



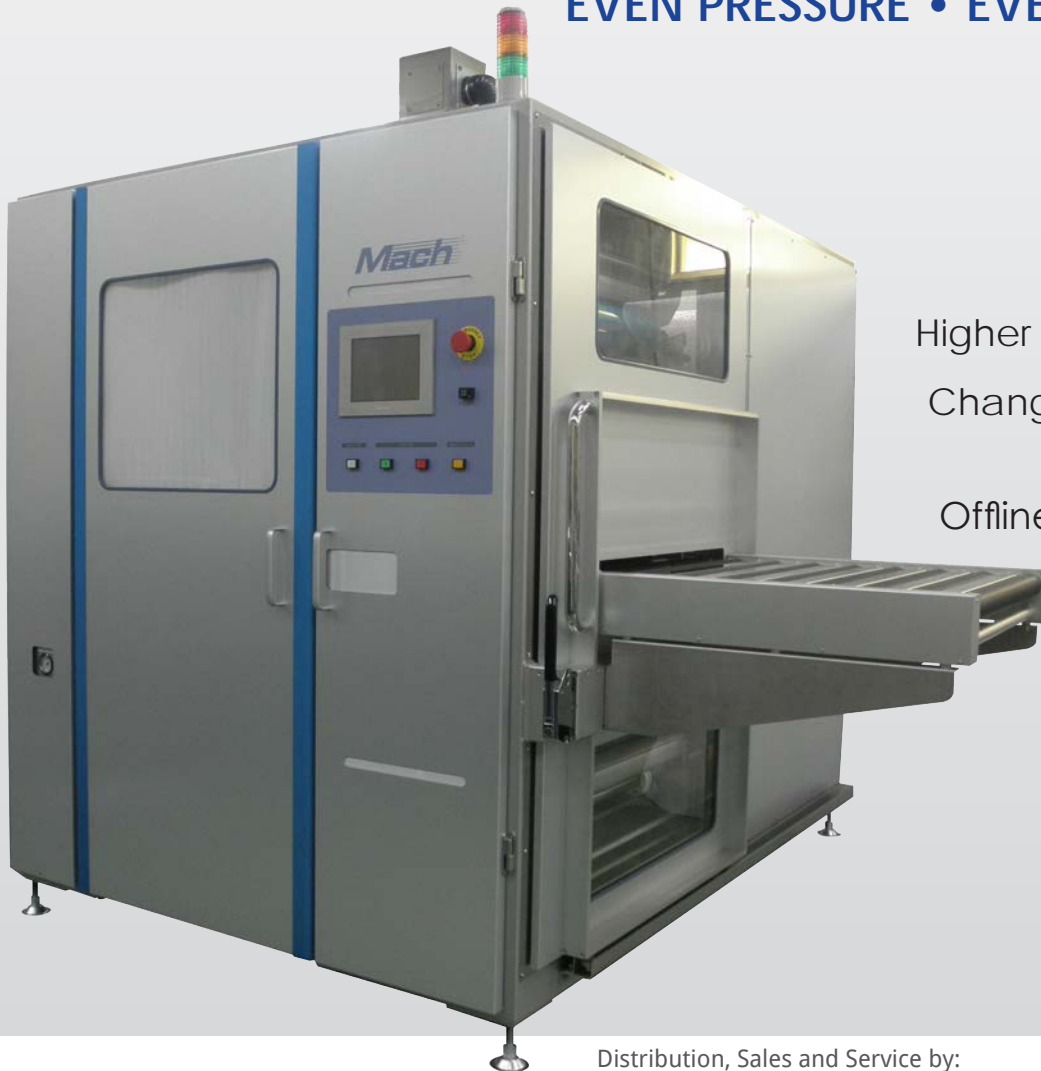
# *Mach*

## 630NP/6630NP

NEXT GENERATION AUTO FILM LAMINATOR  
FOR THE PRINTED CIRCUIT BOARD INDUSTRY

## An Innovation for Dry Film Lamination

**EVEN PRESSURE • EVEN HEAT • RELIABILITY**



*Plus...*

No Expensive Hot Rolls

Easy Maintenance

Higher Film Placement Accuracy

Change Rubber Durometer and  
Rolls in 5 minutes

Offline Cassette Loading of Film



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## A Laminator's Most Important Function

The application of UV photo sensitive dry film onto a PCB copper panel requires optimum EVEN pressure and EVEN temperature across the entire surface.

