RECYCLABILITY PROJECT OF METALLISED PAPER AND COLOURED/PRINTED BARRIER-COATED PAPER

Project title: Recyclability assessment of metallised paper and coloured barrier-coated paper.

Duration: 12 months

1. Idea and objectives

The recent experience of the COATING AND METALLIZATIONS RECYCLABILITY PROJECT conducted by Innovhub and Lucense-Centro Qualità Carta with the coordination of Aticelca during the year 2023 on different types of metallised papers has shown significant differences in the behaviour and outcome of recyclability parameters between different types of products.
Metallisations on paper tend to fragment differently during pulping, depending on the type of material and mode of application. In particular, the following main cases can be distinguished
- aluminium foil laminated to paper: it generally results in medium-large, non-adhesive fragments.
- direct metallisation on paper: normally generates very small, non-adhesive particles, in some cases not detectable by image analysis.
- metallised paint: tends to generate medium-sized particles.
- metallised plastic film: metallisation on plastic film is normally not released into the paste during pulping. There are cases where the adhesive used for the lamination comes off the film together with the metallisation and passes into the pulp.

The metallised fragments/particles being reflective interfere with the measurement of macrostickies by image analysis.
- If there are no adhesives and additional glues in the product, it is possible to verify the absence of Macrostickies with adhesive character under the microscope.
- If there are additional glues in the product, it is not possible to discriminate by means of image analysis the metallised particles, false positives, from the glue particles actually detected as Macrostickies. In this case it is not possible to attribute a result to the measurement of the Macrostickies parameter.

Similarly to metallised paper, also barrier-coated paper may show interference in the macrostickies analysis. The COATING AND METALLIZATIONS RECYCLABILITY PROJECT – 2023 was able to find an integration to the test method which is able to overcome the interference in case of white barrier-coated paper but is not able to solve the issue for metallised papers and for coloured barrier-coated papers.

The aim of the work is to test some new steps in the analytical procedure, in order to solve the critical issues concerning the determination of the Macrostickies content also in the case of metallised papers and coloured barrier-coated papers.

2. Working plan

2.1 Participants

The project is coordinated by Aticelca. The experimental laboratory activity is carried out by Innovhub-Area Carta and Lucense-Centro Qualità Carta.
Participation in the project is open to companies (called “manufacturing companies”) producing paper and board and paper and board products with coating or metallisation, producers of chemicals and coating and metallisation technologies. The participation in the project is limited to a number of participants sufficient

to provide 10 samples with metallization and 6 samples with coloured or coated printed papers. Companies that have already participated in the first part of the project in 2023 will have priority. The project is also open, with the role of Observer, to paper mills equipped with paper and board recycling plants, associations and other organisations in the sector, and any other stakeholders in the paper, printing and converting supply chain. The participation as Observers is subject to approval by the manufacturing companies.

2.2. Working phases

Based on the results of the COATING AND METALLIZATIONS RECYCLABILITY PROJECT - 2023 and the current state of knowledge, a work plan consisting of the following steps is assumed:

PHASE 1 : CHARACTERISATION

Innovhub, Centro Qualità Carta, manufacturing companies providing samples for experimentation.
Duration: 2 months

Objectives: To determinate the characteristics of samples for each manufacturing company for a total number of about n.10 samples of metallised papers and about n.6 samples of coloured/printed barrier-coated papers. Note: for companies that submit samples already analyzed in the 2023 project this phase will be skipped.
Description: Collection of technical information on the samples to be analysed from the participants. Compilation of data sheets with data on the product: quantity/thickness of metallisation or coating, type of metallisation/polymer, chemical/physical characteristics, use and melting temperature, application technology, end use of the material.

PHASE 2 : STANDARD ANALYSIS

Innovhub, Centro Qualità Carta
Duration: 3 months

Objectives: To determine the parameters Macrostickies by means of standard UNI 11743 procedure.
Description: New samples: full analysis of recyclability according to the standard procedure currently in use. Samples of each company are tested in a single trial (or more if needed) by both laboratories. Samples from the previous project: only macrostickies analysis, while for the other parameters will be kept the evaluations already obtained in the previous project. Samples of each company are tested in a single trial (or more if needed) by one laboratory.

