

The Parts of a Puzzle

Are your replacement parts purchasing decisions increasing the productivity of your machines? Or, are they costing you money?

If your hot melt system parts purchases are made based on price alone, you may find that additional downtime is costing you much more than you are saving on the initial purchase.

Success in business results from many factors, but it can be summed up in a simple equation:

Performance + Productivity = Profit

You can expand this definition but, at a minimum, a) performance means meeting quality goals and customer expectations; b) productivity occurs with maximized output and minimized downtime, and c) profit includes available funds for future expansion and product improvements.

In business, as in life, it's often the little things that count most. In this case, those 'little things' are the wear parts that you replace to keep your machines up and running at peak performance.

Years ago, it was common to proactively replace wear parts at predetermined intervals, whether or not those parts had failed. This practice has nearly disappeared today. Manufacturers seek to increase productivity by minimizing maintenance downtime while, at the same time, reducing maintenance costs

by operating components until they actually fail.

This strategy can be successful if component life is both long and predictable. It is especially beneficial if the components can provide a warning of impending failure. However, it is mandatory that the component provide the quality that you require, whether

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that quality is in the adhesive-pattern integrity, the temperature control and uniformity, or any of a number of other factors.

Today's disposable-product production machines are running faster than ever, and speeds continue to increase. As manufacturers make more products on fewer machines, every part of the production process is pushed to new limits. Meeting these challenges takes dedicated effort, determined engineering and reality-based testing. It also

takes vendors who prove their commitment to continuous improvement by investing significant resources -- such as time, money and people -- in developments that stay one pace ahead of your performance requirements.

Nordson Corporation is such a company. With a corporate commitment to invest five percent of its sales each year in research and development and a proven track record for selling start-of-the-art material-application systems and components, Nordson is developing the solutions today that you will need to meet your production requirements tomorrow.

This quality and performance extends to the spare parts you require. The following pages detail the research, the processes and the improvements that ensure parts you purchase from Nordson work better, last longer and are competitively priced. Why use anything else?

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If Parts Made by Nordson...

WORK BETTER,

Performance improvement -- *continuous* performance improvement -- is a critical component of increased productivity. Depositing the proper amount of adhesive in the proper place on your product involves many factors. These variables include temperature and pressure, as well as the quality of the manufacturing processes used in the production of the adhesive application equipment.

Nordson leadership in performance improvements is evident in the following examples:

Nozzles. Achieving performance-enhancing designs of an adhesive application nozzle entails many hours of development and testing. Nordson has pioneered techniques to measure the performance of nozzles -- testing that has resulted in optimal designs.

To fully appreciate the quality of a Nordson CF nozzle, you have to take a closer look. The performance of a nozzle is only as good as the quality of the manufacturing process. A nozzle with holes drilled off center or holes filled with burrs greatly impacts pattern quality and performance consistency. Take a close look and compare Nordson nozzle quality with the quality of competitive nozzles. The difference will be clear. Even if the competitive nozzles cost less to purchase, can you entrust the productivity of your production line to such clearly inferior parts?

Sophisticated manufacturing techniques developed by Nordson result in high-precision nozzles. Since this method is highly automated, nozzles are consistent from batch to batch. However, the commitment to quality does not stop here. State-of-the-art inspection equipment allows thorough checking of all aspects of the nozzle. Furthermore, statistical process control methods are used to keep all critical parameters within specifications, thus preventing any quality problems from arising.

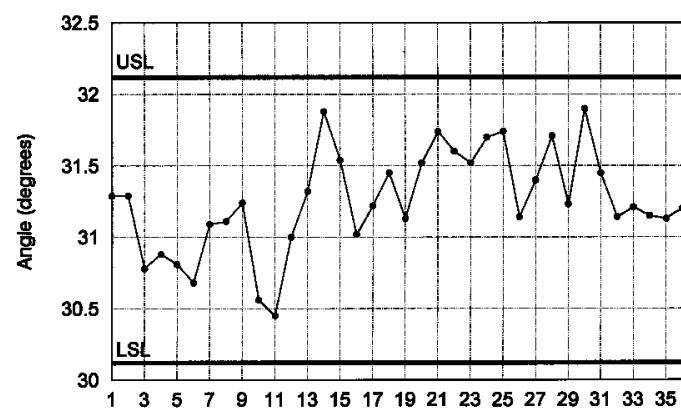
Extrusion Modules and Valves. Nordson modules and valves are assembled with highly automated processes that assure high quality and consistency in performance. After assembly, all modules are subjected to rigorous testing to ensure that they meet critical performance standards.

