White Paper

ADVANTAGES OF

Tankless Adhesive Melting Systems For End-of-Line Packaging

Nordson

Nordson Corporation

For carton sealing, case sealing, tray forming and a host of other packaging applications, the deposition of thermoplastic (hot melt) adhesives has long been a popular method. Depending on the basic functionality desired, production environment and application requirements greatly impact the choice of melters. Fortunately, a wide variety of melters with a choice of system controls, melt technologies, tank capacities, pump types and output connections are readily available to today's packagers.

Many packagers are always on the lookout for ways to reduce waste and increase reliability on their lines. After all, adhesives are produced using petroleum, energy and water. The constant change and volatility in petroleum-based resins and prices for key raw materials places significant strain on packaging manufacturers.

The once-prevalent practice of placing a liberal amount of adhesive on a package to ensure a strong seal or bond is no longer economically or environmentally feasible. Today's packagers demand new options that will overcome these challenges while preserving the integrity of their processes and financial bottom lines. The new melter technologies go a long way in meeting these objectives.

Traditional tank-based adhesive melter systems, prevalent on packaging lines today, have several operational drawbacks, related to the way the hot melt adhesive is handled and heated. These drawbacks include:

- **Messy manual filling** of adhesive from large boxes or bags. When operators scoop and pour pellets into the melter tank, spillage is almost inevitable.
- **Danger of adhesive running out,** stopping the line.
- **Overfilling by operator.** In order to spend less time running back and forth to keep the tank filled, well-meaning operators may fill the tank to the top, even to the extent of leaving the tank lid ajar to accommodate the overfilling. This increases the possibility of contaminants getting into the tank or adhesive spilling onto the shop floor. Overfilling also results in broken tank lids, which often happens in the morning when the operator tries to open a tank lid that is glued shut.
- **Thermal shock during refilling.** Adding an unusually large amount of adhesive to a melter at once can cause the adhesive temperature to dramatically decrease. The melter must melt the influx of new adhesive and return to its set operating temperature, often causing a temperature swing. Adhesive that is applied to a package during this cycle, at less than optimal temperature, may not bond properly, creating product waste and quality rejects.
- **Buying a bigger tank system than** needed, just to avoid filling it as often. Production-oriented buyers tend to over-specify tank capacity to reduce filling frequency. An oversized tank increases the amount of material at temperature at any given time, resulting in thermal degradation of the material and energy consumption. Instead, the specification of an adhesive melter should be based on machine speed, volume needed and necessary melt rate of the adhesive material.

- **Sludge Buildup.** Over time, sludge develops in the bottom of tanks due to the chemical changes occurring due to large amounts of molten adhesive. Increased maintenance, cleaning and line downtime can result.

- **Charring.** Time, temperature, exposure to atmosphere and inconsistent liquid levels in a traditional tank melter lead to charring of the adhesive. Charring is the oxidation of hot melt adhesive at elevated temperatures due to prolonged and repeated heating.

Packaging-line impact of charring

Charred adhesive material can cause production downtime. Charred hot melt, if not filtered out or otherwise removed from the system, can accumulate in hoses and clog nozzles, potentially damaging the equipment. Time-consuming manual cleaning is necessary to remove charred adhesive from the tank.

Charring can also cause dispensing problems. Beads of adhesive missing from the programmed application pattern, or in the wrong area of box, can damage the integrity of the package. Char-related dispensing problems are difficult or impossible to predict. In each case, the line stops until the problem is corrected.

Missing beads in an adhesive pattern can lead to "pop opens" after application, somewhere in the supply chain. Pop opens at the retail location may damage the packer's quality reputation.

Increased maintenance, including draining and cleaning of the tank, or changing of filters, is a common occurrence in an attempt to solve the problem. Arguably the best way to overcome the drawbacks of the tank-based melter system is to eliminate the tank altogether.

Tankless systems

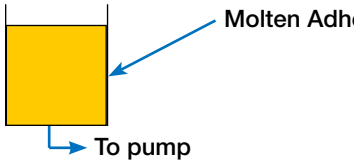
Integrated tankless melter and fill systems (such as Nordson's Freedom® and ProBlue Liberty™ models), are designed to minimize the need for operator interaction. Both systems deliver adhesive, energy and maintenance savings, improving productivity.

