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NYLOK'S COMPLETE TESTING CAPABILITY GUIDE



A report by
Jake Proctor

INTRODUCTION

Although not a lab for hire, Nylok's New Product Development (NPD) lab has been equipped with several key pieces of test equipment. After a major renovation in 2015, the 2,000 square foot NPD lab was ready for use by a team of skilled engineers and interns. From testing characteristics of the fastener itself, to testing full assemblies

held together by fasteners, Nylok has built a well-rounded arsenal of tools. Over the past several years, the equipment has been used for a range of reasons from qualifying new products (like [NyShield®](#) and [NySeal® 2.0](#)), to testing the limits of the mainstay products (such as [Blue Patch](#) and [Precote 80®](#)), and everything in between. This paper aims to cover the team's capabilities, as well as highlight some of the equipment used in the NPD lab.

ATLAS COPCO PF6000 DC NUT RUNNER

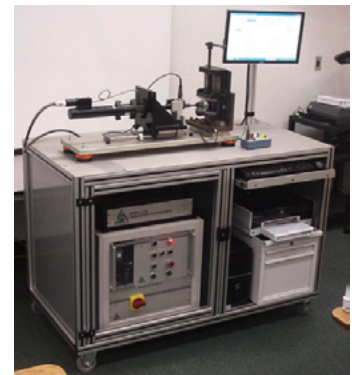
To start, Nylok's NPD lab is set up with an Atlas Copco PF6000 DC nut runner. The DC nut runner is one of the newer pieces of equipment and has played a vital role in new product qualification tests. The PF6000, in combination with a range of assembly tools, was designed to install fasteners at specific and customizable installation torques and rates. For example, the tool can be set up to install an M10 fastener in one to four stages where each stage's installation rate, and target torque can be specified.



This installation strategy can then be saved onto the controller for later use. The tool operator can set and save several installation strategies, easily switching between fastener sizes. Ultimately, this equipment has given Nylok the ability to test and qualify products by exactly matching an applications final torque strategy. Most recently, the PF6000 has been a critical tool used for demonstrating Nylok's newest product, [NySeal® 2.0](#). The tool is used to install M6 and M10 fasteners to 9 N-m and 58 N-m respectively, and demonstrates the sealants reusability after five installations. The equipment can even generate torque vs. angle curves, which can be used to determine the effectiveness of the installation.

PCB PIEZOTRONIC LABMASTER PROFESSIONAL RS MACHINE

Nylok's R&D lab is also equipped with PCB Piezotronic's Labmaster Professional Model 3200, which, like the first piece of equipment is used to test the fastener properties itself. This piece of equipment, known more commonly as an RS machine (or from another popular brand, a Schatz machine), is a torque-tension tool that provides information on applied torque, installation angle, clamp load, and threaded torque. With specific fasteners size information, as well as installation hole size, the



equipment can also be used to generate coefficient of friction (COF) data. One key attribute of Nylok's new products, which was a requirement for any material that is applied to the bearing surface of a fastener, is that it does not lead to a greater clamp load loss over time in application. The RS machine was used to test and verify the clamp load loss of both [NyShield®](#) and [NySeal® 2.0](#).



AUTOTECHNOLOGY COMPANY NEUTRAL SALT SPRAY CHAMBER

An additional piece of equipment in Nylok's arsenal is a neutral salt spray (NSS) chamber from Auto Technology Company. This is the newest large piece of equipment to be added to Nylok's NPD lab going into operation in the summer of 2022. For several years, Nylok has received questions from major OEM's regarding the performance of [NyShield®](#) in NSS testing. Although NSS testing is not the best method for evaluating the barrier coating's ability to prevent galvanic corrosion, Nylok is now equipped to answer the question by testing in-house. The NSS chamber is designed to test per ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus, which measures the effectiveness of sacrificial coatings, such as zinc and zinc nickel. The primary focus of the chamber is to evaluate the length of time that elapses until red and/or white rust forms on test samples. This test works by isolating metal fasteners inside a salt and fog environment for a duration of time (typically up to 1000 hours). The fasteners are evaluated daily for any signs of red or white rust forming.

NYLOK CYCLIC CORROSION CHAMBER

The fourth major piece of equipment that Nylok has in their R&D lab is a cyclic corrosion chamber. This chamber was designed and built completely by the team at Nylok

and complies with all requirements set by GMW17026: Accelerated Corrosion Laboratory Test for Galvanic Corrosion Mechanisms. During the development of [NyShield®](#), Nylok worked closely with General Motors to recreate a cyclic corrosion chamber that is similar to what is used at GM's proving grounds. This chamber was built in early 2016 and has since been used to perform multiple cyclic corrosion tests. In summary, the cyclic corrosion chamber is used to evaluate "in-field" corrosion resistance by simulating 15+ years of corrosion in approximately 3 months. The chamber is maintained at 151°F and sprays a salt and mud solution on test samples every 3 hours (90 seconds of spraying). This spraying and drying cycle continues for 70 to 90 days, and the progress of the test is monitored using special "mass loss" steel coupons. The test is generally used to evaluate the corrosion effects between two materials in contact with each other. For that reason, the chamber is typically filled with test assemblies of some sort to test.



COPERION ZSK- 26 TWIN SCREW EXTRUDER

Another specialized piece of equipment stocked in Nylok's NPD lab is Coperion's ZSK-26 Twin Screw Extruder. This piece of equipment is designed to give users the ability to combine

various types of polymers, along with inorganic functional fillers and other enhancements to polymer formulas. The twin screw extruder has played a critical role in Nylok's new product development and will continue to serve as one of the key pieces of equipment during future development.

OTHER TOOLS

In addition to the many large pieces of equipment mentioned above that Nylok uses for testing and qualifying new and existing products, Nylok's R&D lab is also equipped with many other key tools. Like any good engineering and New Product Development lab, Nylok utilizes an Ultimaker 3D printer for prototyping test apparatuses. The 3D printer has also served Nylok's manufacturing team on several occasions for prototyping and testing equipment for machine builds and upgrades. With the ability to print polylactic acid (PLA), polyvinyl alcohol (PVA), polycarbonate (PC), and many more plastics, the 3D printer has been extremely important in new product development.

A 3D printer is not the only small piece of equipment in the lab. The space also houses several other pieces of equipment for both testing and analysis including the following:

- Microscope
- Precision cutter
- Shadow graph
- Humidity chamber
- Ultrasonic cleaner
- Several environmental thermal chambers (including a vacuum thermal chamber)
- Pyrolysis oven
- Others



CONCLUSION: BRING ON THE QUESTIONS

Recapping the information provided in this paper; over the past several years, Nylok has invested key resources into its NPD lab to ensure new products can be thoroughly tested to their limits. Many large pieces have been covered, most of which are intended for testing, but one, the twin screw extruder, has been and will continue to be used for formulating.

In addition to the larger pieces, also covered was a list of smaller pieces of equipment that, in combination with the larger pieces, have placed Nylok at the top of the list in terms of testing capabilities. The NPD team at Nylok has used this equipment for the development of both [NyShield®](#) and [NySeal® 2.0](#), and has tested both products to their limits to ensure the technical information listed is accurate. The equipment has also been used for several other projects for product testing, as well as prototyping and development processing equipment. Again, Nylok's NPD team may not be available for outside hire, but they stand ready and prepared to answer any of your questions regarding these products.

For more information on Nylok® and NySeal®2.0, please contact: sales@nylok.com. Make sure to also check out our new website at nylok.com

