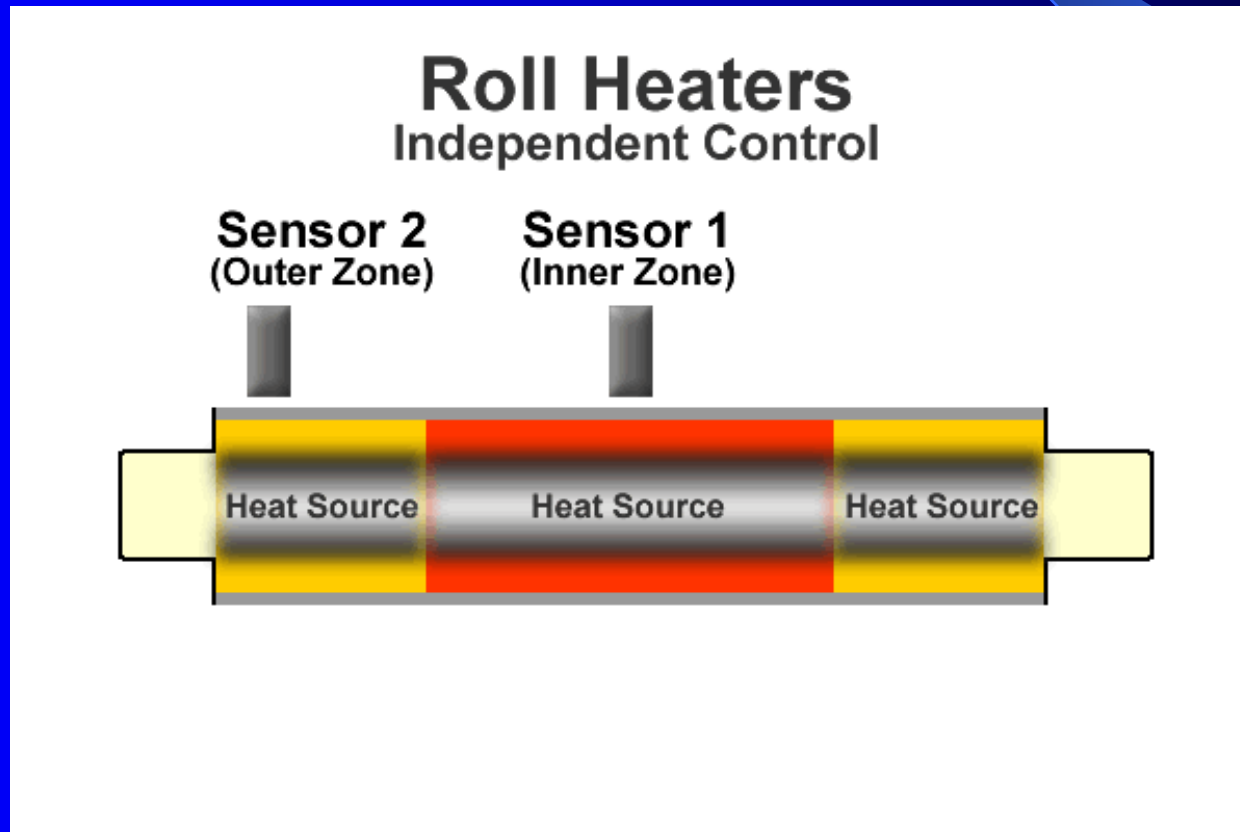
3. Improved Temperature Tracking

More even temperature distribution eliminates the heat sink problem at the center of the roll



