

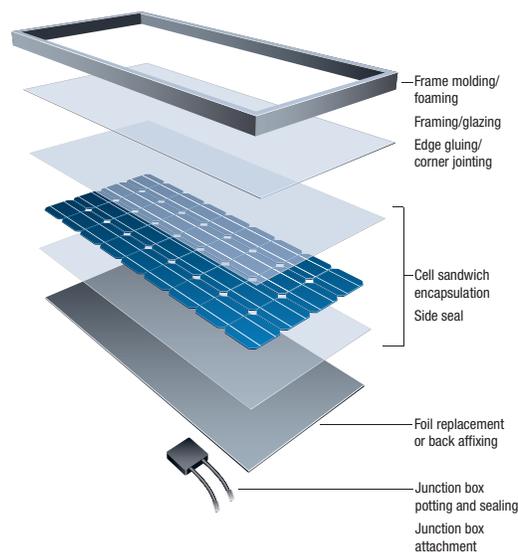
Nordson® Solar Solutions

Helping you reduce production costs of high-quality crystalline photovoltaic (PV) modules

As reaching grid parity is paramount to solar energy's acceptance as a renewable energy source, one of your biggest challenges is cost-effective production of reliable, long-lasting PV modules.

Your ability to realize economies of scale in both purchase of materials and development of efficient processes is essential to reduction of production costs. With more than 50 years experience in precision dispensing technology, Nordson can help you best utilize materials and production.

From improving existing processes to development of new ones, Nordson can help establish product consistency and reliable, repeatable production. This means you can most efficiently use your resources to produce durable PV modules.





Lower Material Costs

Nordson helps you realize lower material costs by allowing purchase of dispensable material in larger bundles. Our systems help protect integrity of materials from problems such as contamination or premature curing. As threat of material degradation and loss of physical properties is diminished, you can start using pails or even drums of material rather than more-expensive, small-volume cartridges.

Through our years of experience, Nordson has worked with virtually every dispensable material including:

- hot melt adhesives, such as ethylene vinyl acetate (EVA)
- butyls
- cold liquid adhesives
- polyamides
- warm and cold silicones
- sealants
- moisture-curing materials
- TPS
- two-component materials

This means we can help you determine the best material in the most efficient form for each of your PV module assembly processes. Whether you need liquid or pellets or solid materials, Nordson has an unloader or melter system for you.

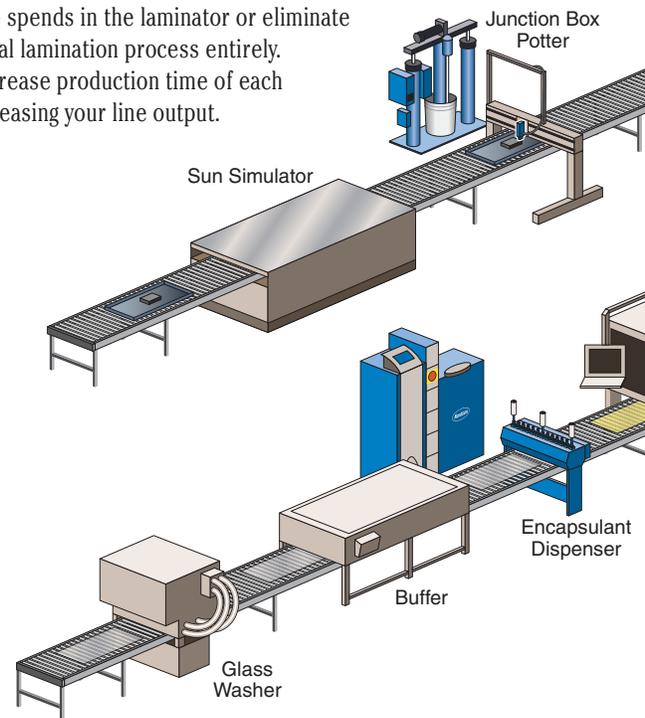
One example to reduce material costs is automating application of sealants/silicones from pails or drums to replace handgun or manual cartridge use in framing or junction box attachment. This change immediately reduces material costs as sourcing larger bulk material is less expensive than cartridges and involves less money and space tied-up in inventory. And, your process will improve as automated dispensing replaces manual application which is both labor intensive and lacks consistency, which impacts your product quality and total material use. Even waste is reduced through elimination of numerous used cartridges which must be disposed of, while drums and pails may be returned to suppliers.

