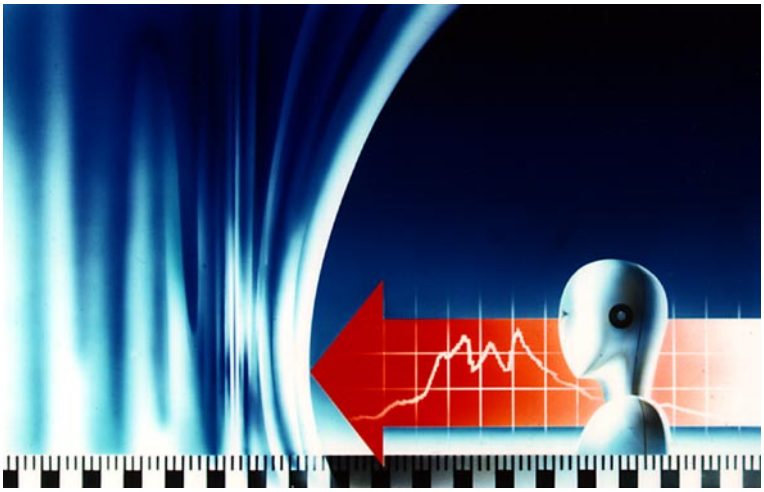
K A Y S E R - T H R E D E

WINCARAT 4.0

CRASH TEST CONTROL SOFTWARE



- **Fully Integrated Sensor Data Base**
- **Test Management and Documentation**
- **Interactive and Automatic Test Execution**
- **Supports K3600, MDS-8/64 and MINIDAU® Data Acquisition Systems**

KAYSER-THREDE

KAYSER-THREDE PORTRAIT

Kayser-Thredе was founded in 1967 in Munich. In more than 30 years of existence the company has developed into a systems house of considerable importance in the high-technology sector.

- Specialisation in the development and manufacture of complex systems for aerospace, scientific and industrial applications.
- Space systems for the International Space Station, transport elements and satellites as well as scientific instruments and facilities, small and medium missions, electronic and electromechanical subsystems and components.
- Systems for transportation and environment: Crash measurement technology, process control and telematics, high speed data acquisition and high speed data archive systems, optoelectronic systems and components.
- International experience in carrying out studies and analyses, system design, development of mechanics, electronics, optical systems and software, as well as in production, integration and testing including mission support.
- Highly qualified employees in science and engineering.
- Certificated according to ISO 9001
- Member of the BDLI and DLR.
- Branch office in Munich, Perchtinger Straße.

Branch Office, Perchtinger Strasse, Munich

EXPERIENCE IN CRASH TESTING

Since 1976 Kayser-Thredе has been supplying European car manufacturers and test houses with ruggedized on-board data acquisition systems for use in safety tests according to SAE J 211. In the beginning of the eighties the European activities have been expanded to a world-wide operation. Today Kayser-Thredе has customers all over the world.

ISO 9001

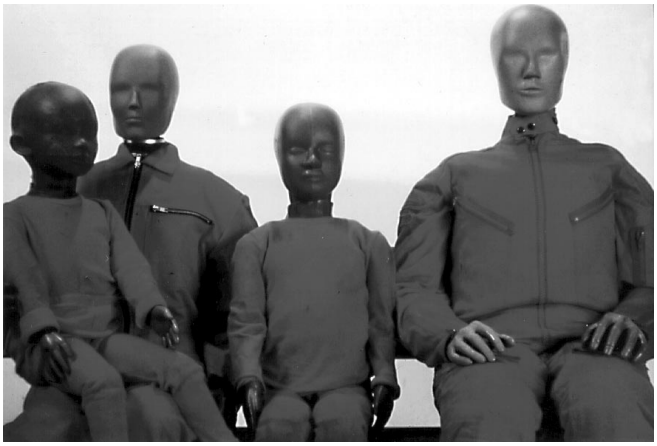
"Customer Satisfaction" is our main goal. That means meeting in full the high standards set by the customer and by ourselves – on schedule, on budget and on target. This is the motto behind all projects developed at Kayser-Thredе – now and in the future.

