

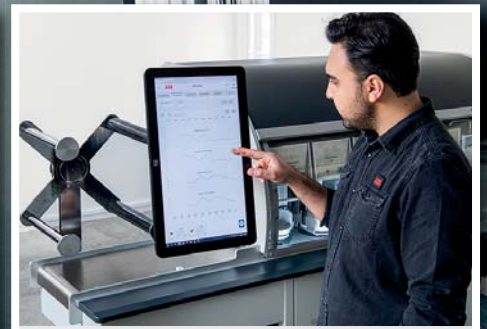
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Countering myths about automated paper testing

There's no good reason why a paper mill shouldn't be using automatic quality testing systems, argues pulp and paper expert Martin Fairbank PhD, who here debunks eight myths often used to maintain the status quo

Automated paper testing has been available to paper and board mills for several decades, and the mills that use such systems are reaping the benefits of faster process optimisation, improved quality compliance and reduced off-spec product.

Given the many positive outcomes of automated testing, it may be surprising that there are mills that have yet to invest in automated testing technology, particularly since modern systems are easier than ever to operate and provide unparalleled speed for confirming quality specifications.

Yet some mills are reluctant to forego traditional benchtop testing procedures due to misconceptions about automated testing. With insight from Jonas Andersson, who has more than 30 years of global pulp and paper industry experience specialised in testing and paper quality and is currently global product manager for automated paper testing at ABB, this article debunks some of the common myths and addresses some of the misconceptions about making the transition from manual to automatic testing.

Myth no1: Automated testing is too expensive

While automated paper testing systems have a higher initial cost than stand-alone instruments, mills achieve a good payback fairly rapidly through quality improvement and a reduction in rejects. Automated systems, as shown in Figure 1, are capable of testing up to ten times as many measurements in the same time as it takes for manual testing, delivers better accuracy and can automatically store and manage quality information.

The results generated by automated testing are instantly available remotely and if available, can be linked with other tools such as data historian systems to enable analysis of the impact of process adjustments. Reducing dependence on manual testing also frees up human resources

to focus on quality improvement while reducing quality control costs. Paper mills focusing on Six-Sigma levels of quality achievement will benefit greatly from the increased volume and accuracy of paper quality data.

Myth no2: Paper mills need to upgrade to an advanced quality system in order to fully utilise all the test data automated testing provides.

Modern automated testing provides all the analytical tools needed to review paper quality and optimise production. Detailed cross-machine information makes it easier to maintain high quality across the width of the entire jumbo reel while ensuring all rolls delivered meet end-users' required specifications.

Built-in dashboards typically include tools to follow both short- and long-term quality trends and detect deviations so corrective actions can be taken. While results can be transmitted to other quality systems, the built-in data

Custom property name	Unit	Mean value	Std. dev	Min. value	Max. value	Count	Outside limits
Air Permeance (Galley's)	Galley's	50.0	3.3	49.7	53.7	6	0
Air Permeance (2/3)	m/min	235	5.07	232	240	6	0
Bondham C, Upper	m/min	79.87	5.71	74	89	6	0
Bondham C, Lower	m/min	90.1	6.17	88	112	6	0
Thickness	mm	152.2	0	152.2	152.2	6	5
TSD HD	mm/m	2.3	0.02	2.49	2.53	6	0
TSD CD	mm/m	9.32	0.04	9.25	9.35	6	0
TSD HD/CD	---	0.27	0	0.27	0.27	6	0
TSD area	---	15.34	0.06	15.62	15.80	6	0
TSD angle	---	99.04	0.16	99.16	99.24	6	0
Burst Strength (B)	MPa	296.1	2.44	295.0	317	6	0
Tear HD Force	mN	302.33	6.70	294	318	6	0
Tear CD Force	mN	126.07	4.38	114	139	6	0
HD Strength	MPa/m	0.83	0.04	0.76	0.89	6	0
CD Strength	MPa/m	2.8	0.19	2.59	3.1	6	0
HD Strain at Break	%	1.99	0.13	1.71	1.71	6	0
CD Strain at Break	%	0.86	0.08	0.76	0.95	6	0
HD TEA	mm	6.6	1.08	4.7	8.07	6	0
CD TEA	mm	13.58	2.32	9.86	15.99	6	0
HD Stiffness	MPa/m	344.16	14.86	341.1	361.01	6	0
CD Stiffness	MPa/m	445.45	35.29	413.25	494.76	6	0
Grammage	g/m ²	41.01	0.29	41.4	41.1	6	1
Residue Sol. HD/CD	---	0.29	0.01	0.27	0.29	6	0
Density	kg/m ³	850	0	850	850	6	5

Figure 2: the dashboard data

visualisation software includes the necessary functions for quality management, so it is not necessary to upgrade any other systems to see immediate value.

Myth no3: Automated testers give different results than stand-alone testing equipment

Since the dawn of automated testing, equipment manufacturers have striven to use the same measurement principles as the benchtop instruments, following ISO procedures and calibrated to the same standards. No correlation is required when an automated testing module uses identical components as the benchtop instruments, thus providing identical test results.

Myth no4: Detailed cross-machine sample testing is not necessary and too expensive

Manual testers typically take measurements at only three positions across the machine and the process can be adjusted using these measurements. Automated systems, however, can make more frequent measurements, for example, every 30 cm across a 10 metre-wide machine, in the same time or less, as shown in Figure 2.

