

## Incident Summary II-1738757-2024 (#49429) (Final)

SUPPORTING INFORMATION	Incident Date	July 24, 2024
	Location	Armstrong
	Regulated industry sector	Electrical
	Qty injuries	1
	Impact Injury	Injury description
		A qualified electrical maintenance technician came into contact with 1500volts AC connected to an electronic card on a piece of equipment during a routine maintenance process. Resulting in injuries that included a laceration on the right thumb and 2 burn marks on the right ring finger and right wrist.
		Injury rating
	Damage	Damage description
		Damage rating
	Incident rating	Minor
INVESTIGATION CONCLUSIONS	Incident overview	<p>The incident occurred on a veneer 'moisture detection' machine while regular maintenance adjustments were being performed to the sensing cards located behind a clear plastic plexiglass barrier.</p> <p>It was noted that one card was neither seated nor secured in its bracket. As a result of this it did not allow the maintenance personnel to access the adjustment screw or metering terminals as per the manufacturer's instructions.</p> <p>The qualified electrical maintenance technician removed the plexiglass barrier to re-seat the card while the equipment was energized resulting in a shock.</p>
	Site, system and components	<p>The Raute Mechano VDA/ DMA unit is located on the output end of the veneer dryers in the process that provides 2 functions:</p> <ol style="list-style-type: none"> <li>1) (VDA) Visual Defect Analyser - Not Involved.</li> <li>2) (DMA) Dry Moisture Analyzer detects residual moisture of veneer sheets after they exited the dryers. Metal brushes in contact with the veneer sheets as they pass through the machine have a small voltage applied that measures the moisture between the voltage applied 'brushes' and 0-volt reference point 'brushes'. The cards process a signal to the PLC noting residual moisture content, if the moisture levels are higher than required, the sheets are re-directed to return through the dryers once again.</li> </ol> <p>The Raute VDA/DMA machine sorts the completed sheets in the applicable locations for use for the type/grade met to finish the process.</p>
	Failure scenario(s)	<p>During regular daily use of the equipment that monitors and evaluates/ grades dried veneer sheets exiting the dryer process, one of the electronic sensing cards on the DMA portion came loose from its mount leaving it in a position where the maintenance could not be performed through manufacturers provided openings of the plexiglass with the required voltage meter and screwdriver. During the process, the maintenance person noted the issue and made the decision to continue by removing the plexiglass cover to re-seat the electronic card with the power still on.</p>

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	<p>The maintenance person was unaware of any dangerous voltages present as there were no warnings of High Voltage within the cabinet, only an 'electric symbol' label was observed on the plexiglass. The maintenance person attempted to re-seat the card and was shocked.</p>
Facts and evidence	<ul style="list-style-type: none"> <li>• The injured person was a qualified electrical maintenance technician that has performed adjustments to the equipment on previous occasions.</li> <li>• The equipment has been in operation for approximately 3 years.</li> <li>• Regular maintenance is required to be performed on adjustment of the brushes daily as well as measuring and adjusting the sensing voltage to 7 Vac on the DMA cards involved.</li> <li>• The technician was unaware of high voltage to the sensing cards, no 'High Voltage' warning labels were provided or applied by manufacturer and no warnings noted in the Service Manual. 7 volts AC was the only voltage reference in the Service Manual.</li> <li>• No wiring diagrams were noted on site for personnel.</li> <li>• On viewing pictures provided, site confirmation and obtaining a wiring diagram the client obtained, the sensing cards were confirmed connected to 1 leg only of a 1500volt secondary winding of a 230mA CCS current transformer with 1500volt rated type GTO-15 #14awg conductor soldered to the electronic board with the second 'grounded' leg of the 1500volt transformer connected to equipment enclosure AND a set of sensing brushes for a '0-VOLT' reference value.</li> <li>• The 'electronic sensing-cards reduce the 1500volts to an adjustable 0–10-volt value (7 volts is the target to maintain) for the 'sensing circuit' and this provides communications for monitoring controls. The 7VAC sensing circuit is connected between the sensing cards to brushes in contact with the veneer sheets as they run through and return through the 0-volt reference brushes to complete the circuit to the 1500volt transformer. The signal output of the cards is sent to a PLC and is dependant on the moisture detected in the sheets.</li> </ul>
Causes and contributing factors	<p>It's probable that shock was a result of a combination of items that included:</p> <ul style="list-style-type: none"> <li>• Lack of information on site for wiring diagrams.</li> <li>• Missing Warning-High Voltage' labelling.</li> <li>• Lack of understanding the equipment and hazards involved by the technician.</li> <li>• Removing a barrier and entering the enclosure with the equipment energized.</li> </ul>



Image 1 - Sideview of maintenance platform to access the machine components for adjustments and testing.