In line with the EC internal market and international endeavours, we have adapted our long-standing, efficient quality management system to the requirements of DIN ISO 9001; we have obtained official certification from an independent certification authority in December 1994 (Certificate Registration No. 41294186).

Main Building, Wolfratshauser Strasse, Munich

WINCARAT 4.0 – CONTROL SOFTWARE

- Sensor Database
- Test Manager
- Data Acquisition
- Test Reporting
- Real Time Display of Sensor Data
- Quick Look of Measurement Data



Crash Test Dummies

GENERAL

WINCARAT 4.0 is the standard software for crash test data acquisition systems. It supports all crash test systems made by Kayser-Threde (K3600, MDS-Series and MINIDAU®) and stores all setup data for each test. WINCARAT 4.0 is the first software for crash test data acquisition that covers all aspects of today's requirements in crash testing including test documentation as defined in ISO-9000.

Kayser-Threde has been developing data acquisition systems for crash tests and control software since 1976. WINCARAT 4.0 is the result of 20 years experience and customer feedback. WINCARAT 4.0 is able to store data in different formats for easy data transfer to most analysis programs such as DIA*dem*® from GfS.

WINCARAT 4.0 utilizes the graphical user interface of MS-WINDOWS-Win95/98/NT4.0® and the advantages of the standard database program MS-ACCESS 8.0®. All information that is used by the software including labels and messages are stored in easy-to-use MS-ACCESS® tables, allowing the user to make changes and to tailor the software to his needs. This means, that WINCARAT 4.0 is not a closed software package where all changes have to be made by Kayser-Threde. It is an open tool that allows the customer to adapt the software to his requirements.

To use the software, it is not necessary for the user to have advanced experience with MS-ACCESS®. However, to get the most power out of the software we recommend the user to be at least familiar with MS-WINDOWS® and MS-ACCESS®. Understanding the concepts and ideas behind MS-ACCESS® and the database structure makes the use of WINCARAT 4.0 easier and more effective.

In addition to WINCARAT 4.0, Kayser-Threde offers a highly sophisticated sensor identification system. When using the ID-modules KM3590, the software allows easy system configuration and the risk of connecting transducers to wrong inputs is minimized.

Another important part of the software is the analysis feature. The goal for Kayser-Threde was to combine crash specific routines such as HIC-calculation with standard mathematics, graphics and other analysis routines. Therefore, we offer a transparent data interface to standard software for analysis and data presentation. This software is DIA*dem*® from GfS.

The complete crash analysis can be automated with the auto-sequences offered in DIA*dem*®, and complete print-outs with all important results are available shortly after test completion.

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PHILOSOPHY OF WINCARAT 4.0

During the development phase of WINCARAT 4.0 Kayser-Threde decided to use a standard database system to store all the data required for a test. The standard database used for this task is MS-ACCESS®, which offers a lot of advantages for the user:

- Data is stored in a standard environment which is installed on millions of PCs worlwide.
- All the data required for a specific test can be easily accessed.
- The user is able to define his desired reports for sensors, tests and test documentation by using the easy-to-use MS-ACCESS® environment.
- Compatibility to future versions of MS-ACCESS®, even on new operating systems, is guaranteed.

Our 20 years of experience in crash testing has shown that test preparation is still one of the most time consuming tasks during test setup. Even today, a major part of the test preparation is the software setup. We felt that it must be possible to reduce this time to a minimum, and the result of our efforts is now available as WINCARAT 4.0.

QUICK LOOK

In order to allow a fast overview over the test data immediately after the test we have implemented a so called *Quick Look* function into WINCARAT 4.0. The user can easily select and graphically display all acquired channels on the screen.

MAJOR PARTS

WINCARAT 4.0 consists of three major parts:

- Sensor Database
- Test Manager
- Test Execution

SENSOR DATABASE

The Sensor database manages the transducers used by the Kayser-Threde data acquisition systems in a relational database.

The main aims during the design of this program section was to minimize time expenditures and error possibilities during the preparation of measurement experiments.

A large number of manual data entries need to be made when defining the parameter values for an analog channel. A large portion of data entries relates to sensor specific values. The practical application shows in 90 % of the cases that the sensor parameters are the same when using identical sensors.