Developing the technologies that will result in success for your business requires major investments in research and development. The Nordson staff of researchers is constantly seeking ways to improve existing technologies and working toward the new technologies of tomorrow. The latest state-of-the-art techniques are utilized in this pursuit.

Hoses. Stable temperature control is critical to maintaining consistent adhesive temperatures. Adhesives used in disposable-products applications have viscosities that are very sensitive to changes in temperature. A mere 10°F swing in temperature can

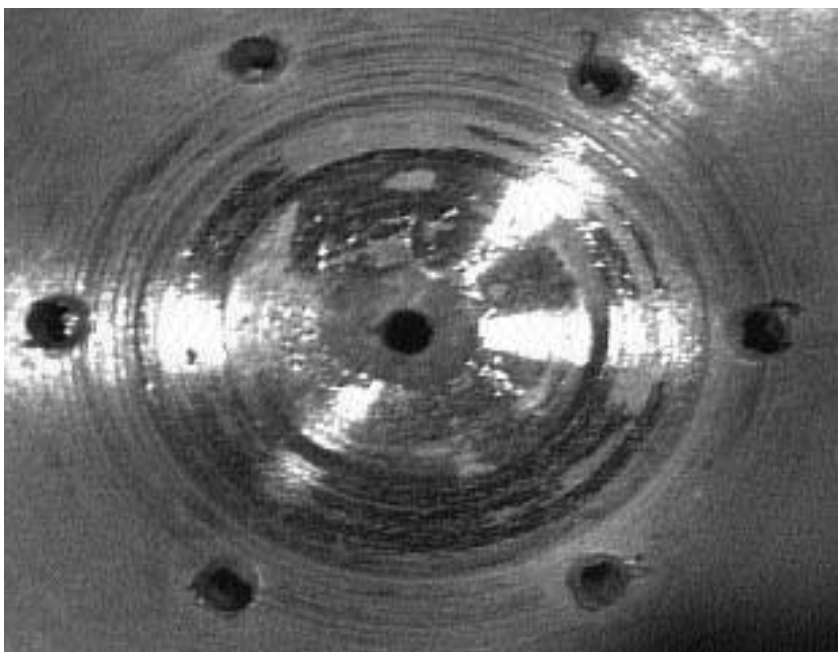
'Work Better' is continued on page 4. →

Controlled Fiberization Nozzle Statistical Process Control

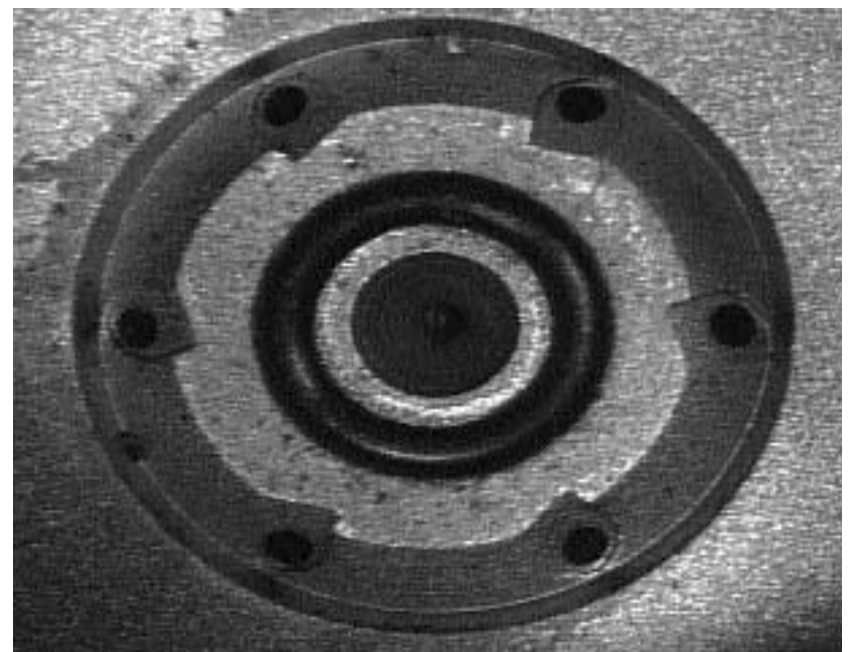


Nordson has pioneered techniques to measure the performance of nozzles -- testing that has resulted in optimal designs. In the example above, statistical process control methods are applied to keep all critical parameters within specifications, thus preventing quality problems from arising.