- Plywood veneer sheets run through the machine and under the platform during operation, the brushes viewed have 7Vac applied to multiple metal brushes with a 0-volt grounded reference point to complete the circuit.
- These brushes are accessible to maintenance personnel during operation.
- Loose card noted in mid-open panel.
- Transformers viewed in far open panel.



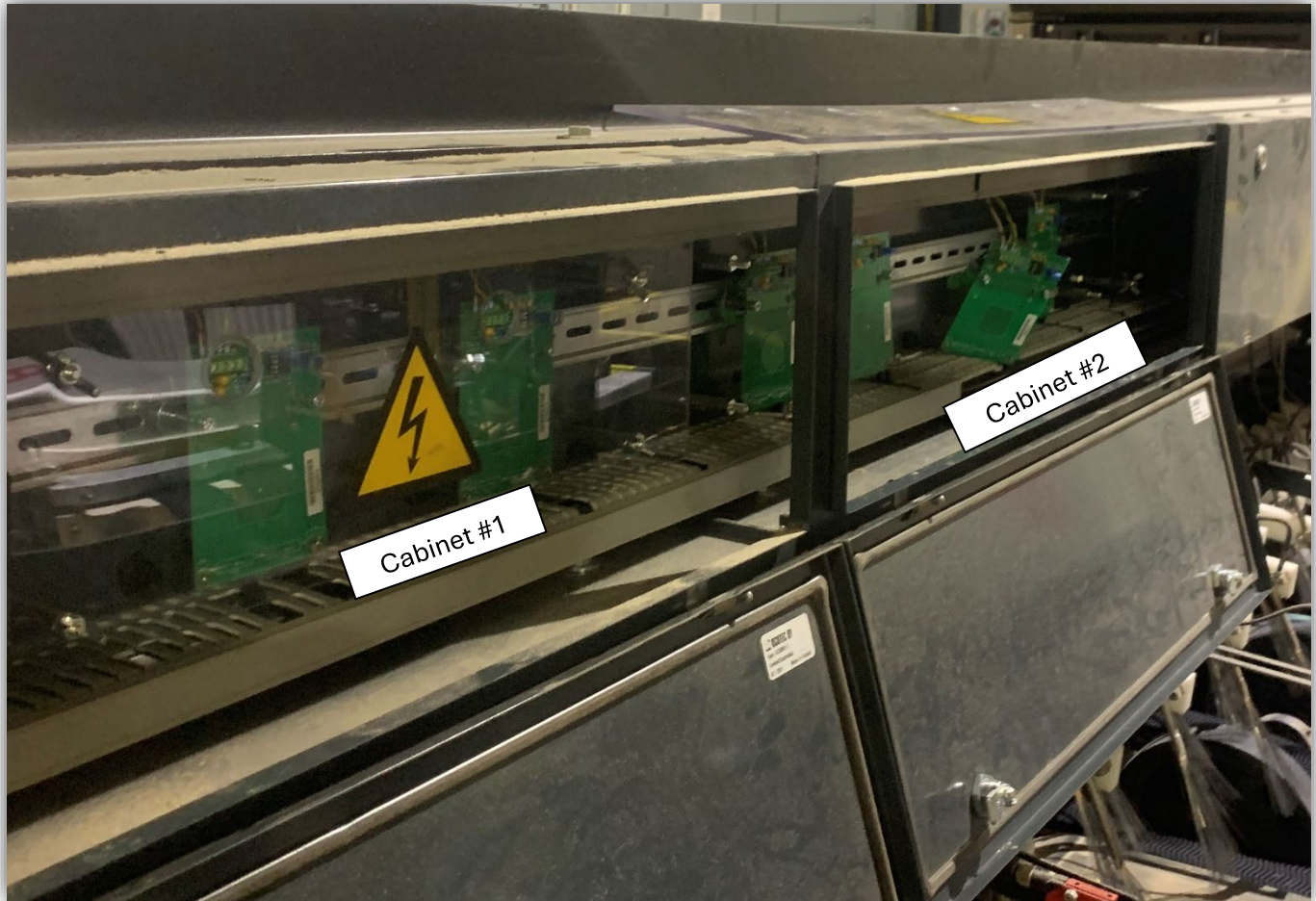


Image 2 - Close up view of the open cabinets after the incident occurred:

- Cabinet #1 with 1500volt transformers and 2 sensing cards located behind plexiglass cover installed 'Electric Warning' label.
- Cabinet #2 with sensing cards, plexiglass cover removed and laying on top of cabinet, loose sensing card where incident occurred is viewed.

