Monopile foundations support 80% of Europe's offshore wind turbines. Current design methods cannot predict cyclic lateral loading response, and existing empirical relationships not practical for design. Hyperplastic Accelerated Ratcheting Model (HARM) recently developed to accurately capture monopile's cyclic response. More physical modelling needed to verify HARM for a variety of loading and soil conditions. New computer-controlled laboratory apparatus presented alongside example results. Focus on: multi-directional, low-amplitude and storm-type cyclic loading.

LABORATORY APPARATUS
Existing test data mostly limited to: uni-directional, high load amplitude, single frequency cyclic loading. New 1g apparatus performs variable lateral cyclic load tests at model scale. Two actuators facilitate planar multi-directional loading. Six displacement transducers allow calculation of pile's pose. Initial tests in dry, very loose Leighton Buzzard 14/25 sand. Accounting for stress-level, $R_D \approx 4\%$ at full-scale.

DATA ACQUISITION & LOAD CONTROL
Software developed in LabVIEW to perform load-control tests. Two PID controllers compute actuator velocity to achieve demanded load. Data acquisition, kinematics calculations, data logging and actuator communication performed simultaneously.

FUTURE WORK
Tests at higher sand densities, representative of typical offshore sites. Low-amplitude tests to higher cycle number. More realistic multidirectional and continuously time-varying tests.

SUMMARY
New laboratory apparatus developed for cyclic lateral loading of model monopiles. Example results demonstrate capabilities of apparatus and begin to show response to variable cyclic loading. Future work will continue exploring monopile's response – to improve understanding and allow extension and validation of HARM. Moving towards a robust model for cyclic monopile design.