PHASE 3 : MODIFICATION OF THE MACROSTICKIES ANALYSIS PROCEDURE AND SOFTWARE SELECTION

Innovhub, Centro Qualità Carta
Duration: 6 months

Objectives: To evaluate the possibility of modifying the specimen preparation procedure and image analysis of Macrostickies in order to discriminate non-adhesive metallisation/coating particles from Macrostickies adhesive particles present in the product.
Description: Study of a possible analysis procedure and types of contrast powder (coloured or fluorescent powder) to distinguish between the presence of Macrostickies from non-adhesive interfering particles by means of colour contrast. A selection of samples will be chosen to perform this phase. Selection of a software suitable for the measurement of the coloured particles area. The development of ad hoc software not already available on the market is not included in the project.

PHASE 4 : VALIDATION OF THE PROCEDURE AND PROCESSING OF RESULTS

Innovhub, Centro Qualità Carta
Duration: 4 months

Objectives: To validate the procedure and to elaborate on the results obtained and the case studies encountered.
Description: Validation of the procedure by executing the new procedure on all the remaining samples. Preparation of an aggregate report of the work conducted and the results obtained. Preparation of specific reports on the individual samples analysed for the manufacturing companies participating in the project that provided samples.

PHASE 5: DRAFTING A PROPOSAL TO AMEND THE TECHNICAL STANDARD

Innovhub, Centro Qualità Carta, manufacturing companies providing samples for experimentation, observers.
Duration: 2 months

Objectives: To draft a proposal to amend the technical standard in order to overcome interference problems in the testing of Macrostickies in case of metallised paper and/or coloured/printed coated papers.
Description: Elaboration of a draft proposal to amend the technical standard UNI 11743:2019 / Aticelca 501 in particular regarding the Macrostickies determination phase. In case it is not possible to determine a procedure to overcome interference problems, other possible solution will be investigated and a feasibility assessment will be prepared with other methodologies.

3. Positive impacts, use of results, dissemination

The project will have an impact on the entire paper and paper converting value chain. In particular, it will enable manufacturers of metallised papers or coloured barrier-coated to have an analytical method of measuring the level of recyclability compatible with these specific processes, thus enabling them to meet

the market demand to develop products with specific properties but which maintain an adequate level of recyclability in current paper and board recycling plants. At the same time, it will enable paper and board recycling companies to receive material that is actually compatible with their current recycling technologies.

Each individual manufacturing company will receive all the detailed information produced by the project regarding its samples.
The individual manufacturing companies participating in the project will therefore already have information and evidence on the behaviour of their products during the project, thus anticipating the development of products compatible with recycling processes.
The project results will also be shared among the participants for general parts and anonymised or aggregated data. The data will be anonymised or aggregated in such a way that the product of the individual participant cannot be traced.

Project results, general work outcomes and aggregated data will be subject to approval by the participants for dissemination to third parties. In particular, they will be used by Aticelca to initiate the updating of the Aticelca 501 evaluation system, also by means of a public consultation, and to enable the UNI Paper Commission to prepare the revision of the UNI 11743-2019 laboratory technical standard.
General results and data in aggregate form may also be forwarded by Aticelca to CEPI for the development of the recyclability measurement method it is developing at European level.

Finally, Aticelca will endeavour to give visibility to the project in national and international contexts with the objective of only disseminating general information on the aims, the results obtained and the data in aggregate form for which the participants have consented to dissemination. Individual participants will also be able to disclose their participation in the project, the aims, the general results obtained and the data in aggregate form for which the participants have consented to dissemination.

4. Project costs

Manufacturing companies participating to the project provide the same number of samples (2 per company).

The cost of participation is fixed and equal for all manufacturing companies, including the report with the results obtained on the individual samples provided.

Finally, the manufacturing companies are invited to participate in the project coordination meetings to discuss the results and progress of the project.

