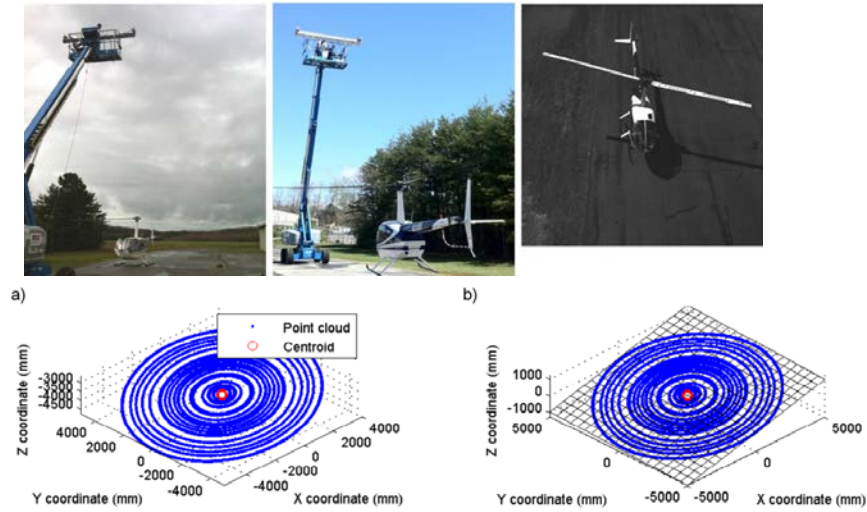




MASTER'S RESEARCH – TROY LUNDSTRUM

Operational data collection and analyses of the main rotor of a Robinson R44 Helicopter



Stereophotogrammetry in conjunction with three-dimensional point tracking (3DPT) algorithms has proven to be a highly robust measurement technique when used to perform dynamic measurements on small, rotating systems. This measurement technique can be scaled up to much larger systems and has several desirable features for helicopter and wind turbine measurement applications that include: 1) it is non-contact and doesn't require the use of roll rings or slip rings for signal transmission, 2) the applied measurement targets have a negligible effect on the aerodynamics, mass or stiffness of the structure, and 3) position data can be readily collected on many hundreds of points over what is capable using conventional multi-channel data acquisition systems and transducers. A field test was conducted in which operating data was collected on the main rotor of a Robinson R44 helicopter in both grounded and hovering operating conditions. The first part of this work describes the experimental setup and data acquisition process of the test performed and the second part of this work presents some of the results including blade dynamics and extracted operating deflection shape information for a Robinson R44 Helicopter.