Unique microgravity tower attracts global scientific community

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Scientists from NASA, Europe and Australia will beat a path to Queensland University of Technology's Carseldine campus when the southern hemisphere's only microgravity tower is completed later this year.

The microgravity tower will allow scientists to study, in a reduced-gravity environment, many diverse phenomena in many fields including nanomaterials, new materials, fire-safety, metallurgy, biotechnology and combustion.

The tower's designer, Associate Professor Ted Steinberg of QUT's School of Engineering Systems, said that when it was finished the tower would be one of only three or four such facilities in the world and would make QUT a global leader in research on the effects of gravity in many research disciplines.

"Already the microgravity tower has attracted research partners in both industry and government from several places in Europe and the USA," Professor Steinberg said.

"One important proposed research programs relates to supporting the development of the Crew Exploration Vehicle (CEV) that will replace the Space Shuttle."

Painted green and reaching 30m - "the same height as the QUT campus's signature gum trees" - the tower's unobtrusiveness would belie its true

value to research, he said.

The tower works by placing the experimental material inside a “drop capsule” that, when dropped from the top of the tower, allows the experiment to be in free fall (or zero gravity) for two seconds, enough time for scientists to make crucial observations about the phenomena being studied.

“The drop capsule is brought to rest on an inflated airbag that allows the experiment to be slowed down and readied for another drop. Scientists are able to analyse the result when the drop is completed,” Professor Steinberg said.

Professor Steinberg said the microgravity tower would be an attractive and cheap alternative to the usual methods of zero-gravity testing.

“To do this type of research without a microgravity tower is often extremely expensive and time-consuming because researchers have to send their experiment into space on a space shuttle or use a ‘vomit comet’, a NASA jet that changes altitude rapidly, to negate gravity’s effects,” he said.

“Researchers can pay huge fees to run an experiment that weighs just several kilograms in the space shuttle whereas the QUT facility will cost far less per drop.”

“We can also perform many drops per day and the experimental system being used can weigh hundreds of kilograms and be quite large.”

Professor Steinberg said reduced-gravity testing could give scientists insights into phenomena not able to be studied in normal gravity since the effects of buoyancy, sedimentation and other convective disturbances are not present in gravity.

“For example, it has been demonstrated that the formation of certain silica nanomaterials is greatly enhanced when it occurs in reduced gravity leading to better materials and that the solidification of metals in reduced-gravity environments produces stronger structures than are formed in normal gravity.”

Source: Queensland University of Technology