In particular, it is envisaged
- project start-up meeting
- meeting after completing phases 1 and 2 and halfway through experimental phase 3 to discuss the results initially obtained
- meeting at the end of the testing experimental phases 3 and processing phase 4 to discuss all the results obtained, before drafting the report

Further meetings may be arranged if needed.

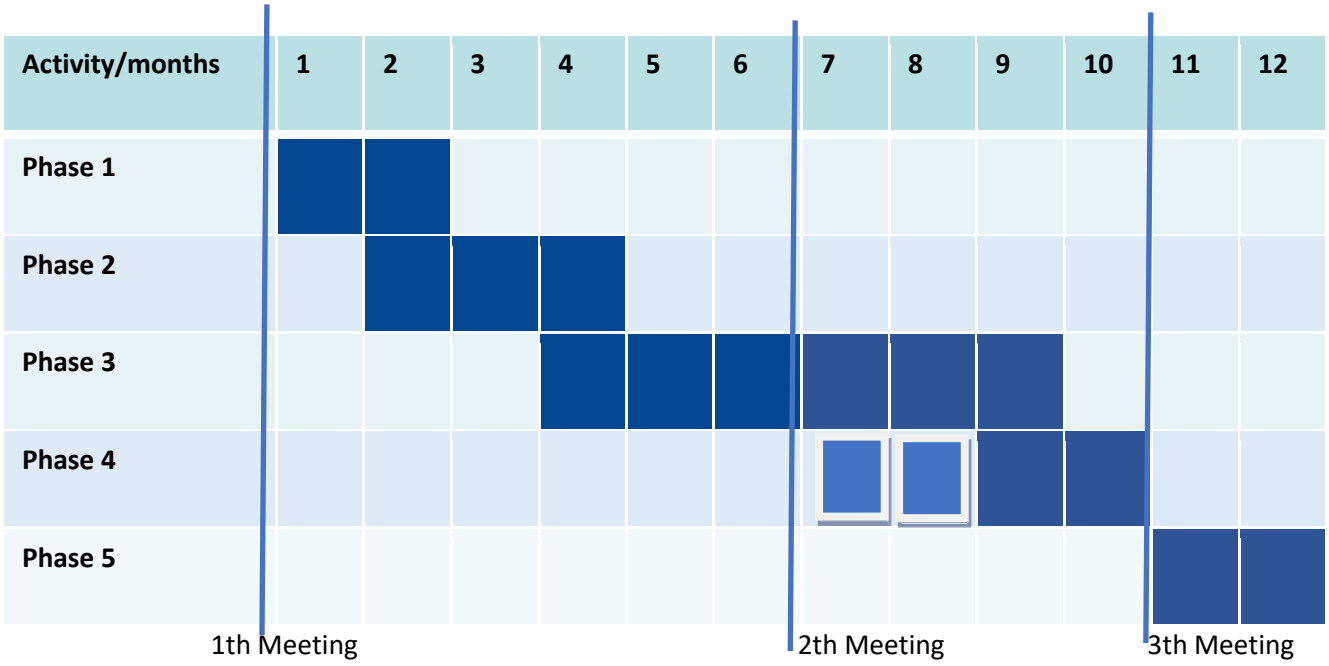
PARTICIPATION COST PER MANUFACTURING COMPANY (includes participation in the project and analysis for 2 samples)	3.000 €/company
PARTICIPATION COST PER MANUFACTURING COMPANY (includes participation in the project and analysis for 1 samples)	2.500 €/company
DISCOUNT FOR COMPANIES ALREADY PARTICIPATING WITH SAMPLE FROM THE	500 €/sample

The amount of the total cost for each company will be divided 50% between Innovhub and Lucense. Participation costs will be invoiced directly by Innovhub and Lucense. Separate invoices by the two laboratories will be issued.

Associations, institutions and other organisations and companies that are not producers of metallised paper or coloured barrier-coated paper or producers of paper products with metallised paper or barrier-coated paper or suppliers of technology and materials for metallisation or barrier coating may participate, subject to approval by the manufacturing companies and at the conditions established by the manufacturing companies.

Annexes

ANNEX 1: Project GANTT



ANNEX 2 (separate file): Application form