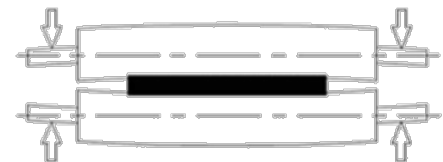
## Historic Technology

From the beginning of the PCB manufacturing industry in the early 1950's, printed circuit board dry film lamination has been implemented by applying pressure to the end shafts of heated rubber rollers. The mechanical physics as shown in Fig. 1 demonstrates how there is uneven pressure across the surface of the film lamination with increasing lower pressure and lower heat toward the center of the board.

As electronic circuit packages became miniaturized, their connection leads moved to 50 mil pitch and smaller – requiring the resulting PCB traces and spaces to reach sub 0.005" size.

This uneven pressure phenomenon across the surface of the PCB can ultimately cause faulty image transfer resulting in open circuit defects on the final etched layer further resulting in an entire panel being scrapped. To deal with this new dry film precision requirement (sub 5 mil features), the industry has tried many modifications; heavy duty rolls, cantilevered pressures mechanisms, and wet lamination.

Success has been limited.



**Straight Rolls with Roll Bending**



**Low Pressure**

Figure 1

## A Technology Breakthrough

The uneven pressure situation has now been solved by utilizing a new mechanical concept whereby a heavy barrel type roller transfers pressure onto a common rubber roller with remarkable consistency for both pressure and temperature.

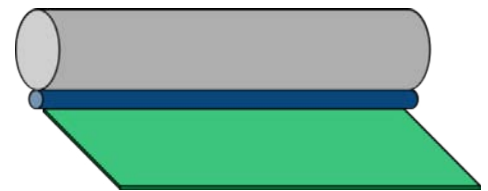
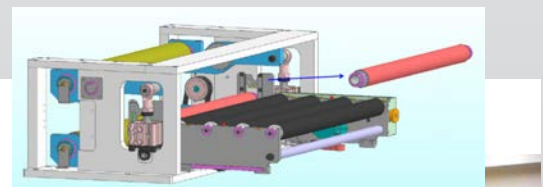


Figure 2

## Mach 630NP Standard Features

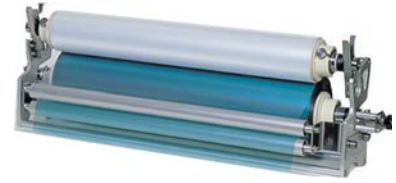
- Easy Lamination Roll Exchange
- Easy Maintenance
- New Pressure and Temperature Uniformity Module
- New Enclosure for Clean Operation
- ECO Take-up Roll for Easy Mylar Removal
- Touch-screen PLC Panel Control



## Laminator Options

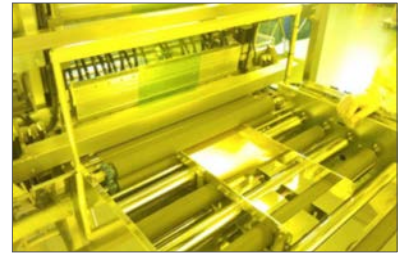
### Film Loading Cartridge (Offline)

- Convenient loading and unloading of dry film offline  
Note: once the film is loaded offline, the time to reload the laminator is less than 10 minutes for both top and bottom



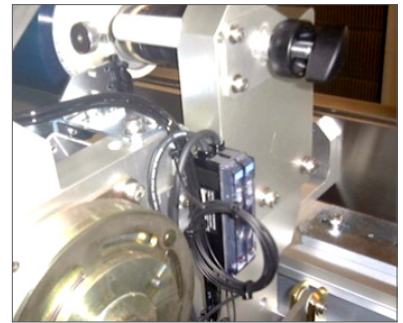
### Ultra Thin Transport

- Standard thin core: minimum 0.06mm (incl. Copper) (0.00236")
- Special Order: minimum 0.04mm (incl. Copper) (0.00156")