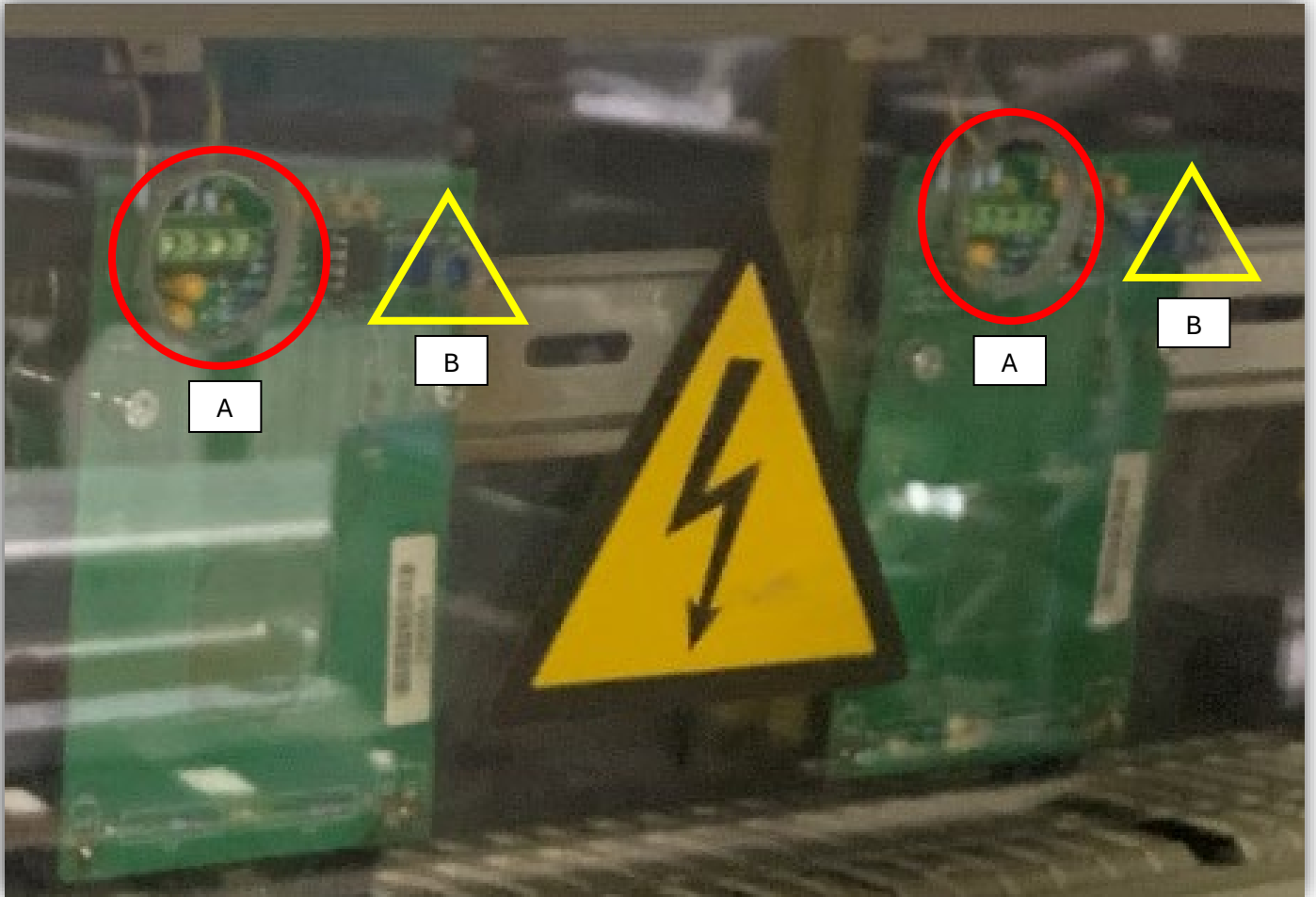


Image 3 – [A] Close up of manufacturers voltage measurement access through plexiglass cover. [B] And access points for maintenance personnel to measure voltages (0-10volts, 7 volts target) with screwdriver access holes.

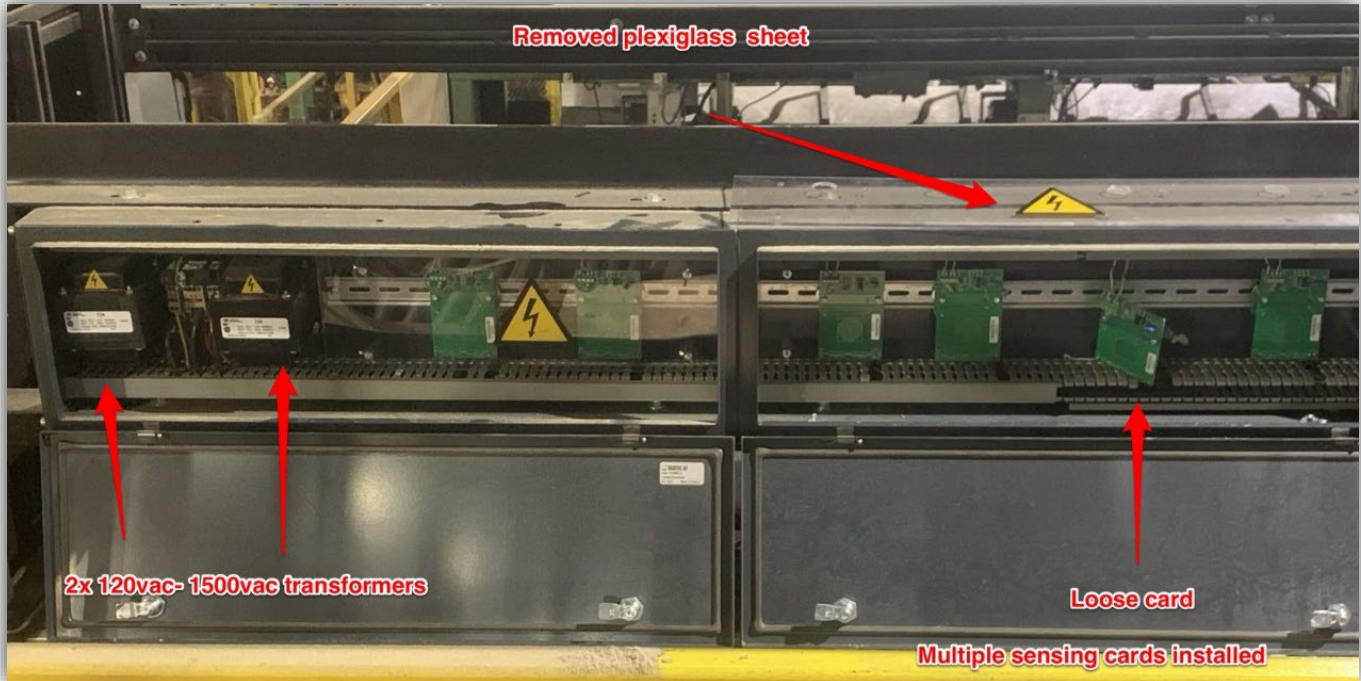


Image 4 - Front view of the machine - Locations of transformers, various sensing cards and exposed metal brushes that make contact with veneer sheets during process.





Image 5 - Sensing brushes below with 7Vac sensing circuits measuring moisture in sheets as they cross the brushes to 0-volt sensing brushes.