Here's how they work: a sensor monitors molten adhesive levels in the melter and small amounts of material is automatically added to the system when adhesive is needed. Melt-on-demand technology means the system melts only what is needed, when it is needed. The closed system minimizes adhesive degradation due to prolonged

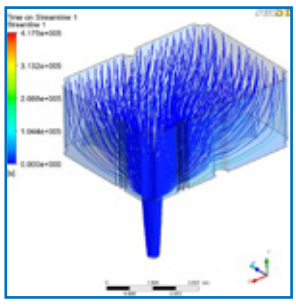
Tankless Melters

Understanding the Benefit-Reducing Residence Time (how long the adhesive remains in the melter)

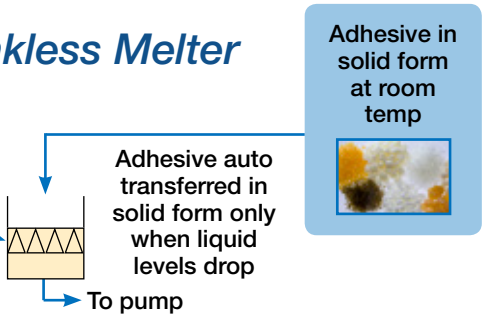
Tank Melter



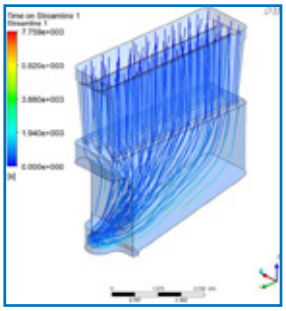
- Typical "tank" holds 5-20 lbs of molten adhesive

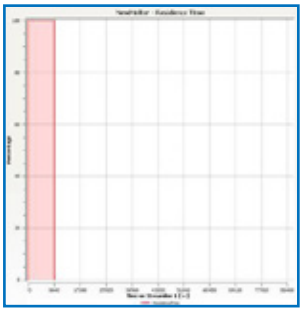


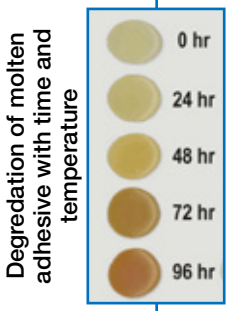
Tankless Melter



- Tankless holds estimated 1 pound of molten adhesive
- High efficiency heat exchanger melts only what is needed, when it is needed







Computational Fluid Dynamic studies conducted and lab proven to ensure Nordson's tankless architecture supports "first in, first out" -adhesive added is the first to be processed; reducing time and thermal stress on adhesive.

Nordson

thermal exposure, temperature variations and minimizes exposure to the airborne contaminants found in most production plants. Tankless designs also reduce energy consumption. The ProBlue Liberty system uses 10 percent less energy than traditional tank systems, while the Freedom system provides up to 38 percent energy savings over traditional tank systems.

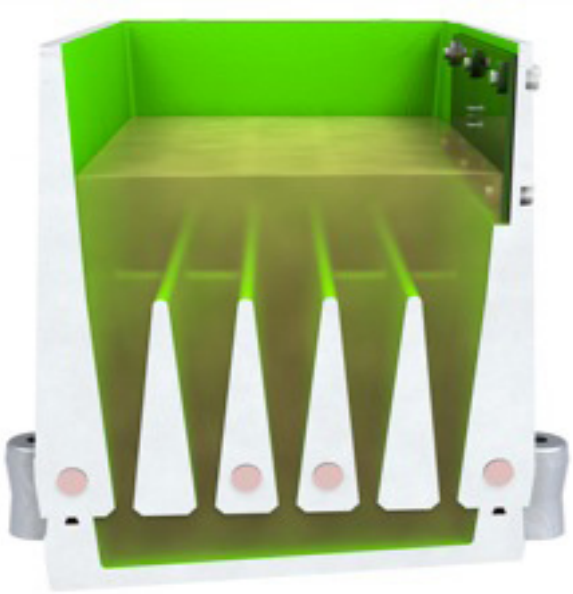
While the typical tank system holds 5-20 pounds of molten adhesive, a tankless system holds only one pound of adhesive at application temperature. A high-efficiency heat exchanger makes this melt-on-demand technology possible.