Thus, the MS-ACCESS® based Sensor Database provides a solution in terms of time expenditure and error minimization.

- All sensors and their characteristic data are entered once into the database.
- Sensor data of identical design may be copied within the database.
- During the definition of analog channel parameters for an experiment, the user only needs to enter the corresponding transducer number under which all data is stored.

Program Description

The software offers the following program sections:

- Generation, modification and deletion of transducer data sets
- Sensor Group Management
- Group Location Management
- Model Table
- Status Table
- Unit Table.

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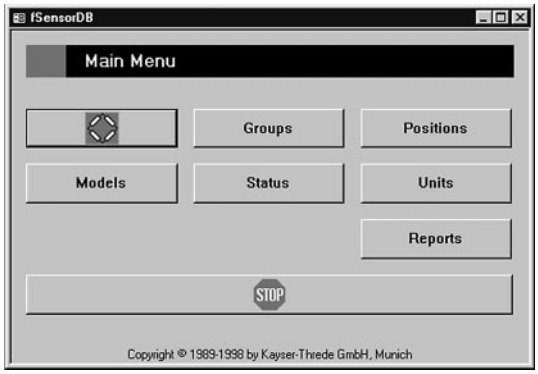
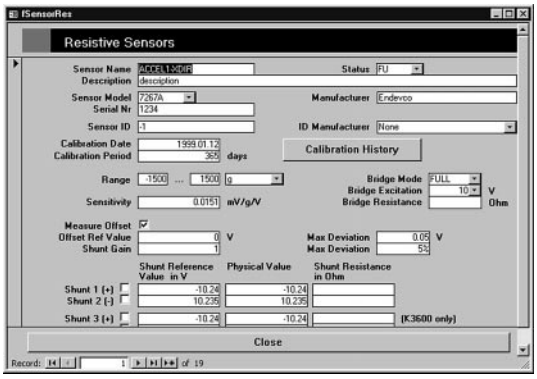
All sections can be accessed via a comfortable screen menu:



ENTERING SENSOR PARAMETERS

All sensor parameters can be entered with the software. The main parameters are the sensitivity and the measuring range, others are general information such as, for example, serial number, ID number, sensor name, comments, offset and shunt values, as well as calibration information. The unique sensor names can then be used to select the individual sensors in the test or group management.

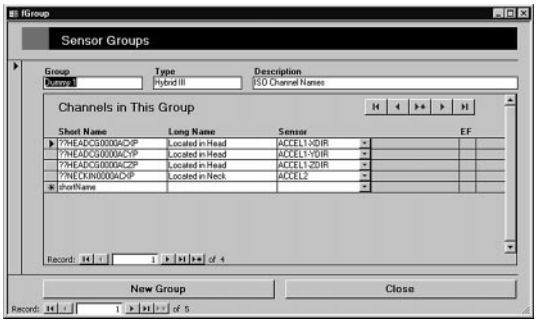


MANAGING SENSOR GROUPS

Apart from managing single sensors, sensor groups can also be created. A typical sensor group would cover, for example, all the sensors installed in a dummy. Complete sensor groups can then be selected in the test definition instead of having to assign single sensors to the measuring channels. This considerably reduces the test preparation time.

Each sensor in the sensor group can also be assigned a short name. This short name usually corresponds to the customer-specific measuring point designation. HEAD_X, HEAD_Y and HEAD_Z would then be the typical short names for a triaxial acceleration sensor in the head.

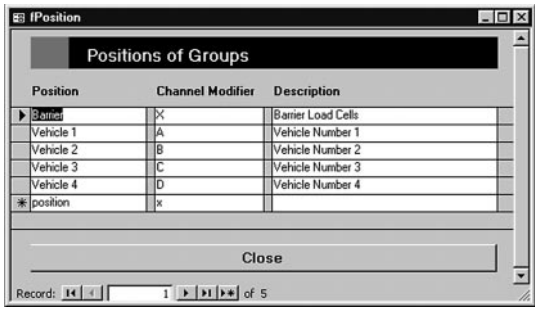
These short names are stored in the results file as channel information and can be used as identification criteria within an automatic data analysis.



