

Redesigned hip joints need a simulator

People are living longer than ever. But a long life has its price. With age come more diseases and health issues, such as hip problems that can limit a person's mobility.

Hip replacement procedures have become common, although implants have a lifespan too. It might happen that a hip replacement you get at 60 needs to be replaced at 75. This is not the ideal scenario.

To minimise these cases, researchers are testing new materials and designs to prolong prostheses' lifespans. These potential solutions need to be tested, but each test costs tens of thousands of euro. Enter, the University of Malta's hip joint simulator.

The hip joint simulator is a machine that replicates the joint movements and loads imposed on the human hip. To do so, the simulator uses three stainless steel frames, each of which can be controlled independently using motors. These motors act as the 'muscles' of the hip, programmed to replicate the walking cycle during testing.

When it comes to simulating load and forces, a mechanism can load the implants with weights of up to 300kg in a fraction of a second. This emulates what happens while walking, when the weight of the body rests on one leg due to the body's shift in the centre of gravity. While running, inertial forces



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can cause the hip to sometimes take five times a person's body weight.

Finally, to simulate the environment inside the human body, researchers use a specialised solution that mimics the bodily fluids surrounding the hip joint. They even warm the fluid to imitate body temperature.

The hip joint simulator forms part of the MaltaHip project that intends to radically redesign hip implants to give them the longer lifespan patients want and need. Watch this space for more. [T](#)

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Spring and load cell system mounted on the hip joint simulator