

The mechanical characterization of coatings films. More reliable results thanks to new technologies

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The subject to which the title of this article refers to the extensibility test (often called elasticity test) of free coating films. In the case of transparent products, the films under the test tend to become white once they are subjected to traction and this unfortunately determines some particular problems in the measurement.

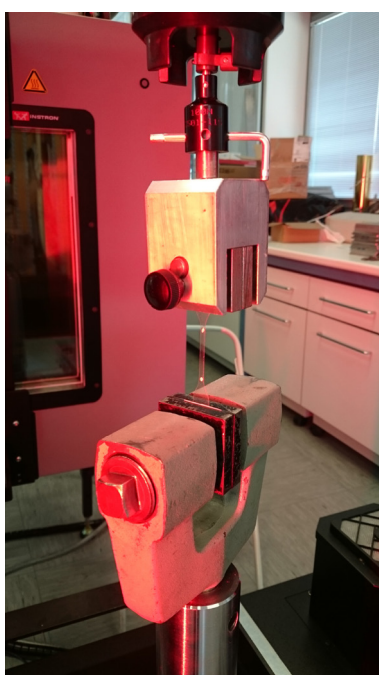
The dynamometer used by Catas to carry out this test is in fact equipped with a video extensometer which offers several advantages compared to those of a mechanical type, among which, for example, the fact of not determining any contact with parts of the dynamometer and therefore having no influence on the specimens. This allows, in theory, to carry out very precise measurements of the extension of the films.

However, in the case of transparent or semi-transparent coating films, the accuracy of the results is sometimes invalidated by the bleaching of the films during the test.

The testing area is in fact delimited by two points, which are marked on the test specimens through the use of colored markers: white, in the case of transparent films and black in the case of white films.

If the procedure adopted does not present any problem for the latter, in the case of transparent films the progressive whitening during the traction phase may result in the loss of precision in the identification of the markers by the video extensometer.

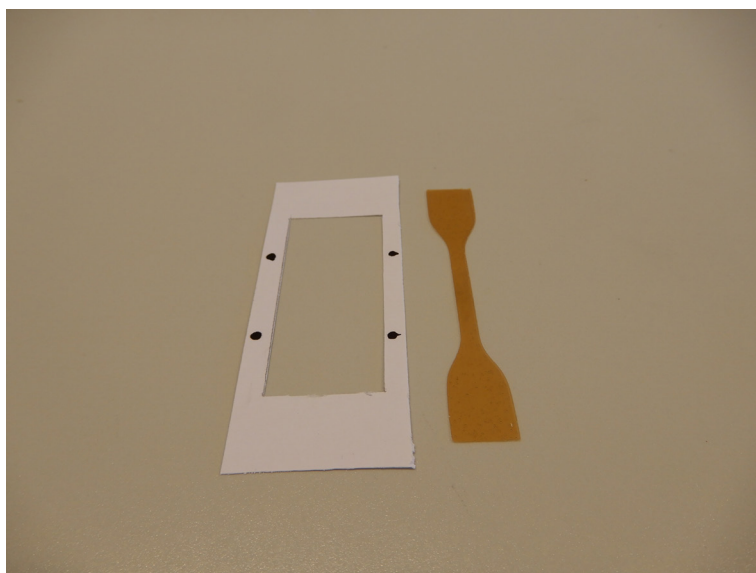
Several attempts have been made to improve the measurement, but the results were not much satisfactory with any of the proposed solutions, including that of changing the color of the markers.



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A further step was then to review the test system using a frame to support paint films. The frame in question has been cut out of a white cardboard, on which the points that delimit the test area have been reproduced. In this way the markers are not affected by any bleaching of the film.



The coating film was anchored to the fixed frame and mounted on the dynamometer. The frame was then cut between the delimited points and the test was started.

The prototype immediately provided positive feedback as there was no signal loss to any extent. After several experiments carried out with various types of coatings, the new system has ultimately shown greater accuracy of results and greater repeatability.

The collected data indicate that it is good practice to prepare at least fifteen specimens per sample to obtain at least ten useful data given the difficulty in obtaining film without defects.

It must be remembered that the uniformity of the film has a strong influence on the accuracy of the data; air bubbles and inhomogeneity of thickness, of a fairly common order, greatly influence the result in any way the application of the liquid coating is performed.

This means that there is the need to use a certain number of frames with very precise dimensions and finding a solution to make a fair number of them efficiently.

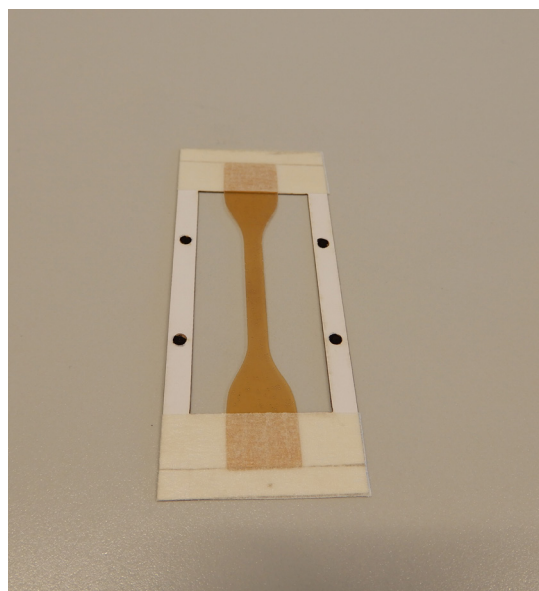
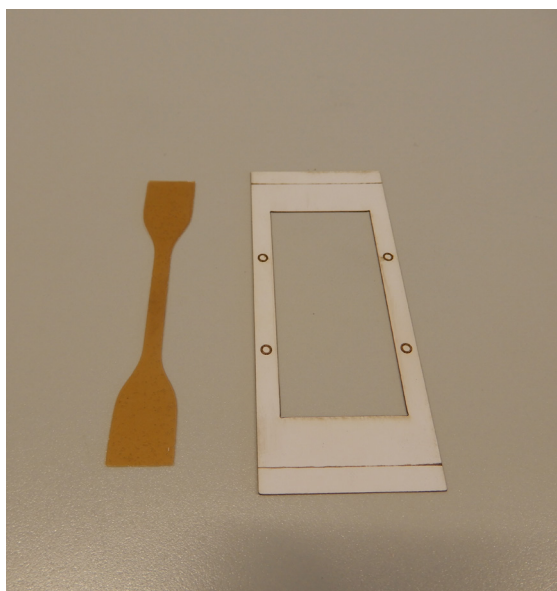
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Thanks to an internship carried out with the Istituto Malignani of San Giovanni al Natisone, a very effective solution was found for these laboratory needs, reporting the design of the frame on a PC and subsequently using the laser cutting available at the aforementioned Institute. In a few minutes it was therefore possible to create a hundred high-precision frames, also marking the points to be marked for the video extensometer and the area where the films must be anchored, to comply with the provisions of the standard.

The high precision of the system, for design cutting and marking of the frames has ultimately allowed further progress in the test methodology which thanks to these improvements is now more reliable and effective.

In addition to reporting the positive results of this experimentation, we would also like to point out how the collaboration between Catas and the education institutes can lead to very interesting results involving students in subjects where they can already take advantage of their own training and skills.



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