MANAGING INSTALLATION LOCATIONS

The same short names are often used in different groups because a triaxial acceleration sensor is usually available in each dummy, and this then has the names HEAD_X, HEAD_Y and HEAD_Z. To avoid identical short names in the subsequent tests preparation and test results, an installation location can be added to the measuring locations for a group. Typical installation positions are, for example, the driver's seat or the passenger seat. This menu can also be used to assign abbreviations as well as the freely selectable designation of the installation location.

These abbreviations are then automatically added later to the group short names. Example: When F is used as the abbreviation for the driver's seat, the three short names for the dummies installed on this seat are then HEAD_XF, HEAD_YF and HEAD_ZF. The software performs this assignment automatically.



MODEL TABLE

Crash laboratories usually use a whole range of sensors from the same model series. To simplify adding new sensors, sensor models can be entered in this Basic Table.

The user then only has to select the sensor type from this table and the significant parameters are then automatically entered in the Sensor Table.

SENSOR STATUS

It is possible that certain sensors cannot be used for a test, e.g. the calibration period has expired. In this case, the sensor status is set to "Unusable" and it cannot be selected for a test. The user can use this menu to pre-define a whole range of statuses.

UNITS

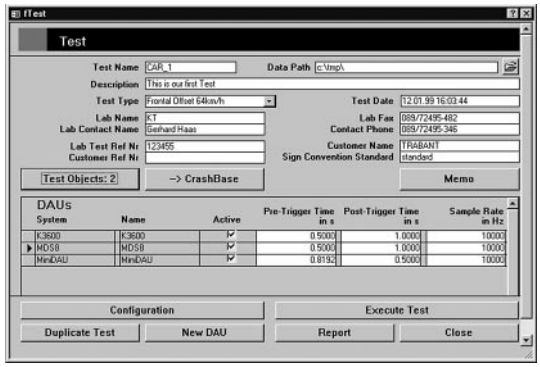
The user can use this menu to enter any number of physical units (engineering units) to be assigned later to the sensors.

TEST MANAGER

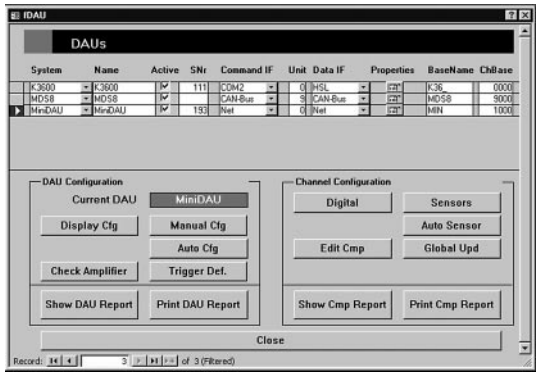
The Test Manager serves to prepare the actual test itself. It assigns sensors and groups stored in the Sensor database to the hardware measuring channels.

The Test Manager also supports the test execution. The user can define a sequence of steps for proper test execution.

Test Preparation



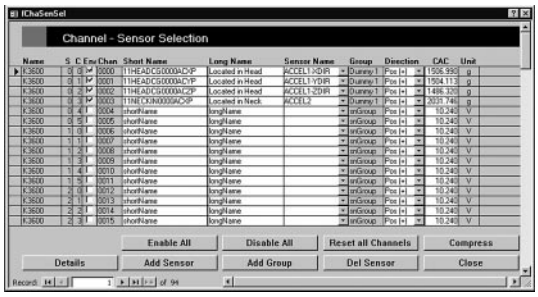
Each test already executed can be inquired, displayed and executed using the Test Manager. The test name entered on the title page of the respective test serves to identify the test. The MS-ACCESS® Search and Filter functions can be used to search for single tests (e.g. test date, test name, test engineer etc.). The title page contains general information on the test as well as a list of the measuring units used in the test.