Adhesive fill system transfer hoses and hot melt hoses are available in a variety of lengths, allowing for location flexibility. A disposable melter filter eliminates the need for routine filter flushing reducing periodic maintenance. Service, maintenance and daily operation can be performed from one side of the melter reducing floor space required to accommodate the melter's service envelope.

This concept also minimizes the need to oversize a melter based on tank size. The integrated fill system provides as much adhesive as needed for most end-of-line applications.

Other features included on Nordson's tankless systems may include:

- Status-at-a-glance graphic controls make system monitoring easy.
- Automatic pressure discharge valve relieves system hydraulic pressure in seconds.



- Quick-disconnect power and I/O plugs and a patented, quick-release base design simplify set up.
- Plug-in modules shorten downtime because users can quickly add and remove hoses and applicators.
- Easy-access board fuses, quick-disconnect electrical replacement elements, and front-access filters, pump and controls make maintenance easier.
- EcoBead™ intermittent bead pattern generators, integrated into all the Freedom systems, and available with ProBlue Liberty systems, save on adhesive consumption with the push of a button.

In contrast to a traditional tank system, which must be refilled 1-4 times in an 8-hr. shift, Nordson tankless sys-

tems can run multiple shifts with no operator interface. This frees up an operator for other tasks.

An analysis of your packaging line, throughput, cost of adhesive, cost of downtime, and other factors must be taken into account to determine the payback time for a Nordson tankless adhesive dispensing system. A comparative estimate of the savings and ROI for a Freedom system using an assessment tool and different variables is shown on the following pages.

Instead of throwing money (and hot melt adhesive) at your case-packing operation, it will be worth your time to study the alternatives. Tankless adhesive systems may prove to be the investment in smart dispensing you need.

For more information:
Duane Fisher
Strategic Marketing Manager
Nordson Corp.
duane.fisher@nordson.com

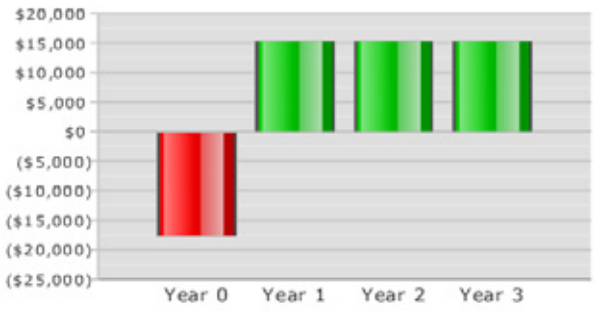
Nordson Corp. Corporate Headquarters
28601 Clemens Road
Westlake, OH 44145 USA
Telephone: 440.892.1580
www.nordson.com

ProBlue Liberty™ Adhesive Dispensing System

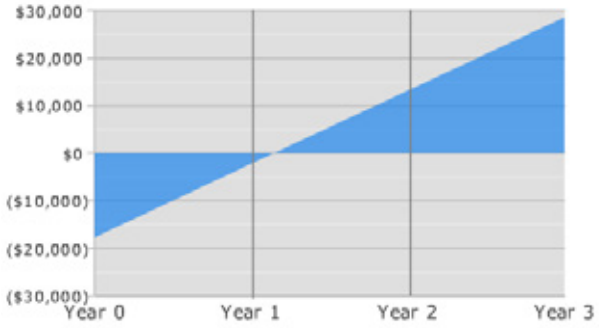
Why invest in Nordson tankless hot melt processing equipment?

