Studying Wetting Properties of Different Coatings
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Wetting is the first step in defining adhesion of coating to the substrate. To have a good adhesion performance, coatings should be able to completely wet the surface. Wettability is measured through analysis of contact angle formed between a droplet of liquid with the substrate at certain times. The lower the contact angle, the better is the wettability so its adhesion. However, when it comes to wood as a biological material with substantial variations among and between different species, many other parameters will come into play. Depending on the grain orientation, surface morphology, moisture contact and treatment, there are significant differences in density, pore size and other surface properties of the wood. This study is focused on finding correlation between coatings' surface tensions, base (water-based vs solvent-based) and resin types (alkyd, acrylic and PU) with their wetting properties on chemically modified and unmodified wood samples. The student working on this project will have the opportunity to learn how to measure surface tensions of liquid coatings using Tensiometer and contact angles of a wide range of coatings using a high speed camera, and calculating dynamic and static contact angles of different coatings on wood using MATLAB software. Additionally, student will need to use advanced multivariate statistical analysis techniques to model correlation between coating properties with their wetting performances.

Research area: Thermofluids