

DYNAMIC CHARACTERIZATION OF FULLY PARTITIONED DAMPER SEALS

Balance piston seals are subject to large pressure differentials and can generate large forces directly impacting the stability of centrifugal compressors. The most common designs are textured seals (honeycomb, hole-pattern), pocket damper seals (PDS) and fully partitioned damper seals (FPDS). The dynamic performance of textured seals has been extensively characterized and compared against each other under similar operating conditions. PDS and FPDS have also been tested and compared to textured seals under a variety of conditions at multiple facilities. However, there is not a complete data set that can be used for direct comparison of effective stiffness and damping between FPDS and textured seals at test conditions representative of centrifugal compressor applications. The aim of this project is to create a complete data set of force coefficients for FPDS and enable a direct comparison between the dynamic performance of FPDS and textured seals under similar inlet pre-swirl conditions and pressure ratios. The FPDS will be tested in the same test facility used to evaluate textured seals and under similar test conditions. The dynamic identification procedure will follow that used by Dr. Constantinos Rouvas and Dr. Dara W. Childs. Force coefficients will be reported as a function of excitation frequency and compared to those identified for textured seals.