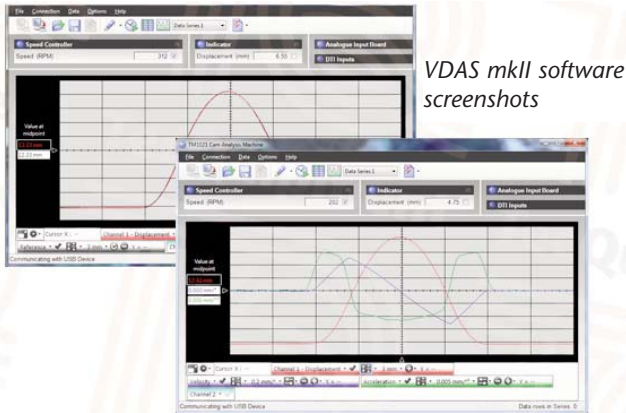


# TM1021

## Cam Analysis Machine

**Studies the dynamic behaviour of different cams and followers and their 'bounce' speed**

Works with  
**VDAS**<sup>®</sup>



- Bench-mounted product to analyse the dynamic characteristics of different cams and followers
- Shows cam and follower separation or 'cam bounce' – under safe and controlled conditions
- Includes different cams, followers, springs and masses for a wide range of experiments
- Fully interlocked for safety
- Highly visual and audible – perfect for demonstrations
- Works with TecEquipment's VDAS<sup>®</sup> (mkII) to capture data and show live traces (on a computer screen) of the follower movement – even at bounce

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- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd

# TM1021

## Cam Analysis Machine

### Description

The TM1021 is a comprehensive machine that allows students to study cams and followers. It shows how they convert rotary to linear motion, and helps students understand their limits of use before the onset of 'bounce'. It also introduces students to key topics of cam terminology such as 'nose', 'flank' and 'dwell'.

The main part of the product has a precision machined heavy steel base which holds a high-torque direct-drive variable-speed motor. The motor shaft connects through a coupling to the main shaft which then passes into the cam test area. Self-aligning heavy-duty bearings support the shaft which has a substantial flywheel. The flywheel reduces speed variations as the torque demand changes during the cam rotation cycle. The cam under test fits to the end of the main shaft, accurately mounted both axially and radially to ensure repeatability.

The follower fits to the bottom of a vertical shaft running in low-friction linear bearings. TecEquipment include a tool for easy changeover of a choice of two followers. Students may also fit one of a choice of two compression springs and adjust their preload. These add to the mass of the follower and vertical shaft pushing the follower onto the cam face. Students may also add different masses (included) to alter the mass of the follower and thus the force applied to the cam. The selection of springs, followers and cams allow for a wide range of investigations.

Sensors on the main and vertical shafts measure angular position of the cam and vertical position of the follower (displacement or 'cam lift').

A key point of the design of the machine is safety while still allowing easy use. A fixed guard covers the shaft and flywheel. A hinged protective guard with electromechanical interlocks prevents users from touching any moving parts in the cam test area when in use. The guard opens only under safe conditions to allow students to change the cam, spring and follower.

A Control and Instrumentation Unit allows students to vary the cam speed. This unit amplifies and conditions the signals of follower vertical position (displacement) and cam angular position. It also includes a microprocessor-controlled multiline display of cam speed in revolutions per minute, radians per second and rotational frequency in Hertz.

TecEquipment calibrate the conditioned signals of follower displacement and cam position to work with the Versatile Data Acquisition System, VDAS® (mkII). The VDAS hardware and software produce live displays of the follower displacement against cam rotation. Uniquely, it also calculates and displays live plots of the first two derivatives of displacement - velocity and acceleration. The live plots alongside the characteristic 'bounce' sound allow students to find the speed at the point of cam bounce. They can then compare it to that found from simplified theory.