Test Configuration

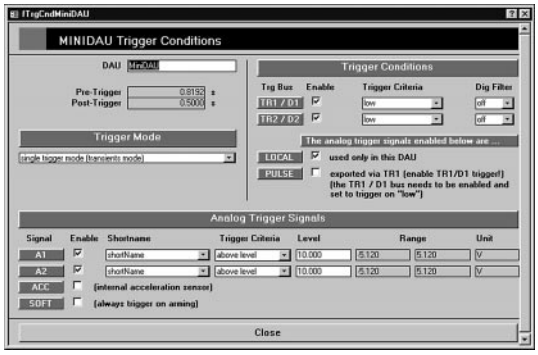
The Configuration menu is used to specify the complete hardware used in the test. This means that the exact configuration of the measuring equipment is defined (including all modules and their serial numbers), and the single measuring channels, sensors and sensor groups are assigned.

WINCARAT 4.0 supports manual or automatic configuration. Automatic configuration automatically recognizes all the system components of the connected measuring system and stores these in a database. Sensors can then be assigned immediately to these components.



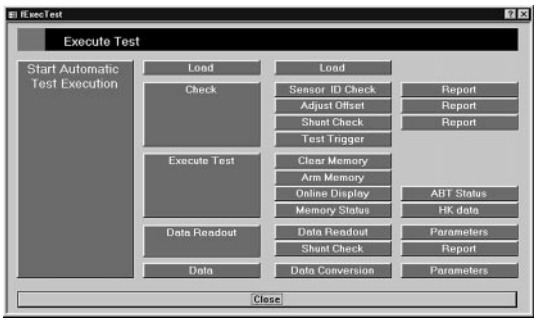
The assignment of sensors or groups can also be done automatically. Sensor-ID modules (e.g. Kayser-Threde or Endevco) must be used in this case. Existing tests can also be copied and then modified as necessary for the new test.

The Configuration menu is also used to set the trigger conditions for the respective test. Various combinations of digital and analog trigger criteria are available depending on the hardware used (K3600, MINIDAU® or MDS-xx). The following screen shows an overview of the manifold settings:



TEST EXECUTION

The real core of the Test Manager is the test flow control. A sophisticated flow control plan allows the user to select and configure the single steps. The following single functions can be activated for the test flow control:



LOAD

Downloads all the channel settings to the connected measuring hardware. This function is necessary when the settings for the single channels have changed.

SENCHK

SENCHK checks the ID numbers of the connected sensors and then checks the ID numbers found against the values stored in the database. The software displays the respective channel number, the number found and the expected number should differences occur. Any such differences are also stored in a table and can then be output as a report on the printer or screen. The SENCHK function is only available when Sensor ID modules are used.

ADJUST OFFSET

Serves to activate automatic zero point correction for the connected sensors. The offset values are measured and corrected. WINCARAT 4.0 compares the offset value determined for each channel to the reference value stored in the database for the channel.

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Channels with measured values outside the defined limits are marked in the database and can be output as a report on the printer or screen. The determined offset values are stored in a database and remain available for retrieval over a long period of time. The automatic flow is aborted when an error is recognized.

SHUNT

The shunt program section checks the shunt and compares the determined values with the nominal values in the database and outputs deviations as a report in the same manner as for Adjust Offset. Measured shunt values are stored in the Test database.

CLEAR MEMORY

Resets the measured data memory of the measuring system for new data.

ARM MEMORY

The memory must be armed before the measuring system is ready to record data. This function also serves to program the trigger settings. Data are first recorded after the memory has been armed. The following Online Graphic function can only be performed with armed memory.

ONLINE GRAPHICS

Four analog measuring channels can be displayed in strip chart recorder mode after the memory has been armed and the measuring system has started to record data. Certain digital information on trigger and memory status are also displayed. This allows the user to check the function of the connected sensors. All measured values are displayed scaled in physical units.

CHECK TRIGGER

Not only the Online Graphics function but also this program section can display trigger channel statuses. This function was specially introduced for K3600 systems without High Speed Link and MINIDAUS®.

READOUT

The Readout functions read out the data after a test and transfers the data to the PC. The Parameter function allows the user to define the time screen to be read out as well as the measuring channels to be transferred. The complete data memory does not have to be transferred for systems with sufficient memory (e.g. MINIDAU®).

