

# Membrane Filter Boosts CMM Productivity and Accuracy

**By Brad Lisk**  
**Quality Control Manager**

**Brackett & Cochran Manufacturing Inc.**  
**Summerville, SC**

Oil in the air supply to a CMM was causing inaccurate measurements and resulting in scrapped parts. A check valve that passed CMM inspection, for example, later failed functional testing and had to be scrapped, indicating that the CMM measurements were inaccurate. Oil contamination also required the CMM to be taken out of service at least monthly to be thoroughly cleaned. After installing a new type of air dryer that uses advanced membrane separation technology, there has not been one instance of oil contamination of the CMM. The time formerly spent cleaning the device is now spent measuring or making parts, and scrap caused by inaccurate measurements has been eliminated.

Brackett & Cochran Manufacturing is a contract manufacturer that supplies individual component parts and subassemblies to a variety of industries. Brackett & Cochran is known for producing only the highest quality parts. Much of its production is related to the healthcare industry, such as parts for hospital beds and operating room tables. The company is equipped with state-of-the-art CNC machining and CNC turning centers as well as conventional job shop and welding equipment. Brackett & Cochran has ISO 9002 Quality System Certification. To ensure high quality of machined parts and assemblies, the company monitors its processes with test equipment, and when necessary manufactures its own test equipment.

The CMM, a Brown & Sharpe Microval model, is used to compare new parts and finished parts against customers' drawings. Manual measurements are also taken, but the CMM is preferred because it is faster and provides the ability to program the inspection process. For example, the QC department can program the CMM to guide the technician through an inspection process, displaying critical dimensions and allowable tolerances as he takes measurements. Another benefit of the CMM is that it can get accurate measurements on parts that are too complex to inspect adequately with manual tools.

## **Air-operated CMM**

The Microval CMM operates on air bearings that allow the operator to easily move the arm around the part being inspected. The bearings have .020-inch air holes so it is important that the compressed air supply is clean. At Brackett & Cochran, the air supply for the CMM is the same compressed air used in the rest of facility. The Microval includes both a particulate filter and coalescing filter that are supposed to remove both oil and water particles from the air supply. At Brackett & Cochran, they controlled water effectively but did not prevent oil from reaching the CMM. The QC department tried installing another air drying filter system upstream of the CMM but it did not prevent oil contamination either.

When oil permeated the filters, the holes in the air bearings clogged. With less air passing through the bearings, the CMM became difficult to move. Because the operator must carefully move the probe of the CMM all over the part, the sluggish motion compromised accuracy. At times, parts that passed a CMM inspection failed functional testing, indicating that the measurements obtained with the CMM were wrong. The device was then taken apart and

cleaned but this was not a simple process because all the tubing that supplies air to the bearings had to be cleaned as well. Old filters were replaced with new ones, costing \$600 annually.

### **A different air cleaning approach**

One possible solution to this problem was replacing the compressed air system for the entire building. That would have been expensive and the CMM was the only device that required a clean air supply. Another option was presented by a salesperson from Parker Hannifin Corporation, Tewksbury, Massachusetts, who came by to demonstrate a new type of compressed air dryer. The Balston Membrane Air Dryers offered by Parker Hannifin use membrane separation technology. In the demonstration, the salesperson used a compressor to inject oil into the air supply, then showed how a regular coalescing filter reduced oil permeation by 50%. The Balston dryer, which provides clean dry compressed air through the use of state-of-the-art membrane technology, reduced oil permeation by 99%.

This demonstration convinced the QC department to install a Balston Model 76-25 Membrane Air Dryer. The dryer was installed downstream of an air regulator that reduces pressure to the CMM. The compressed air goes into the Balston system but prior to entering the membrane drying portion of the system, the air passes through two high efficiency coalescing filters. The filters remove oil and water droplets and particulate contamination with an efficiency of 99.99% at 0.01 micron. Next the air passes into Balston dehydration membranes. These consist of bundles of hollow membrane fibers, each permeable only to water vapor. As the compressed air passes through the center of these fibers, water vapor permeates the walls of the fiber, and dry air exits from the other end. A small portion of the dry air (regeneration flow) is redirected along the length of the membrane fiber to carry away the moisture-laden air that surrounds it. The remainder of the dry air is piped to the CMM.

Liquids removed by the filter continuously drain from the filter cartridge into the bottom of the housing, where they are automatically emptied by an autodrain assembly. The air leaving the prefilter carries only water vapor, which is removed in the membrane module. The dryer delivers air with a dewpoint of 35 degrees F. Selective permeation membranes remove water vapor from compressed air. The Balston Membrane Air Dryer is designed to operate continuously, 24 hours per day, 7 days per week. No electrical supply is required to use these dryers. The only maintenance required is changing the prefilter cartridge once a year. The time required to change the prefilter cartridge is approximately 5 minutes.

### **Excellent results**

After passing through the Balston dryer, the compressed air goes through the CMM filters as well. Since the installation of the Balston dryer six months ago, the filters on the CMM have not shown any signs of use, nor has the CMM needed to be cleaned. Downtime due to contamination has been eliminated, and the company is no longer buying new filters for it every month. So far, the filter on the Balston dryer has not needed to be changed. When it does, the fact that the filter is an off-the-shelf part will simplify the process because it will not be necessary to order filters eight weeks in advance as it was in the past.

In addition to installing the Balston dryer, the Brackett & Cochran QC department completely overhauled the CMM. In all, they spent several thousand dollars, including the purchase of the new air dryer, to get it back in good working order. Since then, the CMM has performed perfectly. Now that the air bearings no longer clog, the unit is easily operated and all parts are effectively measured. The scrap that resulted from inaccurate measurements is no longer produced. In addition, since parts are more easily measured, the process takes less time so productivity has increased.

A new approach to air filtration spared Brackett & Cochran from replacing its entire compressed air supply, and gave the company the well-functioning CMM it needs for quality assurance. With something as simple as cleaner air, Brackett & Cochran has boosted productivity, reduced scrap, and improved the operation of an important piece of equipment.

For additional information contact Parker Hannifin Corporation. 4087 Walden Avenue, Haverhill, MA 14086. Tel: 716-686-6400 Fax: 877-857-3800.