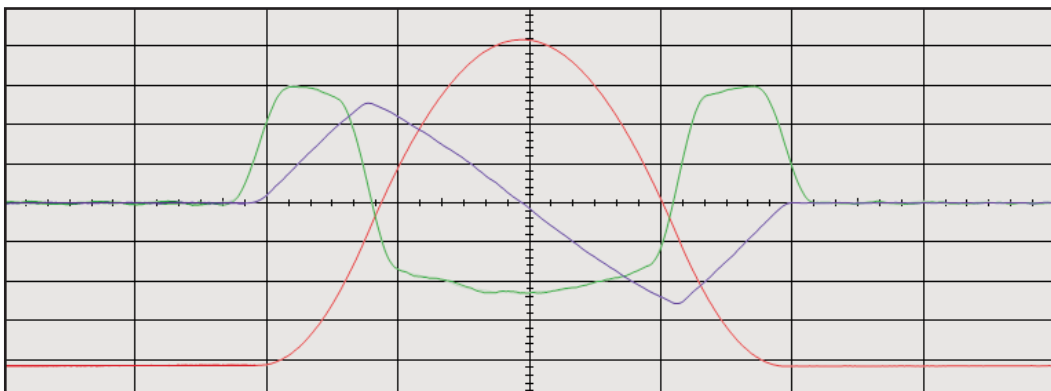
### Experiments

- Comparing actual results with theory for profiles of follower displacement, acceleration and velocity
- Cam bounce speeds for different cam and follower combinations, and comparison of speeds to those predicted by simplified theory
- How spring rate, preload and follower mass affect cam bounce speed

### Essential Ancillary

- Versatile Data Acquisition System – bench-mounted version VDAS-B (mkII)

**Note:** This equipment needs VDAS (mkII) and will not work with earlier versions of VDAS. If unsure, contact TecEquipment or your local agent for advice.

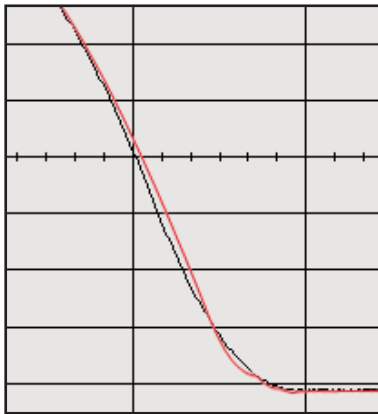


VDAS mkII software showing live plots of displacement, velocity and acceleration for convex cam with flat follower

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# TM1021

## Cam Analysis Machine



Magnified screenshot of trace, showing a reference displacement of the cam response against actual displacement just beyond bounce speed.

### Standard Features

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives

### Essential Services

*Bench space needed:*

A strong, stable bench of 800 mm front to back and 1000 mm plus space nearby for VDAS (mkII)

*Electrical supply:*

220 VAC to 240 VAC 50 Hz to 60 Hz at 1.6 A

### Operating Conditions

*Operating environment:*

Laboratory environment

*Storage temperature range:*

-25°C to +55°C (when packed for transport)

*Operating temperature range:*

+5°C to +40°C

*Operating relative humidity range:*

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

### Sound Levels

Normally lower than 70 dB(A). However, during bounce experiments this equipment can produce sound levels greater than 80 dB(A) for a few seconds. TecEquipment recommend that you wear ear defenders if you are to complete all experiments.

### Specifications

*Nett dimensions and weights:*

Main Unit: 360 mm wide x 750 mm front to back x 720 mm high and 100 kg

Control and Instrumentation Unit: 600 mm x 320 mm x 180 mm and 12.5 kg

Weight of additional parts (Cams, masses, springs and tools): 6 kg

*Packed dimensions and weight (total):*

0.5 m<sup>3</sup> and 150 kg

*Masses and springs:*

Five x 400 g masses and 2 compression springs

*Cams:*

2 convex (of different shape), 1 concave, 1 tangent

*Followers:*

1 roller, 1 flat face

*Tools:*

Spanners and a hexagon tool to fit the cams, springs and followers. Grease to lubricate the cam surface.



TM1021 in use (other items not included)

FOR MORE INFORMATION CONTACT US!



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