



Automatic Edge Tester

for **KNIVES** | **BLADES** | other **LARGE CUTTING EDGES**

Designed and manufactured by
Cutlery & Allied Trades Research Association



CATRA has been involved in the testing of performance characteristics of blades for over 50 years. In particular, the problems of evaluating the cutting ability have been studied using various manual and mechanical methods. This knowledge has enabled CATRA to design an automatic test machine that meets the requirements of consumers, manufacturers and the ISO 8442:5 Standard.

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Available direct from the manufacturers.



The CATRA Automatic Edge Tester can...

... objectively compare various knife blades and determine which one is superior to another.

... monitor the consistency of quality of cutting performance against the norm of manufacturing, to be sure that the knives are within the standard values agreed upon.

... be used as a development tool to enable research into the optimum steel, heat treatment, surface coating, edge geometry and finishing operations to suit the application.



The International Cutting Test Standard BS EN ISO 8442-5: 2004

A group of specialists from various countries have developed a standard within the ISO Standards Committee for articles in contact with food. It specifies the detailed test method and sharpness specification for knives for the preparation of food. However, the test is ideally suited to other types of blades, including:

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|--------------------------------------|--------------------------------|
| ✓ Kitchen and professional knives | ✓ Machine blades and cutters |
| ✓ Handcraft, utility and tool knives | ✓ Agricultural blades |
| ✓ Folding knives | ✓ Chisels and other wood tools |

Testing Method

The blade is mounted in a position with the edge vertical and a pack of specially developed synthetic paper is lowered on to it. By oscillating the blade back and forth the blade cuts into the paper, the depth of the cut being the measurement of sharpness. The test media are loaded with 5% silica, which has a mild wearing effect on the blade edge. By repeating the back-and-forth motion, further cuts are made, which wears the cutting edge. The measurement of cut depth at each subsequent stroke can then be plotted to produce a wear curve for each blade tested.

The test produces two indications:

1. ICP (Initial Cutting Performance)

Represents the cutting ability (sharpness) of the blade as supplied.

2. TCC (Total Card Cut)

Represents the life of the blade by giving a measure of its total cutting ability.

The test is designed for straight or nearly straight blades. However, specially modified machinery can be provided for circular or curved blades.

Specification

Test Stroke	0 to 128 mm
Test Cutting Speed	0 to 150 mm/second
Test Load	25 and 50 N
Max depth of media	50 mm
Overall vertical capacity (max blade width)	105 mm (inc. 50 mm of cut)
Size	1700mm x 1800mm x 2000 mm
Weight	350 Kg
Typical test time plain edge blade	15 mins (60 cutting strokes)
Test time plain edge with auto-set feature	10 mins
Typical test time serrated edge blade	50 mins (200 cutting strokes)
Test time serrated edge with auto-set feature	38 mins
Electrical supply requirements	230V or 110V AC single phase
Compressed air requirements	3 litre/min at 6 Bar

Computer Hardware

Our machines are supplied with integrated PC and swinging arm mounted flat screen monitor and keyboard.

The specification is selected to be compatible with the current software and control hardware built into the machine, using industry standard components and running Windows 11. USB ports & networking connectivity as standard.

Machine Overview

The machine comprises of a rigid metal fabricated frame (Base & Cantilever) to which all major sub-assemblies are mounted. It is configured such that the blade to be tested is fixed, edge upwards, on a reciprocating table mounted onto the base of the machine whilst the test media (card) is applied, under load, onto the knife edge from the cantilever.

The self-centring vice, which fixes the blade, has a jaw designed to compensate for blade thickness and taper in two directions. The centre line of any blade is therefore always the same datum; adjustable pillars support the blade and are used to set the attitude of the test portion of the cutting edge to as near level as possible. This means that any length of blade can be accommodated, provided that the test portion is positioned over the vice jaws for support. The equipment is supplied with a standard vice suitable for a wide range of blade types, but optional special jaws can be supplied to accommodate small or unusually shaped blades.

The vice is mounted on a horizontal low friction slide which allows lateral float of the blade whilst cutting through the media but returns to the fixed datum position for the beginning of each new cutting block. This slide is in turn mounted onto a horizontal table, which facilitates the longitudinal motion of the blade for cutting strokes. Drive to the table and therefore the blade is via a servo motor and lead screw arrangement, which allows precise positional and speed control over all or any part of the table's stroke. Therefore, the test is carried out within a pre-programmed speed and motion envelope.

The test media are strips of card which are pneumatically clamped during cutting. These are mounted in a holder with a capacity of 50 mm cutting thickness on a vertical low friction slide. The test load is applied vertically to the slide and therefore the media, by a calibrated weight of 50N. The method of lowering the media to the blade, together with the vice jaw design allows a full range of blade widths to be accommodated. Measurement of the amount of the card cut is achieved electronically. At the beginning of each new test and after each cut through the 'block' of media, the card is fed forward automatically by a pneumatic indexing system.

Operation of the machine is totally automatic, except for the loading, setting up of the blade and replenishing the packs of cutting media. The auto-set feature simplifies the set up and reduces test time by approximately 25%. The machine functions are controlled by a microprocessor-based unit, which switches electro-pneumatic devices and controls the motor under instruction from the resident program. This unit is in turn a slave to a host computer of IBM PC compatibility. The function of the PC is to provide the operator interface at the keyboard and to manage the test data, parameters, generate test reports and allow rapid comparison of current test data within Access database and Excel spreadsheet environments.

The Automatic Edge Tester uses a Windows 10 interface that is familiar for most applications. This greatly reduces the time taken to train people to use the software. Real time displays of data and results are both numerically and graphically shown on the main test screen. Various display options are available from the user interface screen with the machine in run mode. The operator can, whilst a test is in motion, interrogate the data base and analysis previous test data without significantly affecting test speed.

Although many blades are tested to the specific test parameters of ISO 8442.5 the machine and software systems flexibility allows the operator to design, develop, and store user tests, thereby facilitating a very wide range of blade sizes and types to be accommodated.

Data generated by the test software are stored in a Microsoft Excel file and all test and blade information is readily analysed and searched by the built in a Microsoft Access database system. As a result, large numbers of user selected tests can be compared. Database queries can easily be designed by the machine user.

Accuracy and Repeatability

The measurement of sharpness and cutting-edge durability is not an absolute attribute, such as weight or length; therefore, the results produced are for relative comparison, but defined in the ISO Standard. The system replicates the slicing/cutting stroke, where there are a considerable number of variables which can, and will, change. With over 20,000 tests run on the AET at CATRA, the whole system has been demonstrated to produce accurate and repeatable results across a wide spectrum of blade designs.

Optional Calibration Package

This unit, complete with specific hardware, is to enable accurate physical and dynamic (cutting) calibration of the machine. It is integrated into the standard software and allows calibration data to be stored within the system database. With this option, calibration takes around 1 hour, thereby enabling users to regularly check the system calibration. The system adjustments required because of the dynamic calibration are automatically applied within the machine running software and the test report is marked accordingly.