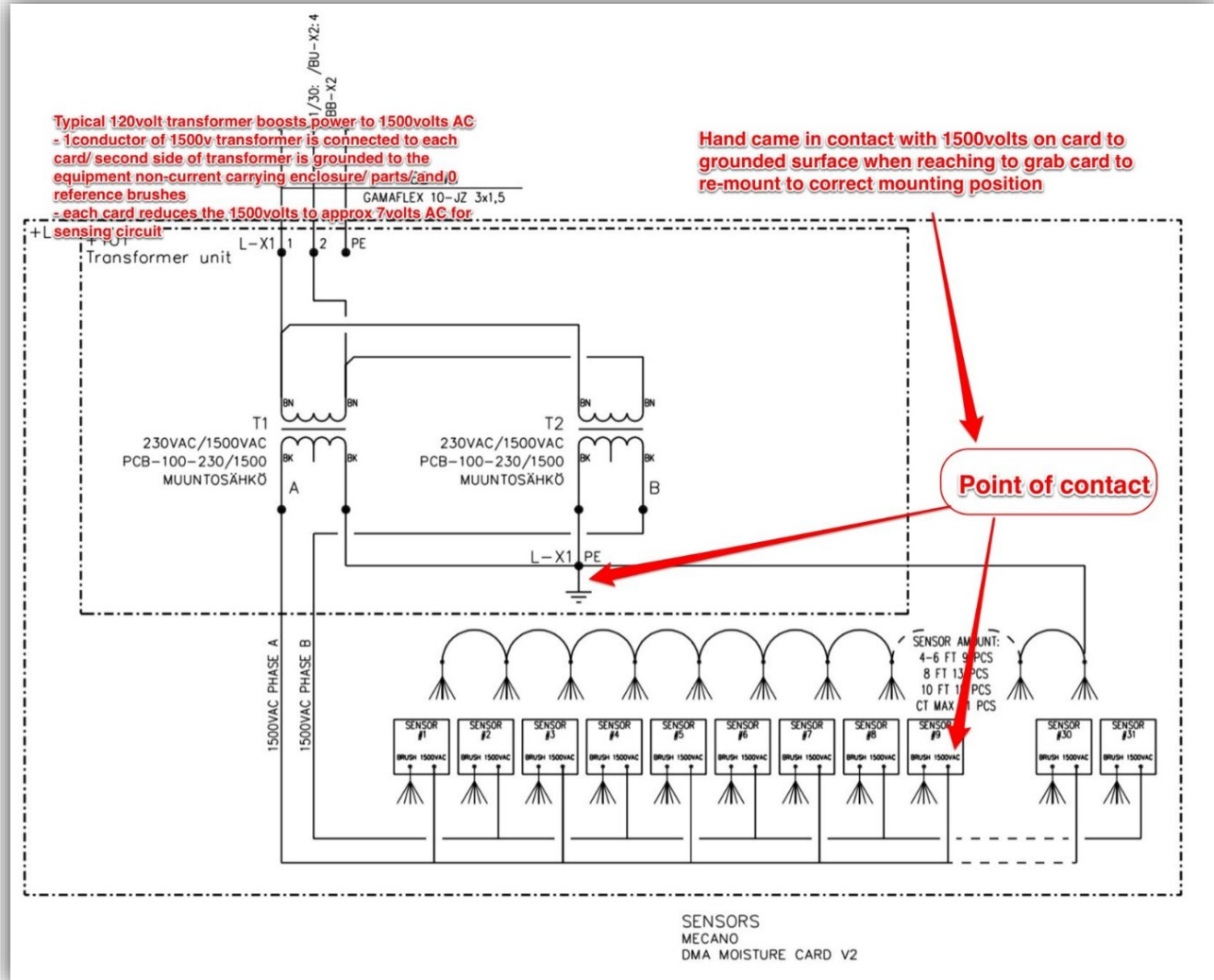


Image 6 - Copy of 1-line diagram retrieved from manual obtained by duty holder after the incident notes:

- 1500volt connections to sensing cards.
- Cards reduce 1500volts to 0-10volts to complete circuit.
- Communications are sent from cards to PLC.
- Point of Contact was created by physical contact with card at the point where 1500volt conductor is applied to any grounded surface.