In this Issue:

Foreword from the Chairman
Customer Satisfaction Survey: how it went
CEPI-CTS & ISO/TC 6 evaluation of precision
The S-Test: a new test for corrugating medium
Come meet us and share technical ideas!
What they say about us

Foreword

Welcome to the seventh issue of the CEPI-CTS Newsletter.

In this issue we will show you the results of our periodical Customer Satisfaction Survey. We gained many useful remarks and suggestions and we are quite proud of the success enjoyed by the Service. Thanks to all who have spent some of their valuable time to answer our Survey!

We will present a new test for corrugating medium that is being currently standardised within ISO, a comparison of CEPI-CTS statistics with those used in ISO/TC 6 when assessing the precision of test methods and a review of two different standards that measure what is apparently the same property.

We greatly value your feedback and suggestions to improve the Service: if you have questions, doubts or requests do not hesitate to contact your Distributing Laboratory or myself at the contacts listed on the left.

Fulvio Savagnone
CEPI-CTS Chairman

Customer Satisfaction Survey: how it went

In 2019 we run our periodical Customer Satisfaction Survey, after five years from the previous one. We received answers from about 18% of our customers, which is the usual amount for this kind of survey.

The questionnaire we sent covered the overall satisfaction and the satisfaction about key specific aspects of the Service, such as quality of sample packaging, reports, flexibility and finally about the smooth implementation of new tests. The questionnaire also included a number of inquiries about possible future improvements and a survey on interest in further tests.

Overall satisfaction ("Satisfactory", "Good" and "Very good") was 97.4%, and Service Quality satisfaction was 93%, with a sensible increase of “very good” with respect to the previous survey. It was noted that, albeit at very low figures, there has been also an increase of “Poor” (1.12% in 2014, 1.75% in 2019).

The graphs in the next page show in more detail the results of the survey.
A wealth of comments, suggestions and critiques were received, ranging from improvements of the reports and the request of personalised ones, to more or different levels for the existing tests; from pointing out delays to suggesting the implementation of further tests. All comments have been thoroughly considered and discussed in our annual WG meeting, resulting in precious input for the management of CTS. In addition to this, individual Distributing Laboratories will continue to tackle the suggestions of their own customers.

Among the requests of implementation of new tests we have selected those listed below. A study of feasibility is currently being carried on: we are planning to conclude it in the first half of 2020 and consequently start the experimental pre-test rounds for the accepted tests.

- Plastic films, thickness, ISO 4593
- Plastic films, tensile properties, ISO 527, Type A (rectangular) test piece
CEPI-CTS and ISO/TC 6 evaluation of precision (S. Moreau-Tabiche, CTP, F. Savagnone)

One of the comments that resulted from the Customer Satisfaction Survey inquired about the reason why ISO/TC 6, in order to assess the reproducibility and repeatability of a test method, uses CEPI-CTS raw data from the pre-test round but elaborates them with different statistical formulas from those used by CEPI-CTS.

The main reason is that the interlaboratory scheme that CEPI-CTS has devised is in fact not intended to calculate the precision of a method, but to assess the performance of a participating laboratory. In our scheme, the pre-test round amongst the Qualified Laboratories provides the following statistics, after having eliminated outliers with the Cochran and Grubbs tests (as per ISO 5725-2): the within-lab standard deviation, the between-lab standard deviation and the grand-mean (i.e., the mean of the valid lab means).

The grand mean (CEPI-A-Mean) gives the assigned reference value of the sample, while the between-lab standard deviation is used to calculate the warning limits: CEPI-A-Mean ± (2.0 x SD-Between) and the action limits: CEPI-A-Mean ± (2.6 x SD-Between), where the coefficients 2.0 and 2.6 are the Student's t for n=999 and a probability of 95% and 99% respectively.

Note that ISO/IEC 17043 and ISO 13528 suggest action limits to be the grand mean ± (3.0 x SD-Between); however, years of experience has led CEPI-CTS to use the narrower action limits because the higher natural variance observed in testing paper-based materials can often cause high variances which in turn lead to excessively wide limits.