ROI in Months: 13.72

Typical Retail Investment & Savings

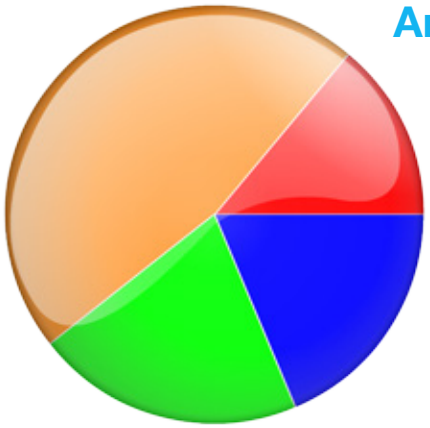


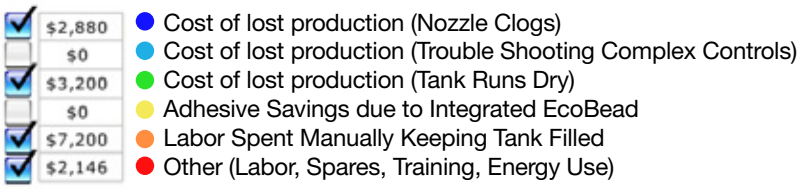
Cumulative Savings



Annual Savings: $15,426

Annual Savings Breakdown





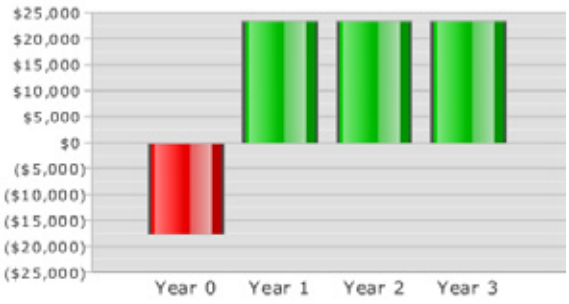
- Tankless systems offer a return on investment in the form of operational efficiencies.
- Typical payback in as little as 12 months
- Efficiency gains in…
  - Cost of lost production due to nozzle clogs
  - Cost of lost production due to tank running dry
  - Labor spent manually keeping tank filled
  - Reduction in spare parts (i.e. nozzles, filters)

Freedom® Adhesive Dispensing System

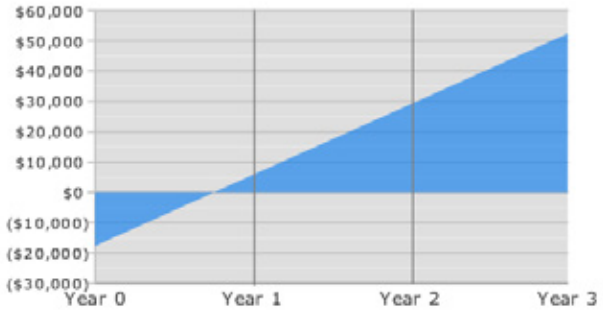
Why invest in Nordson tankless hot melt processing equipment?

ROI in Months: 9.05

Typical Retail Investment & Savings

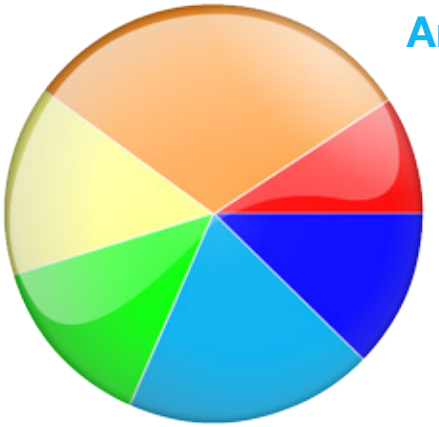


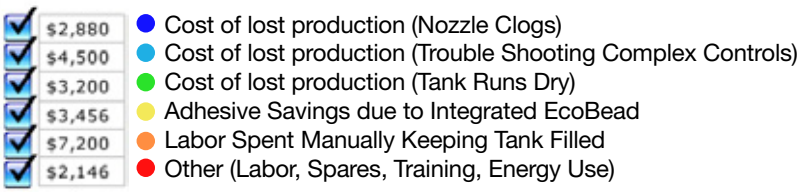
Cumulative Savings



Annual Savings: $23,382

Annual Savings Breakdown





- Nordson's Freedom System with the proprietary integrated EcoBead™ Pattern Generator increases annual savings and further reduces the payback time.
- Payback in some cases may be below 12 months
- Efficiency gains in…
  - Cost of lost production due to nozzle clogs
  - Cost of lost production due to tank running dry
  - Labor spent manually keeping tank filled
  - Reduction in spare parts
  - Reduced adhesive consumption
  - Cost of lost production due to complex controls and diagnostics