### Exit Panel Temperature Indicator

- Monitor device (only)
- Comprised of thermometer sensors located on top and bottom of the exit tray to indicate the surface temperature (both sides) of the finished PCB with dry film attached.
- Also available to the auto control function for monitoring



### Dry Film Usage and End Warning

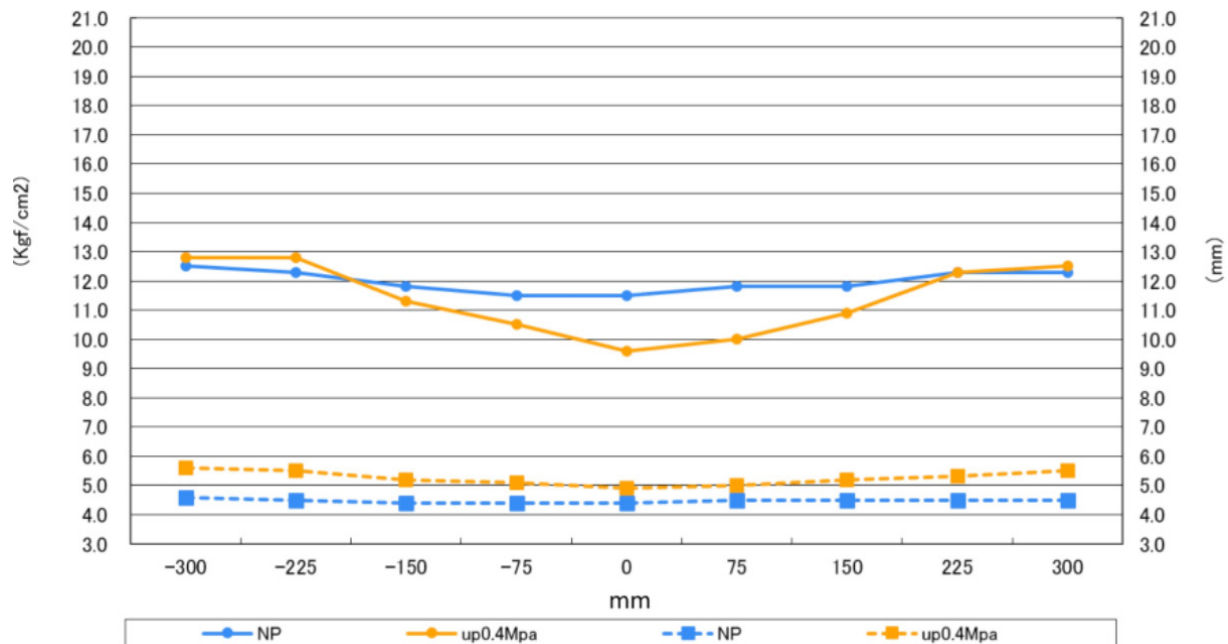
- Beam Sensors (light source and receiver)
- Mounted at both sides of the DF roll and parallel with DF facing each other. The beam sensor detects when the remaining rolled DF thickness gets thin enough for the receiver to receive a signal from the light source and give the operator a warning.



### Mach Prolog Software

- Recipe storage of up to 100 operational parameters

Film Pressure Comparison  
Hakuto's Cantilevered "UP" system vs the new "NP" system