On the other hand, being ISO 5725 too general to be correctly applied to paper testing (destructive tests, high number of replicates, etc.), ISO/TC 6 calculates precision figures using ISO/TR 24498 (which in turn refers extensively to TAPPI T 1200), where the repeatability standard deviation is equal to the within-lab standard deviation and the reproducibility standard deviation is defined as the square root of the sum of the repeatability variance and the between-lab variance:

\[
s_R = \sqrt{s_B^2 + s_W^2}
\]

Actually TAPPI T 1200, when the replicates of a single laboratory are test results, defines the reproducibility standard deviation in a slightly different way:

\[
s_R = \sqrt{s_B^2 + s_W^2(n-1)/n}
\]

In our Handbook document 6:1 "Statistical treatment of the measurement data" we offer several reasons why our between-lab standard deviation can be considered equivalent to the reproducibility standard deviation, i.e. the total variability of the testing method when executed in different labs. Nevertheless we will continue to use the term "between-lab standard deviation" to minimise the possible confusion between what CEPI-CTS does and what ISO/TC 6 does.

The S-Test: a new test for corrugating medium (Dr.-Ing. Heinz-Joachim Schaffrath, PMV, TU Darmstadt)

The S-test is a new method to characterize flute base papers. Derived from the SCT-test, the procedure is comparable (Figure 1). Therefore, the S-test offers some advantages compared to the common CMT. This new method is less dependent on handling procedure and the test could be incorporated in an automatic paper lab.

Compared with other paper and board parameters, the S-test correlates very well with paper grammage and paper thickness. CMT first peak correlates very well, too. Nevertheless, SCT MD correlates less good, although regression analysis still leads to a coefficient of determination of 0.82. Observing CMT end value, the correlation is far less than with CMT first peak.

Taking the base paper, manufacturing a corrugated board and measuring the FCT offers a good correlation with the S-test, if no fine flutes (D, E or even smaller) are used.
Fig. 1: Dimensions of the S-test and photo of an S-test equipment

Repeatability is 22.1 %, which is worse compared to CMT-test (9.4 %) or SCT-test (11.8 %). These values were derived from a round robin test with CEPI-CTS samples of CMT and SCT (used in the CEPI-CTS rounds 2018). Reproducibility of the new test is 22.6 %, which is equal to SCT, but worse than CMT (22.8 %). However, the difference between repeatability and reproducibility is less with the S-test than with CMT or SCT.

To overcome the low repeatability, 20 measures must be made to calculate a mean value. This leads to a confidence interval within a lab (95 % confidence level) of ± 3.5 %, which is acceptable, although less than CMT (± 2.1 %) or SCT (± 1.9 %).

In addition, due to the small difference between repeatability and reproducibility, an S-test value obtained in one lab will be closer to the value of another lab as it can be expected with CMT or SCT.

Due to the advantage in handling, the test became a German standard (DIN 5014) in April 2019. On ISO level, this test will soon be proposed as a new work item proposal (NWIP).

Bibliography

ISO 7263-1 (CMT A-flute)
ISO 7263-2 (CMT B-flute)
DIN 5014 (Compressive strength of an in S-shape fixed sample)
Schaffrath, H.-J.; Schabel, S.: Compressive strength of an in S-shape fixed sample - a new test for paper intended to use for corrugated medium. IPPC 2019, Indianapolis

Come meet us and share technical ideas!

Every year CEPI-CTS organises a Technical Meeting to discuss paper-testing issues that are relevant to the Service and a Technical Workshop to have a hands-on experience on selected technical topics.

Both the Technical Meeting and the Workshop are open to the public: they are therefore a unique occasion to discuss state-of-the-art technical matters with scientists and technicians from the most important European research institutes which manage a comparative testing system that has no equal in the world with regards to scientific soundness, scope of availability of tests, efficiency, number of satisfied clients and last but not least, historical tradition. The 2019 CEPI-CTS Technical Meeting was held at SMITHERS in Leatherhead, UK: issues such as testing of packaging to evaluate its behaviour during transportation and testing of medical devices were discussed.

To make your attendance even more fruitful, we will strive to organise such meetings in correspondence with national or international fairs, conferences and so on. We will adequately publicise our next Technical Meeting and Workshop, don’t miss this opportunity!

What they say about us

"This service allows us to verify that the results given by our measuring devices are always in the targeted standards and conform with the results of the other laboratories. It is a service that follows (and allows us to validate) our quality approach."

Burthier Ahlstrom-Munksjo

The next issue of the Newsletter will be out December 2020