Improve Production Processes

Nordson systems help improve module production further by introducing dispensing techniques previously not common to PV module assembly. This can help significantly shorten the time for each production process and increase output by removing bottlenecks.

You can produce whatever patterns you need throughout your assembly process. Solid or foamed dispensing can apply beads, tape-like films or spray patterns for reliable bonding and sealing.

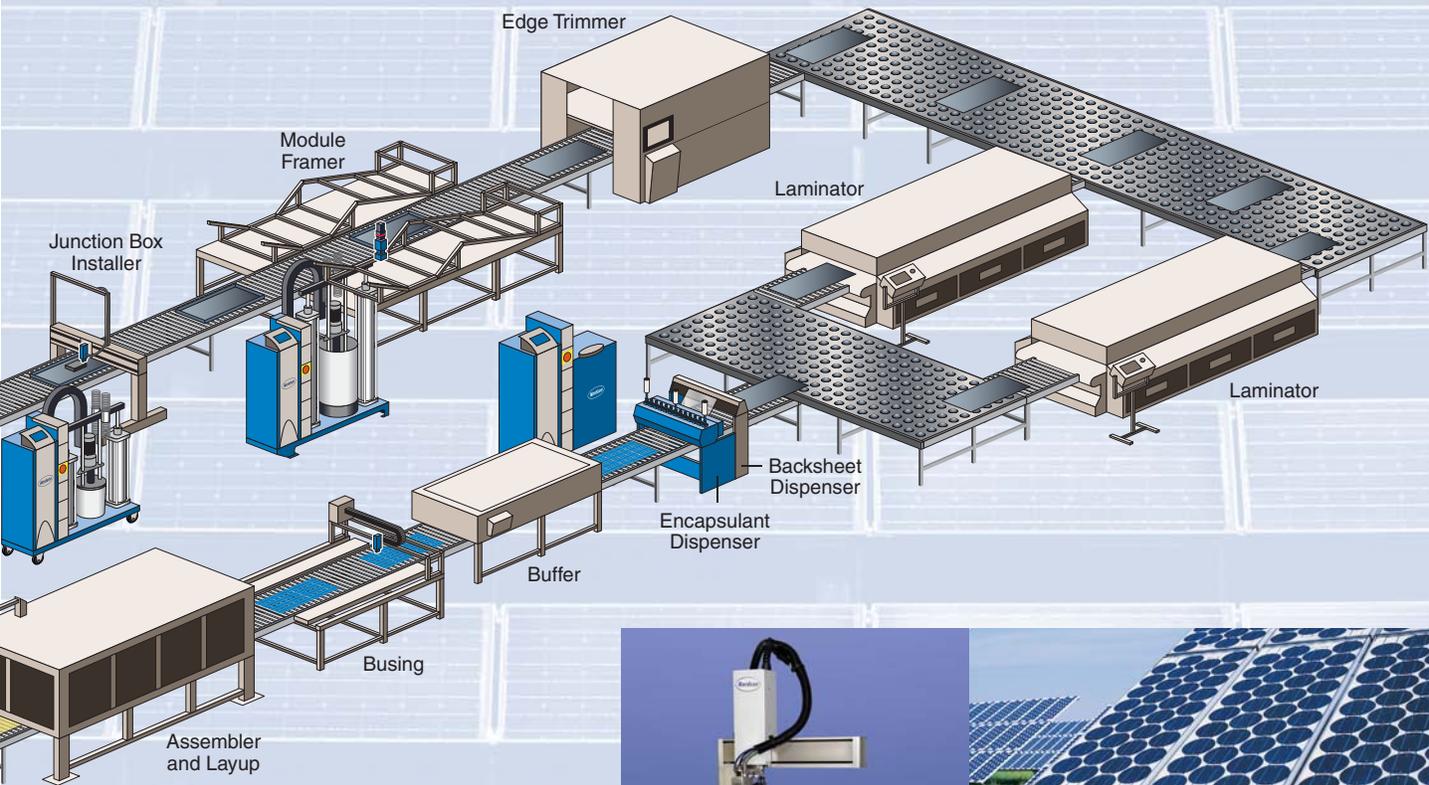
Typically EVA sheets are used to form the encapsulation sandwich for solar cells. This involves placement of separate top and bottom EVA sheets which then require prolonged time in a laminator to produce the weather-tight sandwich. Dispensing molten or liquid materials as a film in place of EVA sheets can significantly reduce the time each module spends in the laminator or eliminate the traditional lamination process entirely. This can decrease production time of each module, increasing your line output.