## Laminator Features and Options

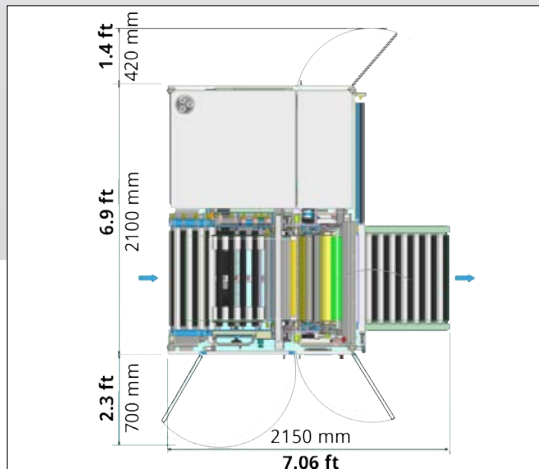
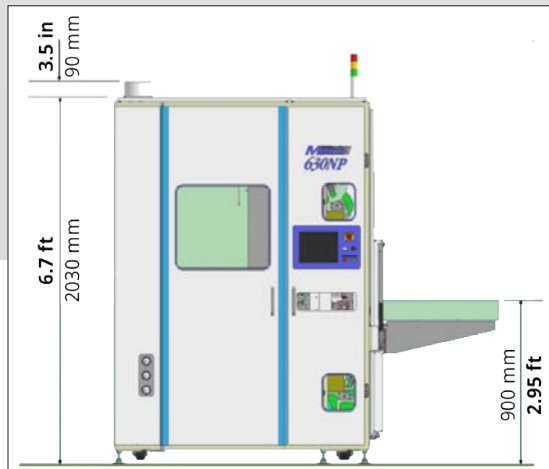
|   | Mach 630NP | Mach 6630NP |
|---|------------|-------------|
| Easy Lamination Roll Exchange             | ●          | ●           |
| Easy Maintenance                          | ●          | ●           |
| EVEN Pressure Uniformity Module           | ●          | ●           |
| EVEN Temperature Uniformity Module        | ●          | ●           |
| Full Enclosure for Clean Operation        | ●          | ●           |
| Touch Screen PLC Control                  | ●          | ●           |
| ECO Take-up Roll for Easy Mylar Removal   | ●          | ●           |
| Cartridge Film Loading System             | ○          | ●           |
| Exit Panel Temperature Monitoring         | ○          | ●           |
| Dry Film Usage and End Warning Indicators | ○          | ●           |
| Ultra Thin Transport                      | ○          | ○           |
| Mach Prolog Software (Custom Request)     | ○          | ○           |

● Standard Feature ○ Optional Feature

## Specifications - Mach 630NP, 6630NP

|                           |  |  |
|---------------------------|--|--|
| <b>Lamination</b>         | Laminating Roll                                      | 1.6" (50mm) Diameter Rubber - various coatings and durometers  |
|                           | Roll Pressure  | Max. 500 Kg/cm <sup>2</sup> (7112 psi)   |
| <b>DF Cutter</b>          | Non-Contaminating Disc Cutter - 2.5" diameter (64mm) |  |
| <b>Anti Contamination</b> | DF Anti-Static Bar                                   | Eliminates charge that attracts dust and contaminants  |
|                           | Enclosure  | Forced circulation with HEPA filter (Option)   |
| <b>Panel Dimensions</b>   | Size (Width)   | Min. 9.8" (250mm) Max. 25.2" (640mm)   |
|                           | Thickness (incl. copper foil)                        | <b>Standard:</b> 0.0040" to 0.236" (0.06mm to 6.0mm)<br><b>Thin Core Option:</b> 0.0016" to 0.236" (0.04mm to 6.0mm)*<br><small>* Sample test required before shipment</small> |
| <b>Conveyor</b>           | Width  | 27.2" (690mm)  |
|                           | Speed  | 3.28 to 18.0 ft/min. (1.0 to 5.5 m/min.)   |
| <b>Dry Film</b>           | Width  | 9.85" to 24.8" (250mm to 630mm)  |
|                           | DF Roll Diameter                                     | 6" Core Diameter: Max. Film Diameter 9.85" (250mm)<br>3" Core Diameter: Max. Film Diameter 11.0" (280mm)   |
|                           | Bobbin Diameter                                      | 3" or 6"   |
| <b>Film Placement</b>     | Front and Back Accuracy                              | +/- 0.02" (0.5mm)  |
|                           | Side to Side Accuracy                                | +/- 0.02" (0.5mm)  |

### Dimensions (L to R)



### Utilities

|         |                                     |
|---------|-------------------------------------|
| Power   | 3 Phase 220/200V<br>50/60Hz, 10kW   |
| Air     | 0.5MPa, 100L/min<br>ISO Rc 1/4 inch |
| Exhaust | 9.5m <sup>3</sup> /min φ 150mm      |



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