Nordson modules and valves are assembled with highly automated processes that assure high quality and consistency in performance.



The performance of a nozzle is only as good as the quality of the manufacturing process. A nozzle with holes drilled off center or holes filled with burrs (above) greatly impacts pattern quality and performance consistency.



When you take a close look and compare Nordson nozzle quality (above) with the quality of competitive nozzles (like the one on the left), the difference is clear.

LAST LONGER,

Continuous improvement of products and services is a cornerstone of Nordson Corporation. This is reflected in Nordson's 1996 investment of more than US\$29 million in research and development. A direct benefit of this investment comes to our customers in reduced operating cost from improved equipment.

The improvement process starts on the drawing board when the product is being designed. After initial optimization and sales release, the product then finds a home in our product-performance laboratories.

In these labs, modules are tested for millions of cycles, hoses are coiled and uncoiled under pressure, motors are run under load and circuit boards are operated in extreme conditions. These tests and many others ensure that the products meet required performance criteria and determine failure modes for possible improvement. After the primary failure modes are determined and analyzed, the products are enhanced and put back into test.

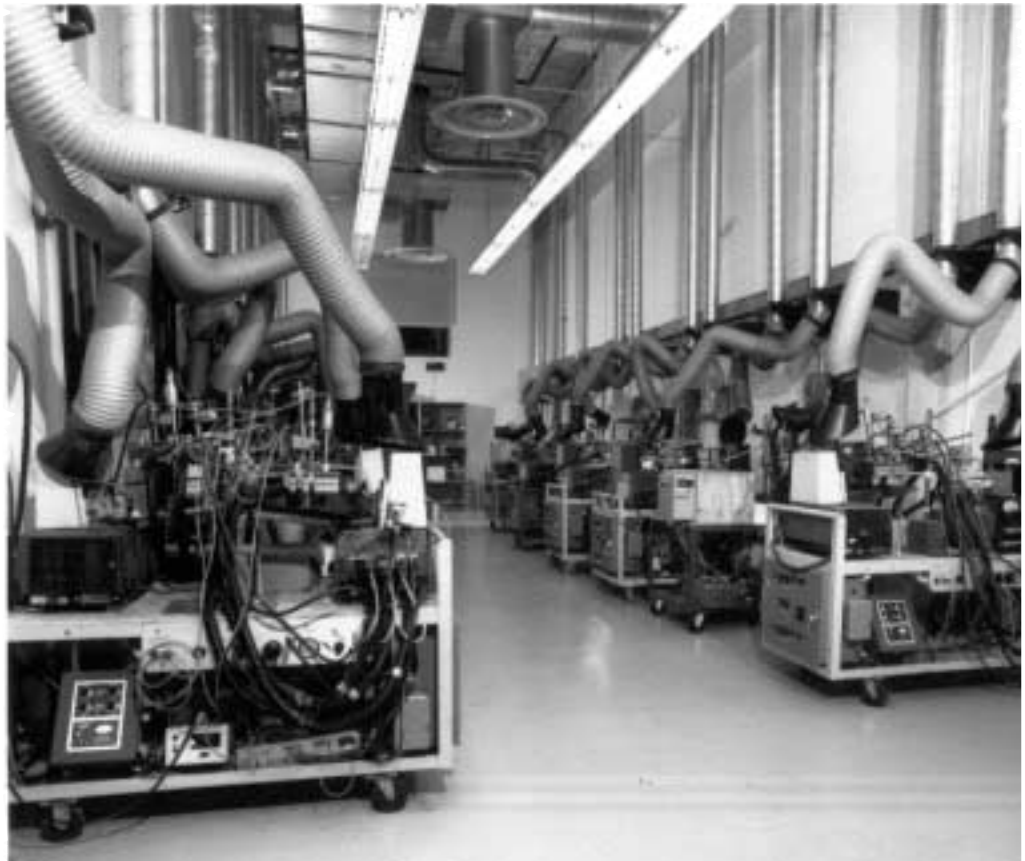
This is a never-ending cycle at Nordson, and it has produced some impressive results. Here are a few examples:

Nozzles. The primary cause of nozzle failure in any hot melt system is cleaning. In standard running conditions, nozzles seldom wear out from abrasion due to adhesives or substrates. When nozzles are clogged with char or debris, they are removed and cleaned. This is when most nozzles are damaged to the point that they require replacement.

