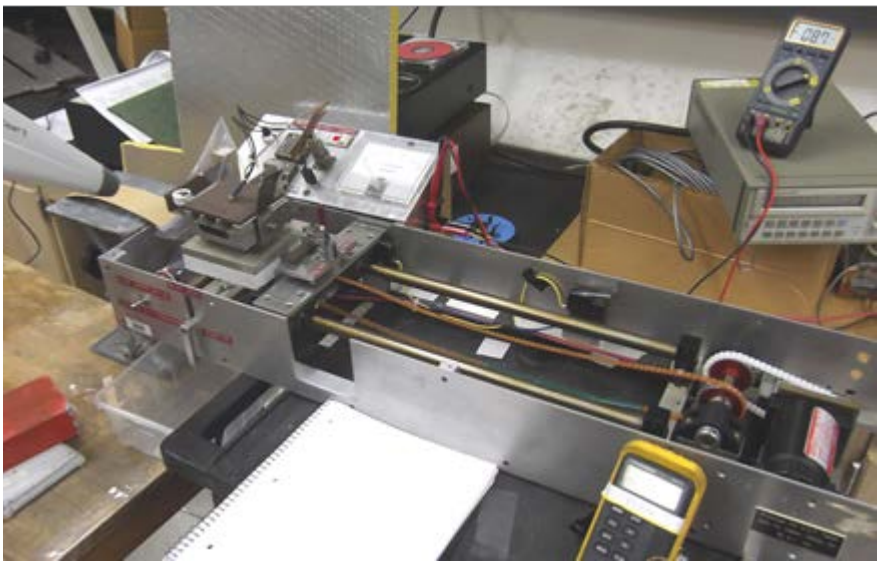
Hot Coefficient of Friction (HCOF) Test

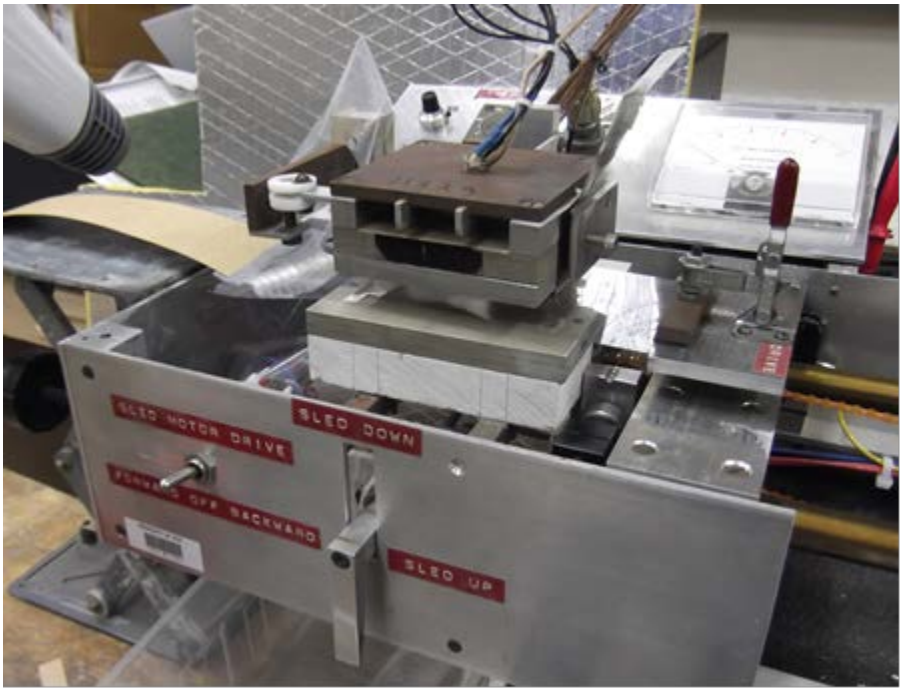
This test is known as T 828 “Coefficient of kinetic friction between corrugating medium and a heated steel surface”. The objective of the test is to determine the coefficient of kinetic friction of paper sliding on a heated steel surface. The relevance of the test is originally to relate the measure of kinetic friction of paper on heated steel to the corrugating runnability of medium based on the IPC findings of R.C. McKee et al., e.g., Tappi Journal 1967 50(7):35. Heated coefficient of friction of paper on steel produces different results than at standard room temperature. In the corrugating fluting process, medium slides over the “teeth” of heated corrugated rolls and so the additional frictional forces induce shear stresses to the medium which can result in medium fracture. The thinking is that a lower kinetic coefficient of friction will result in lower frictional shear force and increased medium runnability.

IPST Physical Analysis lab has a prototype HCOF instrument which consists of a heated steel base and a heated sled connected to a load cell. The base is set at 180 deg F and the sled is at 350 F. Surface cleanliness is important in friction testing, so freshly solvent cleaned and heat treated stainless steel shim strips are placed over the heated sled platen which subsequently rests in contact with the test paper surface. Saturated steam from a jet applicator can also be applied to the paper surface during the pull through the heated sled/base nip emulating typical corrugating conditions. Paper strip samples 2 inches wide 16 inches long in the MD are pulled at a fixed speed of 7.5 feet per minute and the “drag” on the sled, converted from voltage readings from the load cell during travel, is recorded. The ratio of the drag force to the sled weight is the kinetic friction coefficient.

Recent interest in HCOF has arisen from concerns of the results of the inclusion of sizing and pigment additives on the behavior of linerboard and medium in the corrugating process.



Overview of the HCOF set-up showing the sled chain drive, sled and base, heater and load controls electronics.



Close-up of the HCOF sled and base, a test strip is adhered to a clamped Mylar strip and pulled to the right through the heated sled/base assembly. Steam from a portable steam cleaner is applied to the paper test strip at the point prior to entering the sled/base area.