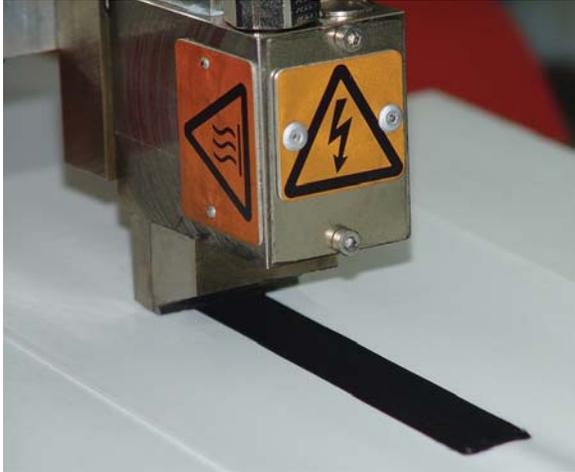


Improve Durability

PV modules are subjected to harsh conditions but must remain impenetrable for decades. The materials and processes used during assembly must protect the internal module components from moisture and corrosion for the modules' lifetime. While the material itself must provide the barrier, the application of the material is also critical. Precise, consistent application, both volume and position, must be maintained to avoid potential gaps or voids of material. Either too little or too much material can allow moisture ingress and corrosion.

Nordson has dispensing systems that offer precise metering of material and maintenance of pressure, even during production start-ups or slowdowns. The control systems allow easy development of precise patterns that can be stored or retrieved as needed. And, use of a Nordson verification system allows inspection of the material to check volume and placement within your defined tolerances.





The Green Commitment

While development of solar energy and thermal heating is inherently “green”, Nordson’s involvement is broader. As most of our customers are manufacturers of a wide variety of consumer and industrial products, helping them more efficiently use materials and processes ultimately helps us all. Faster, more efficient production allows manufacturers to better utilize equipment, both reducing consumption of energy to produce each piece and increasing equipment utilization. Additionally, more controlled, efficient production can reduce scrap and waste generation.

Please contact Nordson solar solutions today to see how we can help you efficiently and effectively produce durable, high-quality PV modules.

The Nordson Offering

Nordson offers a full line of systems to help you most efficiently and effectively use materials and processes. Products including pumps, melters, applicators, controls and verification systems easily integrate into manual, semi-automatic or fully-automatic production lines. And, an ongoing commitment to research and development regularly results in new processes and applications.

Through our years of experience, Nordson has developed a worldwide support network. A locally-available, global team of highly-trained, knowledgeable engineers, service technicians and 24/7 support staff help you develop, install and maintain dispensing solutions for your solar product assembly. Our people are supported by an infrastructure that includes research facilities, test laboratories and parts distribution warehouses in locations throughout Europe, Asia and the Americas.

Our worldwide team supports you before, during and after the sale to develop the right solution for your PV module assembly production.



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