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Improved application of creping adhesive

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ABSTRACT:

Paper creping was studied with VTT's new lab device, on which temperature, blade angle and line load could be controlled. It was connected to a tensile tester (Zwick/Roell Z2.5) that drags a heated metal plate (mimicking Yankee dryer) under the creping blade. The test speed is limited by that of the tensile tester. There are three types of creping operations according to the solids content of the web. Dry creping is made at solids content over 93%, semidry creping at 85–93%, and wet creping takes place below 85%. This device can serve any type.

In this study, polyvinyl alcohol (PVA) was used as adhesive. Fine mist of diluted PVA was generated by the nozzle connected to the ultrasonic oscillator (*Lechler US1*, Germany). High ultrasonic intensity and slow airflow were combined for steady generation of fine mist. The nozzle is located on the top of the hood, which covers the metal plate. Spread mist landed uniformly onto the plate to foam a PVA layer, which was controlled in the range of 20 – 400 mg/m². Comparing with manual application with a sprayer bottle, formed layer was far more uniform. Adhesion for 20 g/m² wet sheets (softwood kraft pulp, freeness 22°SR) was sufficient for dry creping. Sprayed amount of PVA showed a significant impact on creping force.

We also explored different approach of adhesive application. PVA is known as foaming agent for foam-laid paper making. The idea was that PVA remaining in the structure of PVA-foam-laid wet sheets could function as creping adhesive. 120 g/m² PVA-foam-laid sheets were prepared and applied for creping trials without spraying adhesive. As a result, creping was feasible under certain conditions. Never dried papers were preferable, where non-wet-pressed sheets were more successful, while wet-pressed sheets required re-wetting. On the other hand, dried paper was not feasible even with re-wetting. Their adhesion to the metal plate was not sufficient at high solids content. They could be creped only at very low solids content, where free water exists. On commercial creping machine, spraying chemicals onto Yankee cylinder is not only for adhesion, but also to protect the cylinder surface, i.e. avoid damage by doctor blades. For this purpose, usually several chemicals are mixed in optimized ratios to control performance. The target is to create a layered structure: adhesive/release chemicals to be localized on the top, while protective chemicals in the bottom. In general, controlling creping performance is complicated due to a number of factors. Empirical adjustments are often made by experienced operators. From this perspective, creping PVA-foam-laid wet paper is unique, where adhesive chemical (PVA) is already localized on the paper side. This may simplify the control of creping chemicals.

KEYWORDS: Creping; Polyvinyl alcohol; Test method; Tissue paper; Yankee dryer