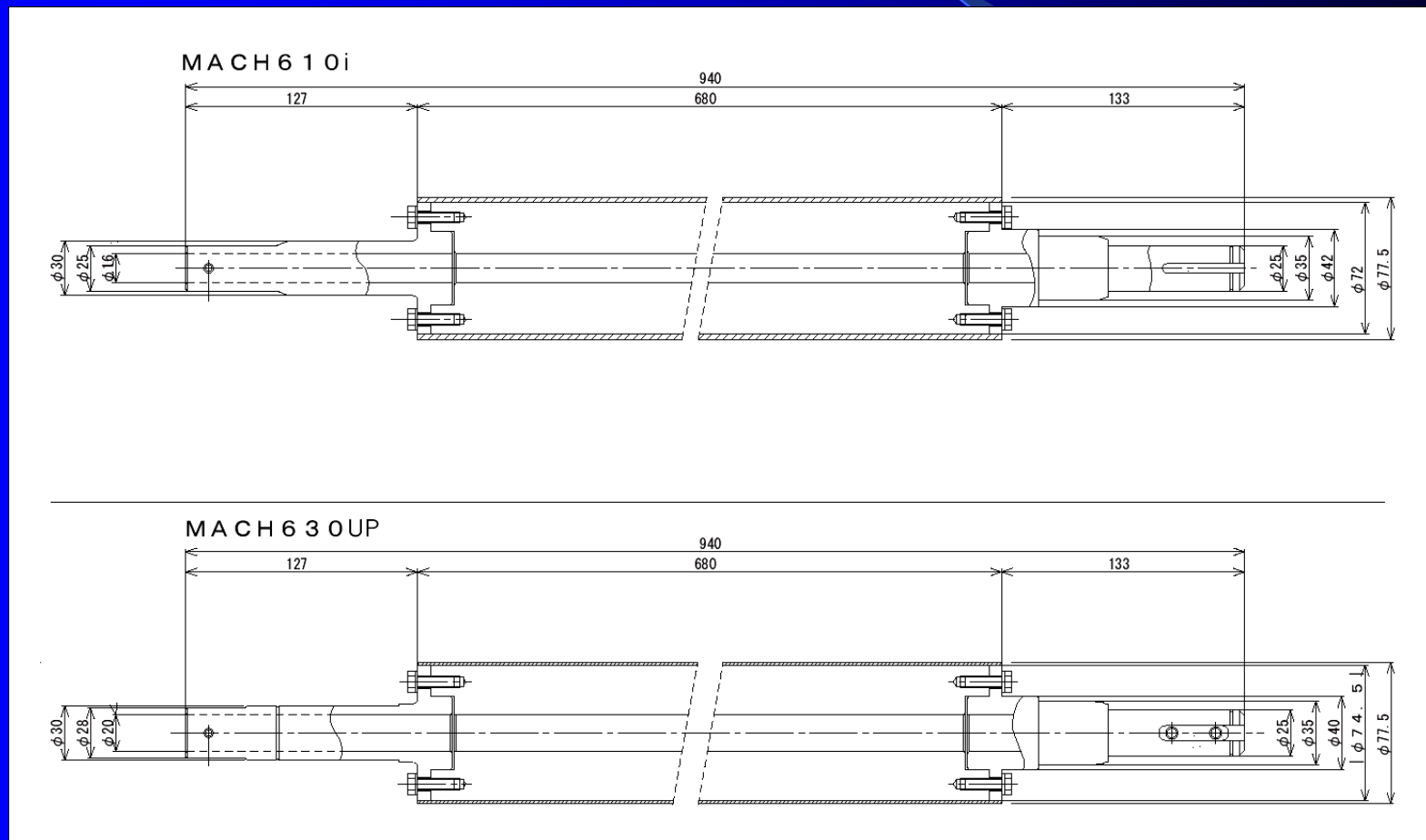
3. Improved Temperature Tracking

Two sensors maintain the temperatures of the inner and outer zones independently.



