Among contact drying technologies, drum drying is widely used in the food industry and to treat heat-sensitive products. It also presents a great interest for sludge drying. The product is sprinkled or coated on a hot rotating cylinder. The wall temperature is above boiling temperature. The absence of mixture and agitation constitutes an advantage for viscous products like sludges, enabling a good control of residence time, water content average and thermal efficiency. In a previous study on a viscous foodstuff thin film drying, it was shown that very high heat flux may be found in the very first instants of drying due to the very small thickness of the product.

It is then important for contact dryer’s design to obtain reliable values of the interface heat flux between the drying material and the heated surface.

An experimental device was developed in order both to provide and to measure a high heat flux at the interface between a hot metallic plate and the thin-layer drying sample. The plate must be thick enough in order to store the energy necessary for complete drying. It must be highly conductive in order to ensure high flux densities at the interface. The heat is then stored at a temperature above boiling temperature and discharged suddenly when the sludge is coated.

It must be emphasized that no direct surface temperature measurement can be made: a thermocouple on the front side would perturbate sludge’s coating. Thus the wall temperature and flux must be estimated using interior location temperature measurements and an inverse heat conduction method.

An analytical conductive model is built using the quadripole formalism, and the system transfer function is calculated in order to obtain both the direct problem solution and the sensitivity coefficients values. The inverse problem is solved using the Beck’s sequential function specification method. An experimental validation is implemented using a heating probe.