

RPI Geotechnical Centrifuge

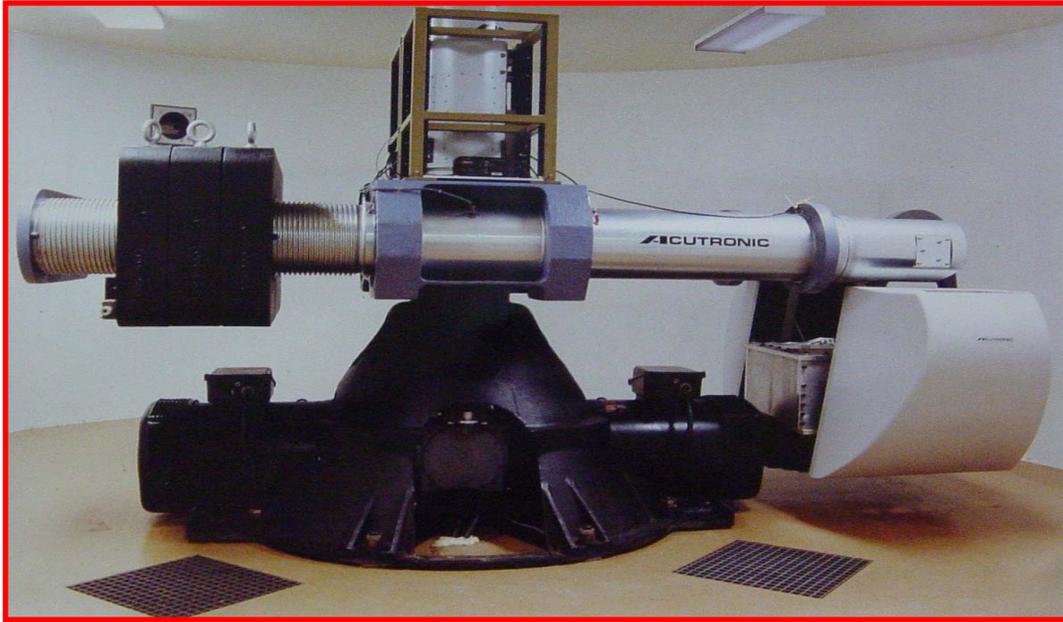


Figure A1: RPI 150 g-ton geotechnical centrifuge



Figure A2: RPI Tele-presence Control Room

The original RPI centrifuge was manufactured by Acutronic, France and was the first of its type (Model 665-1). It belonged to a line of Acutronic Machines (about a dozen exist) all of which have the same basic mechanical structure. The extremely simplified structure of these machines was a noteworthy safety feature. After the recent NEES upgrade to 150 g-ton by Actidyn Systemes, the now modified RPI Model 665-1 centrifuge machine comprises: a) swinging basket; b) centrifuge boom; c) balancing counterweight; d) hydraulic rotary joint and electrical slip-rings assembly; e) drive system; f) aerodynamic enclosure; and g) in-flight imbalance measurement and automatic balancing systems including automatic shutdown if excessive imbalance is detected.

The main attributes which characterize the centrifuge performance are:

- The nominal radius, 2.7m, which is the distance between the center of payload and the centrifuge axis. Usable load capacity and acceleration are defined at this radius. The platform radius, 3.0m, is the distance between the swinging basket platform and the centrifuge axis.
- Usable payload dimensions: The space available for the payload is a depth of 1,000mm, width of 1,000mm, height of 800mm, and a maximum height of 1,200mm.
- Performance envelope: The performance envelope of a centrifuge indicates the allowable levels of acceleration as a function of payload mass. For the RPI centrifuge, the do not exceed limits are: 160g, 1.5 Ton, and 150 g-tonnes (product of payload weight times g's).

The centrifuge is equipped with a fiber optic rotary joint, 28 slip rings and wireless network, which are available to the user for data transmission. A hydraulic rotary joint is also installed with a total of 6 joint passages available to the user, two of which are rated for 3,000 psi hydraulic oil.

A forced-air ventilation system provides cooling within the enclosure, if necessary. A system of electronic locks and safety interlocks prevent machine startup if the enclosure access doors are not securely locked. A recessed portion of the access tunnel holds the variable speed motor controller and power electronics cabinets which drives the centrifuge's electronic motors.