Nordson has taken several steps to help extend the life of its nozzles. The first action does not even involve the nozzle. Nordson systems offer better process control, filtration and hose design, all of which help prevent the formation of char and the accumulation of debris in the hot melt system. This improves nozzle life since the nozzles do not have to be removed and/or cleaned as often.

Another Nordson innovation that extends nozzle life is the use of steel on all wear surfaces. Controlled Fiberization (CF™) nozzles are now available in a special high-thermal-conductivity steel to help resist damage during cleaning. Bead nozzles have a special stainless-steel insert to help them last longer.

'Last Longer' is continued on page 4. →



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PRICED COMPETITIVELY,

Here is a parable that illustrates the short-sighted benefits of 'saving money.' The setting is the 1970s, during the energy crisis in the United States.

Once upon a time there was a man named Frank Frugal. Energy prices were soaring, and Frank was determined to reduce the cost of his monthly energy bill. He had seen an advertisement for a chain saw for only \$200. Based on his calculations, he could save \$200 on his heating bill in only three months if he didn't use as much electricity to heat his home. After all, he already had a truck for carrying the wood and a friend that had plenty of forest where he could cut wood for free.

So, Frank bought his saw, and he was ready to start saving money.

It was an hour-long drive to his friend's farm where he could cut his wood for free, so he got an early start one Saturday morning. On his way, he felt it may be best to invest in some safety equipment. He purchased shoes with steel toes and other safety guards to prevent possible injury. One hour and \$150 later, he was back on his way to the mountains. It took four hours to cut enough wood to fill his truck, and he was on his way home.

Unfortunately, as he was leaving the forest, he encountered a protruding rock that punctured one of his tires. The rest of the afternoon was spent unloading the wood, lifting his truck and removing his tire. He walked out of the forest carrying his tire to his friend's house. His friend then took him to a repair shop where he found the tire would cost \$250.

By the time he returned to his truck, after buying his friend and his family lunch for driving him to the garage, it was close to nightfall. He proceeded to put on his new tire and reload the wood. Finally, he was on his way home with his 'free' load of wood.

When he arrived at his house, his family had already eaten dinner. After eating a cold meal alone, he took a shower and went to bed, deciding to unload the wood the next morning.

The following morning, he unloaded his wood and drove to the rental store to rent a hydraulic wood splitter. They were offering a special Sunday price of only \$40 for the day. Sunday night, after spending the day unloading and split-

'Priced Competitively' is continued on page 4. →

Then Why Buy Anything Else?

'Work Better,' continued from page 3.

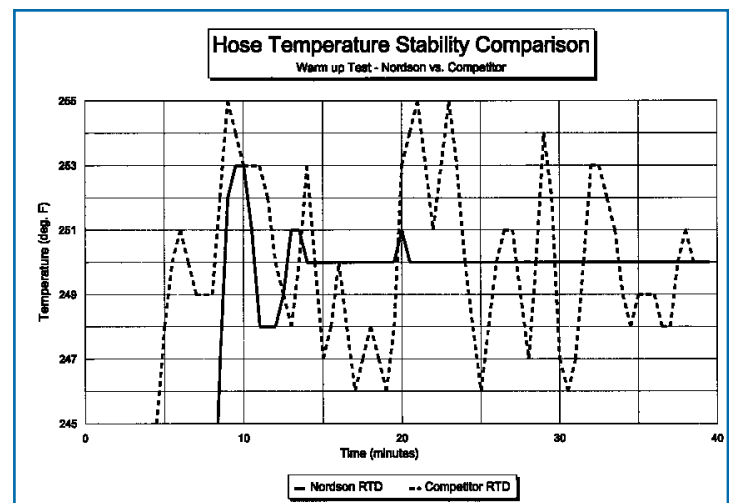
easily translate into a viscosity change of 30 percent. Such a dramatic change affects the performance of even the most robust application process, thus causing unacceptable variations in pattern characteristics. This can mean the difference between a successful and an unsuccessful application.

Nordson assures stable temperature control by using low-watt-density heater elements closely spaced. This design provides more uniform heat transfer and, thus, a more consistent temperature distribution.

Accurate temperature control is important both for bringing the adhesive up to the proper temperature and for maintaining the temperature within narrow limits. Adhesive residence time in hoses tends to be greater than the residence time in most applicators. Therefore, the temperature of the hose plays a major part in the final adhesive temperature.

