



Dynamet 2

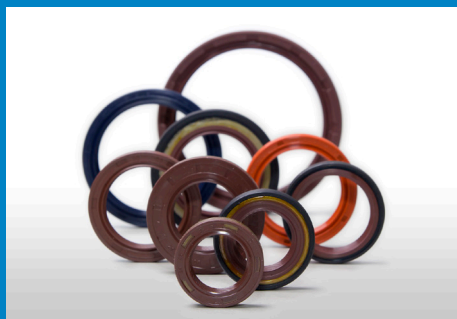
A friction-free system for testing rubber fatigue



Hothouse

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New Technology from DIT



A real-time system for measuring stress and stretch ratios on rubber

Dynamet's, friction-free test system uses a bubble inflation method to subject rubber samples to simultaneous stretching and fatigue loading.

The test apparatus consists of a hydraulic inflation/deflation system, a high-speed vision measurement system and a control system.

By recording visually on screen the stress and stretch ratios during the

test, direct feedback can enable informed decisions to be made in a controlled setting.

Dynamet has a number of advantages over its competitors:

- **Real-time test data** – Dynamet provides real-time feedback on stress and stretch ratio measurements.
- **More rigorous testing** – Dynamet is the only system that can provide long life equi-biaxial fatigue data for elastomers at stretch ratios as high as four.
- **Non-destructive testing** – The Dynamet system avoids the stress concentration and friction inherent in other elastomer fatigue test systems.

- **More control of failure data** – Dynamet provides a method for ensuring failure of the specimen occurs in the observed region of the test piece allowing all fatigue data to be recorded right up to the point of failure.

The novel aspect of the Dynamet test system is the development of an optical system.

The developed control system software controls inflation cycles according to user-selected limits of pressure, volume, stretch ratio, engineering ratio, engineering stress and true stress. This allows the selection of a control method that provides the most accurate representation of the loading conditions.

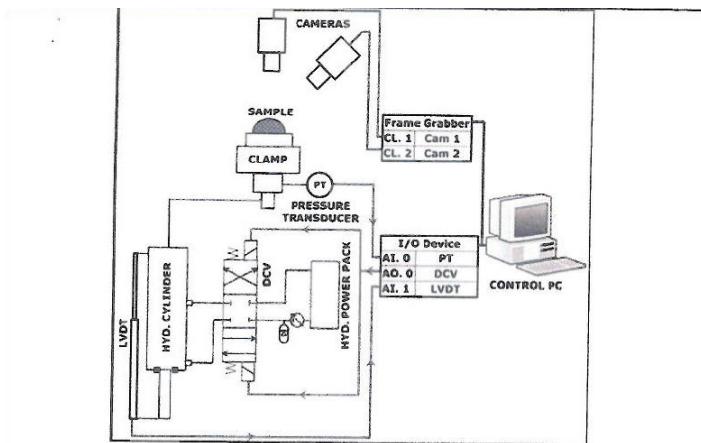


Fig. 1: DYNAMET test system schematic.

Above: The Dynamet Test System

Applications

Tyre companies and other companies that manufacture elastomeric products could avail of Dynamet as a way to calculate accurate lifetime prediction data for components as well as to produce accurate finite element analysis (FEA) modelling of service conditions.

Industry applications include testing of tyres, contact lenses, seals and other elastomer-based components.

Research facilities providing specialist material characterisation would find Dynamet useful in conducting materials testing for companies in the elastomer sector. This is borne out by the number of enquiries and licence applications from companies in elastomer industries.

Opportunity

TResearch and Markets (Researchandmarkets.com) published a report in March 2016 on the Global Rubber Testing Equipment Market: Trends, Opportunities and Forecasts (2016-2021) in which it states that the global rubber testing equipment market is expected to show moderate growth over the period under review as the number of vehicles arriving on roads continues to increase. The report also examines the move towards non-destructive testing (NDT) techniques and highlights the fact that the need to replace older models of testing systems is creating demand for new testing equipment incorporating more advanced technology.

RubberWorld (RubberWorld.com) predicts a record year in 2016 for replacement tyres and expects world demand for rubber will rise by 3.9 per cent per year to 31.7 million metric tonnes in 2019. Rising income levels in developing regions, particularly in the Asia Pacific region, will support gains in motor vehicle manufacturing and usage, fuelling demand for tyres and, in turn, rubber.

Advantages

Dynamet has a number of advantages over existing elastomer testing systems:

- Real-time test data – Dynamet provides real-time stress and stretch ratio measurements, which enables direct stress or stretch feedback control during cyclic inflation.

“Research facilities providing specialist material characterisation would find Dynamet useful in conducting materials testing for companies in the elastomer sector.”

- More rigorous testing – Dynamet is the only system that can provide long life equi-biaxial fatigue data for elastomers at stretch ratios as high as four.
- Non-destructive testing – The Dynamet system avoids the stress concentration and friction inherent in other elastomer fatigue test systems.
- More control of failure data – Dynamet provides a method for ensuring failure of the specimen occurs in the observed region of the test piece allowing all fatigue data to be recorded right up to the point of failure.

Stage of Development

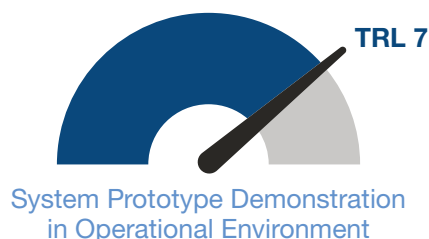
Dynamet has been developed in the School of Mechanical and Design Engineering at Dublin Institute of Technology (DIT).

The test apparatus consists of a hydraulic inflation/deflation system, a high-speed vision measurement system and a control system. The inflation and deflation system was developed previously. The latest stage of development involved devising real-time stretch ratio control source code, a high-speed camera system, a graphical user interface, data acquisition and output systems, lighting, and a casing to enclose the system.

A launch ready version of Dynamet is available and there have already been several enquiries and licence applications from companies in the elastomer industry.

DIT is currently seeking expressions of interest from potential licensees. The technology may be licensed through DIT Hothouse.

Technology Readiness Level (TRL)



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