This not only gives a more accurate average, but constantly provides profile information that can be used to verify online sensors and adjust the cross-machine profile of parameters such as moisture, basis weight, thickness and gloss. Without accurate measurements, these parameters cannot be controlled, and quality suffers. To achieve this manually, more resources and more budget are needed, whereas with automated testing, no extra labour or material costs are required to obtain this increased testing frequency as well as detailed CD profiles.

Myth no5: Operation of an automated tester requires extensive training to operate and maintain

The latest automated testing systems are simple to operate, requiring the minimum of training. For example, with ABB's newest L&W Autoline

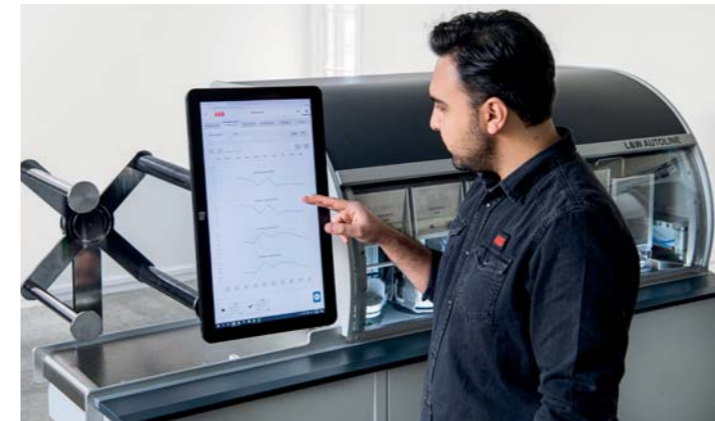


Figure 1: An automated paper testing system from L&W Autoline in use

the intuitive touchscreen interface and trouble-free paper feeding systems further reduce operator involvement compared with previous generations.

Once a paper sample is fed into the device, testing starts by touching the screen, with results automatically collected and organised into reports that are available mill-wide, as shown in Figure 2. Maintenance procedures are very similar to those of the benchtop instruments when they use the same measurement principles.

Myth no6: Testing feedback time is not critical

Many people think that having rapid feedback of test results is not critical because the quality data is only used for quality assurance, and not for quality and process optimisation. Standard testing procedures require conditioning of the paper for up to several hours before testing.

But if operators receive quality information within 15 minutes of a turnup, they can avoid production outside quality limits and the expense of rejecting paper.

An automated paper tester such as ABB's L&W Autoline takes a machine-width strip of paper from a finished reel of paper and conducts a range of tests cross-direction positions within about 10 minutes, providing rapid feedback to operations. This avoids multiple steps in manual testing, such as sample preparation, sample conditioning, manually entering values, calculations, compiling data and comparing to quality specs.

Myth no7: It is hard to service

Automated paper testing equipment runs 24 hours a day and seven days a week, and it's

important to keep it running smoothly. Users typically have a service agreement to take care of equipment maintenance that they can't handle themselves.

Mills seeking to implement automated testing should be confident that their chosen equipment supplier has a reliable, worldwide network of service representatives to handle this requirement and this maintenance can be non-interruptive to the system, allowing continuity of quality testing.

Myth no8: Automated testing equipment will not meet our specific requirements as shown in figure 3

The latest automated testing equipment is highly customisable, meeting the needs of mills of all sizes and with different levels of testing requirements.

Building on the legacy of almost 50 years of automatic paper testing, ABB's L&W Autoline has been continuously improved in terms of efficiency, testing capabilities, scalability and ease of use. New modules have been developed to provide testing of many different types of paper, from fine paper to board. Each L&W Autoline is scalable and customisable, in that the testing modules to be included are selected by the users to match their needs in a system that is now available in two sizes. If needs change, the modules are "plug-and-play" – easily swapped in and out of the system.

The latest Autoline can even start testing a second sample before a first sample is finished, which can save up to 20 per cent of overall testing time. The data collection system manages all the results coming from each of the individual testing modules and matches them up with the cross-machine position and sample



Figure 3: Automated paper testing systems that enable modules to be serviced while in operation ensure minimum impact to quality testing and continuous operation

number. The equipment also queues samples, so that a user does not need to be present to start testing of the next sample as soon as the equipment is available.

Debunking myths with facts: 30 years of automated testing at Stora Enso's Langerbrugge mill

Stora Enso's paper mill at Langerbrugge in Belgium makes recycled newsprint and super-calendered paper, and has relied on the L&W Autoline for the majority of its lab testing since the 1990s. It first purchased the equipment to minimise the need for manual testing, reduce the number of instruments needed and obtain cross-machine profile data in order to optimise quality requirements. In 2019, the mill upgraded its Autoline equipment.

"Thirty years of experience with L&W Autoline made it an easy decision to proceed with a new generation last year," says Monique Gistelincq, technology manager at the mill. "We rely on the Autoline to deliver high uptime and trustworthy results. It is unthinkable nowadays to work without this system."

Overcoming misconceptions for higher quality achievements

For today's paper and packaging mills, the costs of implementing automated testing are outweighed by its multiple benefits. With a typical return on investment of less than two years achievable through detailed quality reports and faster process optimisation, more mills should be ready to make this transition. Ensuring a competitive edge comes from the comprehensive, accurate and rapid test results that are easily achieved with automated paper testing.