By the nature of their construction, it is particularly challenging to control the temperature of adhesive in a hose. Through many years of experience, Nordson engineers have developed designs to achieve this important performance requirement.

Nordson utilizes highly automated hose-manufacturing assembly processes to assure consistency and quality. Hose components are calibrated prior to assembly, and they are precision-wound. These extra steps ensure that resistance and control values match, eliminating the need for temperature-control calibration at installation. Also, Nordson hoses feature area-temperature sensing, which greatly improves thermal accuracy.



Nordson assures a more stable temperature control than its competitors (illustrated in the chart, upper right) by using watt-density heater elements closely spaced.

Nordson hose components (immediate right) are calibrated prior to assembly, and they are precision-wound.

'Last Longer,' continued from page 3.

The third improvement is the single piece, or 'unibody', nozzle. Unibody CF nozzles are manufactured with a special orbital-forming process that combines the nozzle disc and retaining nut into a permanent, single piece. This process strengthens the nozzle and allows it to withstand more abuse.

Extrusion Modules and Valves. Nordson has invested significant research and development resources to extend the life and performance of all of its various modules and valves. In a recent test under rigorous conditions, the average module life was measured at more than 75-million cycles.

These life values are unparalleled in the industry. They result from the technological edge Nordson gains from continuous, intense testing. Over the past few years, the improvements that have grown from this testing include several changes to the internal seal design, improved assembly fixturing and practices, and increased assembly automation. Every module built is factory tested to ensure proper performance.

We are introducing a new version of our Meltex® adhesive module that does not require oiled air for long operating life. And, we will soon implement material changes in the modules to improve consistency and manufacturability. These

changes and others to come are testimony to the fact that Nordson is committed to continuous improvement and to reducing service and parts costs for its customers.

Hoses. Nordson flexible hoses have undergone a radical re-design over the last several years. We have eliminated all chlorine-containing agents in the construction of the hose to help prevent any electrical-contact corrosion. We use a technologically advanced insulating material that is machine-wound onto the hose during manufacturing to provide consistent protection and performance. The measured life is now dramatically up from an already impressive figure.

All Nordson-manufactured hoses are built on automated, custom-designed hose-winding machines. This manufacturing process is unique in the industry. By ensuring an even pitch for the heater, control wires and insulation, the possibility of hot and cold spots is minimized, which extends the life of a hose. This method results in a consistently flexible heating and controlling device, and it yields benefits in the performance and longevity of our hoses. Nordson-designed and -manufactured hoses are also available for competitive hot melt systems, providing the same life and cost benefits realized with Nordson and Meltex systems.

'Priced Competitively,' continued from page 3.

ting the wood, Frank sat down to admire his work and to calculate his actual savings. Based on his earlier calculations, he was going to pay back the \$200 chainsaw investment in only three months. Thus far, he had spent:

Chain saw:	\$200.00
Safety equipment:	\$150.00
Replacement tire:	\$250.00
Lunch for friend:	\$ 50.00
Rental for splitter:	\$ 40.00
Gas for truck:	\$ 30.00
His labor:	\$ 00.00
Total Expense	\$720.00

After his first weekend cutting wood and 'saving money,' Frank decided he would rather sell his chainsaw for \$100 to a friend and enjoy his family on weekends.

You may be asking yourself: Why has a parable about cutting wood been placed in an article about spare parts for hot melt equipment? Unfortunately, there are many similarities to the wood-cutter's parable.

When reviewing replacement costs for spare parts, too often the comparison is based on the price of the product itself (the chain saw). Little time is spent looking at the time it takes to replace the hose (the time spent driving to the friend's farm) and the unexpected time it takes to disconnect and reroute the hose (unload the truck, change the tire and reload the truck). One cannot ignore the time spent by the maintenance personnel to make the change along with the time the machine is down and not making product (the wood-cutter's drive to and from the forest as well as the quality time he is not spending with his family).

Too often we all make decisions based on only the facts and figures we wish to view. Too often we either do not know or we ignore the nontangibles associated with a decision. When we look at 'saving money,' we need to look beyond the initial investment and consider all of the associated costs before we conclude we have really saved money.



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Send address corrections and correspondence to its editor, Carl Cucuzza, Nordson Corporation, 2905 Pacific Drive, Norcross, Ga., 30071, U.S.A. Telephone: (770) 497-3400. Facsimile: (770) 798-8200.

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