The data are stored in a format that can be directly processed by the DIA*dem*® analysis program from GfS. The Data Convert function can be used to generate other data formats such as ASCII, DATS or PIAS.

DATA CONVERT

WINCARAT 4.0 has a conversion section that can easily convert the measured data to other formats such as ASCII, DATS, PIAS or ISO/DTR 13499 for processing by other systems. This ensures compatibility to all common evaluation programs and the brand new CrashBase software.

CREATING REPORTS

An important WINCARAT 4.0 function is report generation to document the test.

WINCARAT 4.0 stores all the test information in MS-ACCESS® tables. The detailed data can then be consolidated into printed reports. WINCARAT 4.0 already has certain reports available and the user can select these by activating a button.

The main advantage of WINCARAT 4.0 is that the user can use the functions integrated in MS-ACCESS® to create own, customized reports. The user can customize existing reports or layouts to meet individual company requirements.

Kayser-Threde can also create user-specific reports on request.

ANALYSIS SOFTWARE DIA*dem*®

DIA*dem*® Windows™ software is a unique concept for network or stand-alone processing of technical data. DIA*dem*® has been conceived as a PC-WORKSHOP in which software devices can be stored as required.

Because it is a virtual workshop, it can be as small or as big as necessary, and it can grow with your needs.

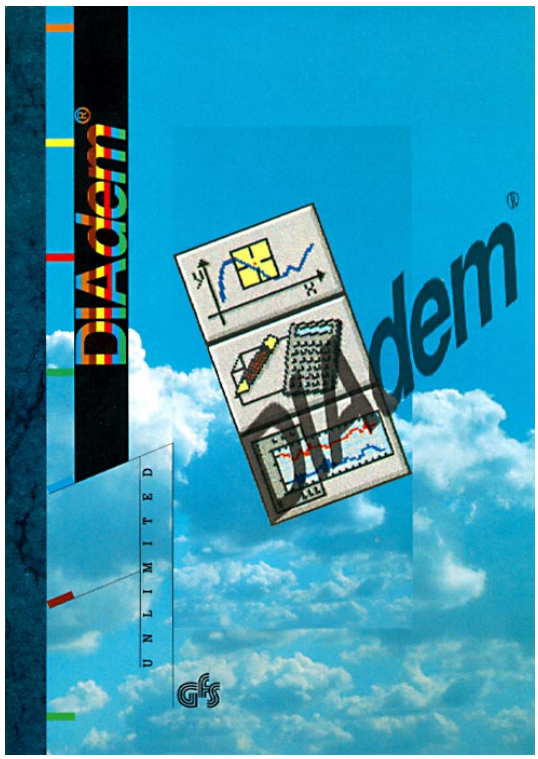
The devices have been constructed as methodically as the the WORKSHOP itself. They consist of separate modules, each containing related functions. When you work with a device, you only see that device's functions without undesirable distractions. You can even develop your own special devices without having to write a program.

The DIA*dem*® PC-WORKSHOP´s doors are always open ... for future development of devices ... or for current benefits such as using DIA*dem*® functions in word or a data processing programs in an office environment.

Among other functions such as formula calculation, basic mathematics, statistics, signal analysis, matrix operations, graphical presentations of data DIA*dem*® offers for the crash test user special crash test analysis algorythms. The following functions in accordance with SAE or ISO specifications are available:

- HIC calculation (Head Injury Criterion) either HIC, HIC36 or HIC15 including begin/end times of the relevant time interval.
- Incremental and accumulative SI value (Severiy Index) for chest and rib areas.
- Filtering with CFC60, CFC180, CFC600, CFC1000.
- X-ms value: calculation of the maximum accumulation value that lasted X milliseconds (usually X > 3 ms) according to NHTSA.
  Saving the begin time of the X-ms value. Devided or complete time intervals are used.
- X-g value: calculation of the total time during which the acceleration signal was > X[g].
  Devided or complete time intervals are used.
- TTI calculation (Thorax Trauma Index) from: Maximum acceleration of the ribs and Peak acceleration of the spine (T12).
- VC calculation (Viscous Criterion).