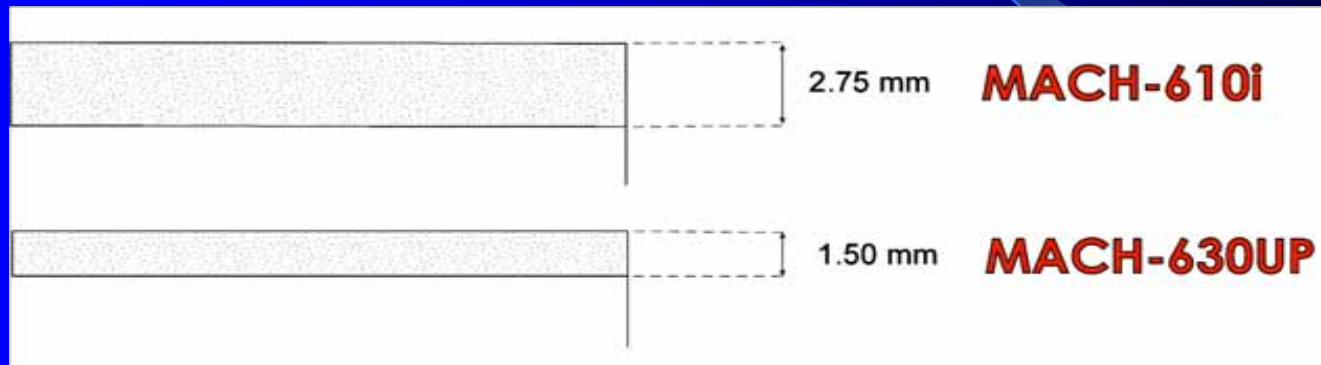
4. Improved Laminating Rolls

Improved lamination quality and faster recovery time



4. Improved Laminating Rolls

The drop in roll temperature due to laminating a PWB depends greatly on the rubber thickness.



| Roll Thickness (mm) | Temp. Drop at Roll Center (Set Roll Temp: 100°C) |
|-------------------------------|---|
| 2.75 (Std. MACH-720i) | (U) 34.9°C : (L) 33.9°C |
| 2.00 | (U) 26.0°C : (L) 25.5°C |
| 1.50 (Std. MACH-760UP) | (U) 24.4°C : (L) 23.7°C |
| 1.00 | (U) 22.5°C : (L) 21.2°C |

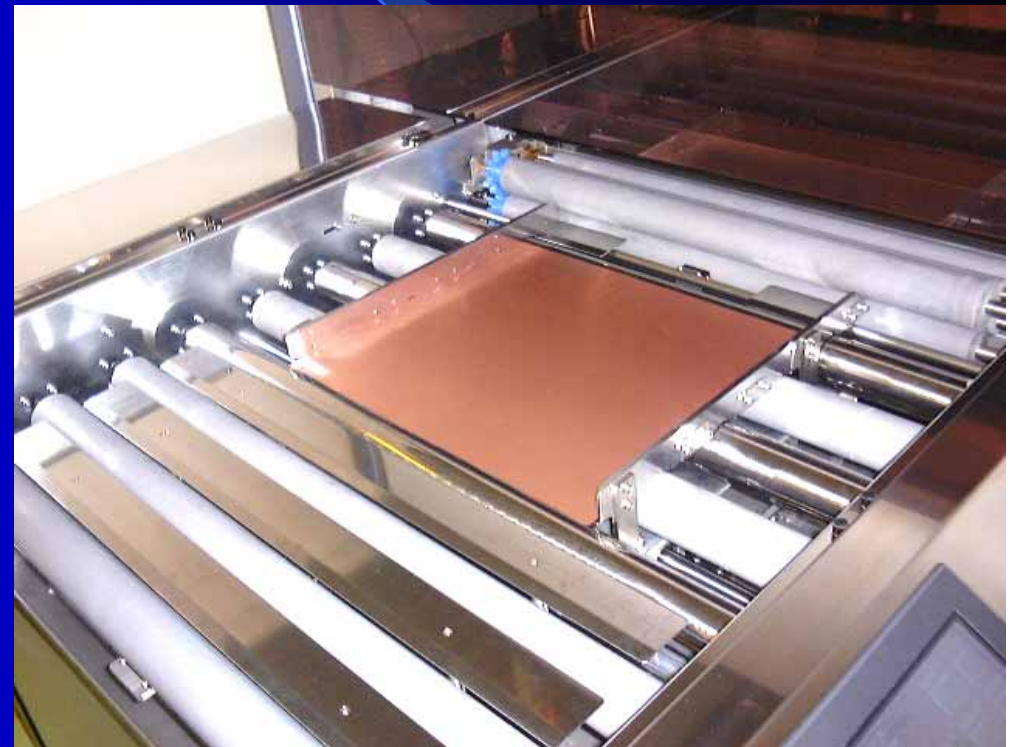
5. Cleaner DF Cutting System

- ◆ Slower blade rotation speed cuts dry film more effectively
- ◆ Drive System:
Stepping Motor &
Timing Belt
- ◆ Creates fewer contaminants
- ◆ Faster overall cut helps increase lamination speed



6. Increased Productivity

- ◆ Higher overall speed
(up to 5.5 m/min.)
- ◆ With other improvements effectively
**DOUBLES
PRODUCTIVITY**



6. Improved Front & Rear Spacing Control

- ◆ Better quality sensors.
- ◆ Independent controls for tacking and roll feeding drive motors.
- ◆ More precise board feeding.

