

## Coefficient of Restitution Facility

One of the primary goals of current particle deposition research is to develop a physics-based model that, in conjunction with a fluid flow solver, can be used to accurately predict the deposition and rebound behavior of particles in gas turbine environments. Unfortunately, existing physical models for the impact mechanics of particles require mechanical property information about the particulate that is unavailable. The Coefficient of Restitution Test Facility at the Turbine Aerothermal Laboratory, shown below, is designed to provide this information by examining the rebound characteristics of particulate over a wide range of parameters, including velocity, impact angle, flow temperature, and surface temperature.

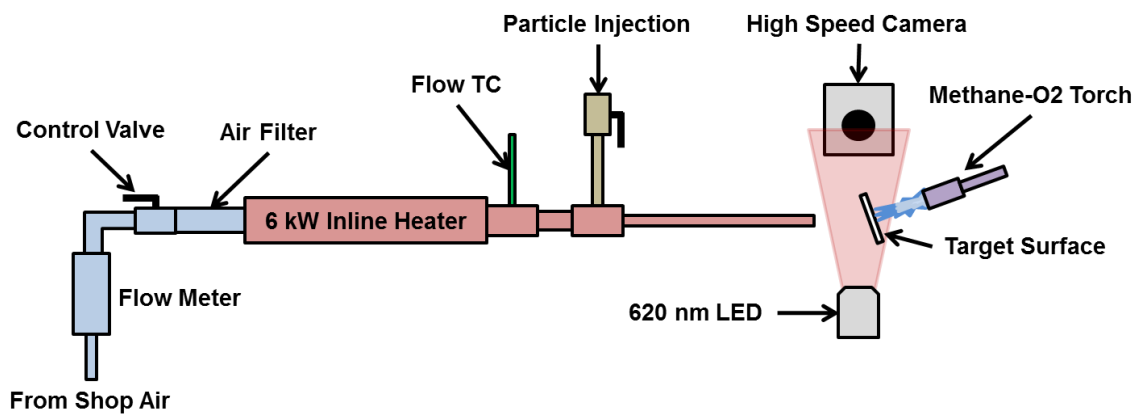
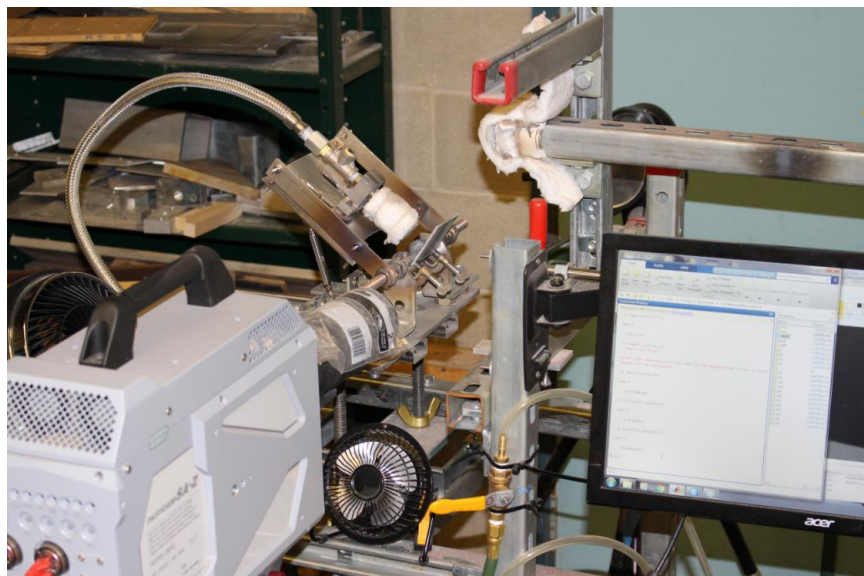
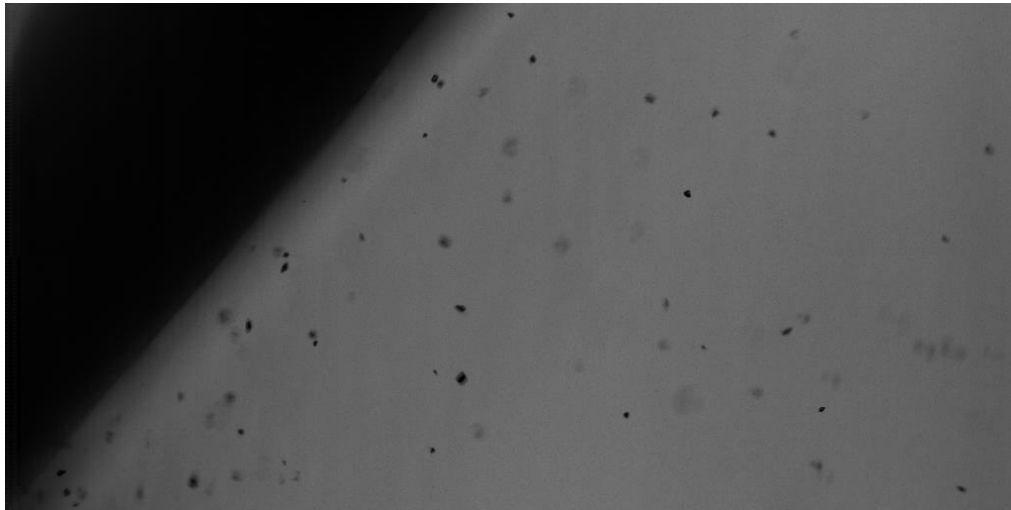


Diagram of the Coefficient of Restitution Test Facility



### **Photograph of CoR facility**

Particle shadows are recorded with a high speed camera as the particles impact the target surface, as shown in the image below. The images are subsequently processed using an in-house code, yielding trajectory information both pre- and post-impact, as well as size and shape information for each identified particle. The quantity of data generated (around 500-600 thousand rebounds per test series) allows for in-depth statistical analyses of the relative effects of different parameters. This information can then be used as an input to a deposition model by means of generating mechanical properties as a function of temperature, for example.



**Sample Image of micron-sized Particulate Impacting a Target Plate Using the High Speed Particle Shadow Velocimetry Technique**