Kayser-Threde would also be pleased to send you the separate DIA*dem*® catalog from GfS along with a Demo-CD.



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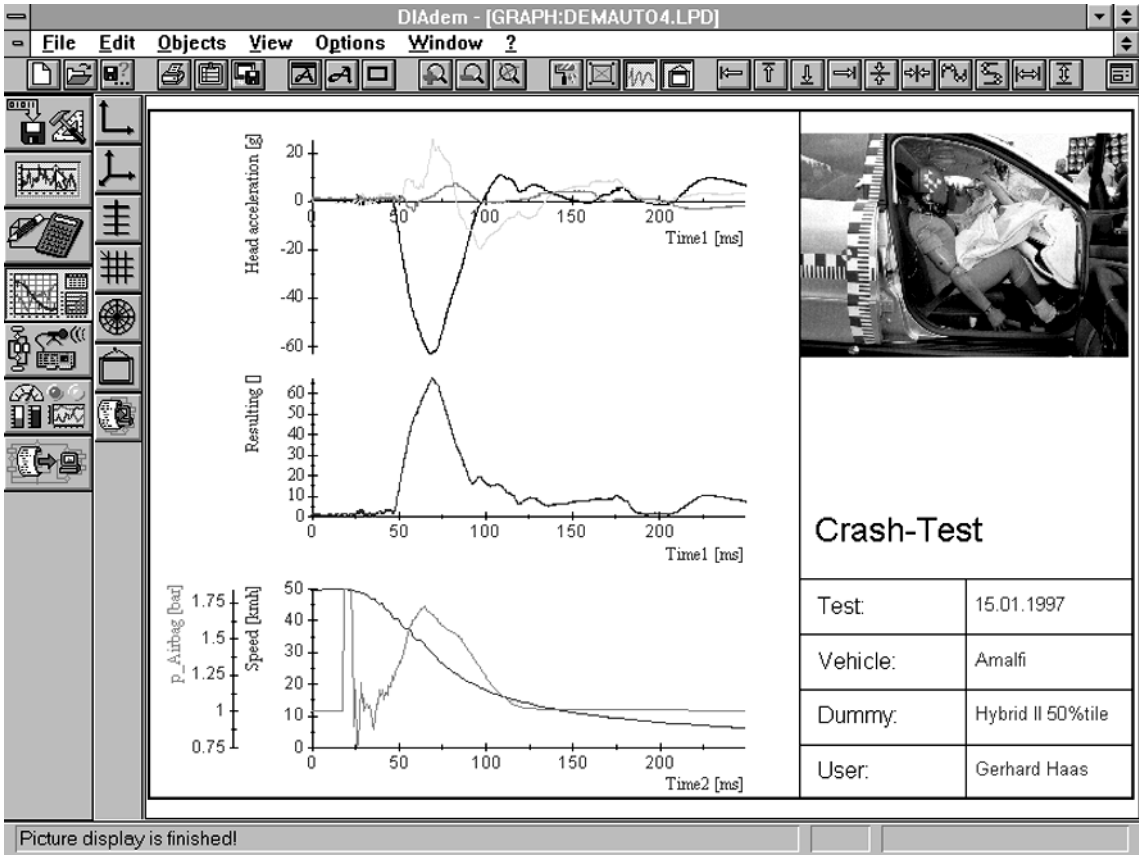

SUMMARY

WINCARAT 4.0 is a control software package with an integrated standard database (MS-ACCESS®) to prepare and manage crash tests.

The WINCARAT 4.0 simple and intuitive user interface makes crash tests child's play for test engineers.

An MS-WINDOWS® graphical interface simplifies operating the Kayser-Threde crash test systems K3600, MDS-xx and MINIDAU®.

When combined with the standardized DIA*dem*® analysis software, the user has a tool to cover all software-specific aspects of crash tests.

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CANADA
- PMG

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- Delphi
- Ford
- TRC

UNITED KINGDOM
- DERA
- Ford
- Jaguar
- Lotus
- MIRA
- Thatcham
- TRL

FRANCE
- Autoliv
- PSA
- Sicma Aero Seat
- UTAC

SPAIN
- IDIADA
- INTA

GERMANY
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