7. Easier DF Setup & Exchange

- ◆ Lamination section pulls out farther, easing DF exchange.
(DF cartridge not available)
- ◆ Mylar take-up roll contracts for easy removal
- ◆ Remaining DF Counter & Alarm



7. Easier Access

The lamination section pulls out farther and is easier to handle than older models.



8. Line Speed Synchronization

- ◆ Front Conveyor, roll speed and rear conveyor are all linked.
- ◆ One adjustment changes the speed of all three sections.



9. Minimal Contamination & Improved Safety

Metal & Resin Finish: The entire machine is covered by matte polished aluminum, stainless steel and specially coated transparent resin panels. All materials are designed to minimize potential contaminants.



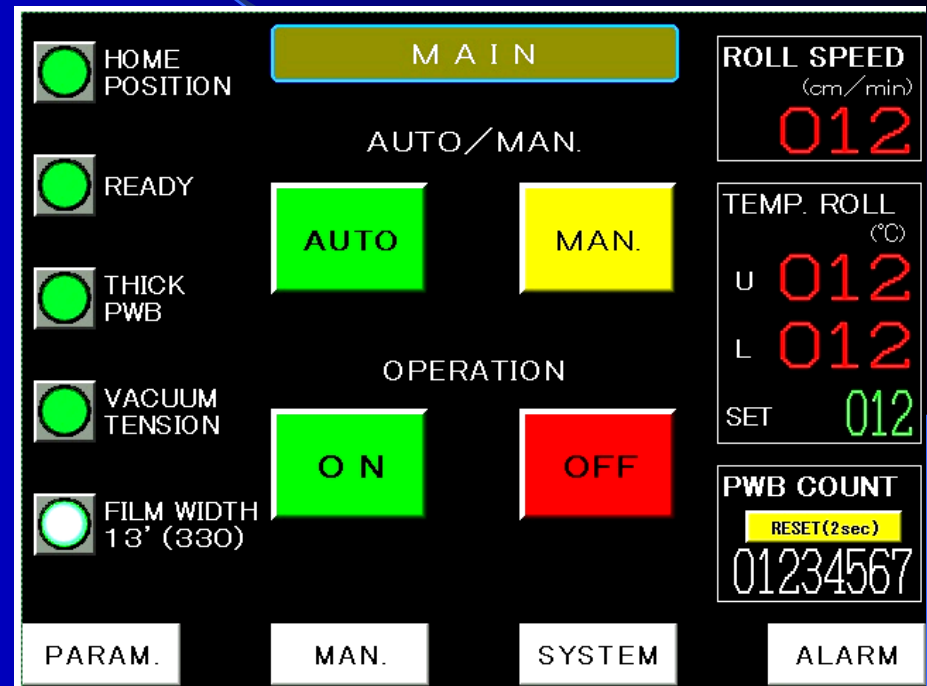
9. Minimal Contamination (cont.)

Other ways the MACH-630UP has been improved to create the cleanest possible environment:

- ◆ Cutter mechanism
- ◆ Internal Plating
- ◆ Mechanical parts moved outside the lamination area.
- ◆ Conveyor Covers

10. Improved System Controls

- ◆ Touch screen controls
- ◆ Combines all functions in one location
- ◆ Straightforward & easy to operate
- ◆ Adds new functions
- ◆ Decreases contaminants



New Touch Screen Control Panel

Composition of Touch Panel:

- ◆ **MAIN** Primary display of the touch screen used for system operation.
- ◆ **PARAMETER** Display of current parameters.
- ◆ **PARAMETER SETTING** For setup of dry film lamination parameters.
- ◆ **MANUAL** For manual operation.
- ◆ **SYSTEM** Indicates remaining film length, panels processed and cutting blade usage.
- ◆ **ALARM** Indicates and describes any current alarms.
- ◆ **HISTORY OF ALARM** Stores a history of important alarms.

Option:

Thin Panel Option Specifications

- ◆ Longer guide plates support and feed thin boards from the pinch rolls to the laminating rolls.
- ◆ Plates are added between the front conveyor rolls and immediately after laminating rolls.
- ◆ Plates are added between the rear conveyor rolls.
- ◆ Thickness: **0.06** to 2.0 mm

Mach 760up: Large Format Performance

