ISO 9000 requirements for pulp and paper testing equipment maintenance

Sven-Ove Löfgren, Roland J. Trépanier, and Herb Patschka

ABSTRACT: The experience of maintaining the pulp and paper testing equipment of over 30 different ISO 9000 certified facilities is summarized. The requirements for reaching and maintaining ISO 9000 certification in a pulp and paper testing facility are discussed.

KEYWORDS: ISO, pulp industry, paper industry, test equipment, maintenance, certification, specifications, test facilities, standards, Scandinavia, Finland, Canada, test methods.

Lorentzen & Wettre was certified to ISO 9001 in 1992, and its manufacturing subsidiaries are to be certified in 1993. All Lorentzen & Wettre companies had started Total Quality Programs several years earlier.

An increasing number of pulp and paper firms are embarking on Total Quality Management programs with the aim of being certified to ISO 9000. To accomplish this, the testing facilities within these firms place certain requirements upon suppliers.

As of April 1992, there were over 30 paper industry sites within Scandinavia and Finland certified to ISO 9000. In Canada there were three mills certified. **Table I** classifies these sites.

ISO 9000 certified facilities must ensure that they perform tests according to applicable standards. They must also ensure that the testing equipment be properly maintained and calibrated in accordance with documented procedures. The testing equipment is adjusted against certified equipment having known valid relationships to nationally recognized standards.

Quality system requirements

Clause 4.0 of the ISO 9000 standards pertains to the quality system requirements. Within Clause 4.0 is a subclause covering "Control of Measuring and Test Equipment (Inspection, measuring, and test equipment)." Text from this subclause has been reproduced in the accompanying box. The subclause specifies the calibration and maintenance inspection of the test equipment. **Table II** lists the corresponding subclause number in each of the three standards (ISO 9001, 9002, and 9003) and level of stringency relative to ISO 9001.

Within the subclause are 10 maintenance and calibration requirements of the test equipment. It is the responsibility of the equipment owner, who is ISO 9000 certified, to ensure that the service supplier meets the requirements.

Customer applications

Ensuring that the maintenance and calibration of test equipment has a valid relationship to nationally recognized standards is one of the most demanding requirements. In general, most ISO 9000 certified testing facilities prefer to use the services of an ISO 9001 certified testing equipment manufacturer that offers maintenance agreements. This consolidates resources and minimizes the cost of "traceability" for each facility.

The needs of each testing facility can vary significantly depending upon the in-house calibration and maintenance capabilities and the market specifications of the pulp/paper/board being sold. Statistics on preventive maintenance requested by some Canadian paper industry facilities is given in **Table III.**

The properties are broadly classified. Bulk includes mass and thickness; optical includes gloss, color, brightness, opacity, and formation; pulp includes freeness, pulp beating, and standard sheet making; surface includes smoothness/roughness; strength includes burst, tensile, tear, and stiffness.

Table III reveals that in 1991 optical properties generated the greatest demand for preventive maintenance and calibration. There was an average of approximately two pieces of optical testing equipment at each site. It is expected that, with time, the other properties will attain a participation level approaching 100%.

Löfgren is service manager with AB Lorentzen & Wettre, P.O. Box 164 93, Kista, Sweden. Patschka and Trépanier are president and manager of design and development, respectively, with Noram Quality Control & Research Equipment Ltd., 125 Hymus Blvd., Pointe Claire, PQ H9R 1E6 Canada.

I. Selected pulp and paper facilities certified to ISO 9000 as of March 1992

	Scandinavia & Finland	Canada
Control Labs:		
Pulp Mills	1	2
Paper Mills	4	0
Board Mills	8	0
Integrated (above)	5	1
Converters	1	0
Research Institutes/ Centers	0	0
Miscellaneous	12	0

II. Comparisons of subclauses related to inspection and measuring of test equipment

Standard no.	Subclause no.	Level of stringency relative to ISO 9001
ISO 9001	4.11	Same
ISO 9002	4.10	Same
ISO 9003	4.06	Less

III. Distribution of Canadian testing equipment at 41 sites maintained by Noram in 1991. Properties are ranked in descending order of %-participation.

Property	No.	% Participation	% Distribution
Optical	73	178	62
Surface	23	56	20
Strength	12	24	10
Bulk	6	15	5
Pulp	4	10	3
Total	118	n/a	100

What ISO 9001 says about calibration

The following text has been extracted from ISO Standard 9001, subclause 4.11, entitled "Inspection, measuring and test equipment":

The supplier shall control, calibrate, and maintain inspection, measuring, and test equipment, whether owned by the supplier, on loan, or provided by the purchaser, to demonstrate the conformance of the product to the specified requirements. Equipment shall be used in a manner which ensures that the measurement uncertainty is known and is consistent with the required measurement capability.

The supplier shall

a) identify the measurement to be made, the accuracy required, and select the appropriate inspection, measuring, and test equipment;

b) identify, calibrate, and adjust all inspection, measuring, and test equipment and devices that can affect the product quality at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to a nationally recognized standard—where no such standards exist, the basis used for calibration shall be documented;

c) establish, document, and maintain calibration procedures, including details of equipment type, identification number, location, frequency of checks, check method, acceptance criteria, and the action to be taken when the results are unsatisfactory;

d) ensure that the inspection, measuring, and test equipment is capable of the accuracy and precision necessary;

e) identify inspection, measuring, and test equipment with a suitable indicator of approved identification record to show the calibration status;

f) maintain calibration for inspection, measuring, and test equipment;

g) assess and document the validity of previous inspection and test results when inspection, measuring, and test equipment is found to be out of calibration;

h) ensure that the environmental conditions are suitable for the calibrations, inspections, measurements, and tests being carried out;

i) ensure that the handling, preservation, and storage of inspection, measuring, and test equipment is such that the accuracy and fitness for use is maintained;

j) safeguard inspection, measuring, and the test facilities, including both test hardware and test software, from adjustments which would invalidate the calibration setting.

Where test hardware (e.g., jigs, fixtures, templates, patterns) or test software is used as suitable forms of inspection, they shall be checked to prove that they are capable of verifying the acceptability of the product prior to release for use during production and installation and shall be rechecked at prescribed intervals. The supplier shall establish the extent and frequency of such checks and shall maintain records as evidence of control. Measurement design data shall be made available, when required by the purchaser or his representative, for verification that it is functionally adequate.

Calibration issues

One of the essential requirements of ISO 9000 are the instructions prepared by the customer regarding the measuring, controlling, calibrating, and registering of the testing equipment. Registering can be facilitated by using any of the ready-made computer programs available in the market. These programs, which are inexpensive, contain all that is needed for an approved register of testing equipment.

Many customers working toward ISO 9000 certification frequently make costly requests of companies performing the calibration of their testing equipment. These requests arise from an insecurity about the calibration requirements. Confusion arises in that the calibration stated in most of the standard test methods can be traceable back to international standards and/or fundamental physical properties. However, this is not the same as if the apparatus had been calibrated to the paper property that it was intended to measure (i.e., for tensile we check the force cell with an applied load, but there is no "standard" paper material that we place in the clamps and check property of tensile strength).

Typically, preventive maintenance and calibration visits are made at six-month intervals. It is not always possible to execute the full calibration at the customer site, usually due to immobile calibration equipment. There is continuing progress to increase the portability of the calibration equipment.

An organization need not be fully ISO 9000 accredited in order to perform calibration according to ISO 9000. However, the organization must be able to prove a valid relationship to nationally or internationally recognized standards. TJ

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