

CAMPUS® - Free, Highest Quality Data for Material Selection and Product Design from over 45 Global resin Suppliers

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CAMPUS (Computer Aided Material Preselection by Uniform Standards) was originally developed by four leading German resin suppliers – BASF, Bayer, Degussa-Hüls and Ticona - in 1988 to produce a truly comparable database for their customers. Today, led by BASF, Bayer, Degussa-Hüls, Du Pont, The Dow Chemical Company and Ticona, more than 45 plastics producers worldwide are using CAMPUS to provide technical data on their products. CAMPUS has become the most successful and widely used materials database for plastics with more than 200,000 copies distributed worldwide.

This remarkable success is based on the unique concept of *uniform representation of data* combined with the most advanced database software for the plastics industry. CAMPUS is the first and the only database system that provides truly comparable data on products from different producers and is available FREE directly from each participating resin suppliers.

The underlying idea of CAMPUS is simple: provide comparable, informative and only necessary practical data. In order to produce truly comparable data, uniform test standards and uniform test conditions must be used. This is accomplished in CAMPUS by embracing the three key international standards for comparable data: ISO 10350-1, ISO 11403-1 and ISO 11403-2.

Availability in multiple international languages

CAMPUS is available in six common international languages (English, German, French, Spanish, Japanese and Chinese) making it quite universal. The language options for user interface, help, property fields, test standards description and product text are handled separately. The program includes the English, German, French and Spanish language options or English, Japanese and Chinese language options. Each participating resin producer distributes their own data including specific language versions for product text.

The list of participating resin suppliers is easily obtained by visiting the CAMPUS web site (www.campusplastics.com). From this site, many participants allow direct download of their data, some have email links to send your address for delivery of their CAMPUS diskette or CD-ROM, while others can be contacted via mail or fax.

Data for material selection

Material data in CAMPUS includes single point data, multi-point data, and product information or process information displayed simultaneously (Figure 1).

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When so much information is available, the ability to easily perform searches becomes just as important as the comparability and quality of data. The CAMPUS program offers advanced search features to find one or more materials that can meet the criteria set by the user to satisfy end-use performance requirements of applications. Besides the ability to conduct standard queries by specifying minimum and maximum values for one or more properties or find an equivalent grade within a specified bandwidth of the properties of another grade, the user has the ability to conduct queries graphically or across multi-point data.

In addition to allowing the user side-by-side comparison of multiple products displaying data in tabular form, CAMPUS also offers displaying the data in easy to view 2 dimensional property correlation maps and polar diagrams. Representation of data in polar diagrams is an extremely informative way to quickly visualize and compare multiple materials.

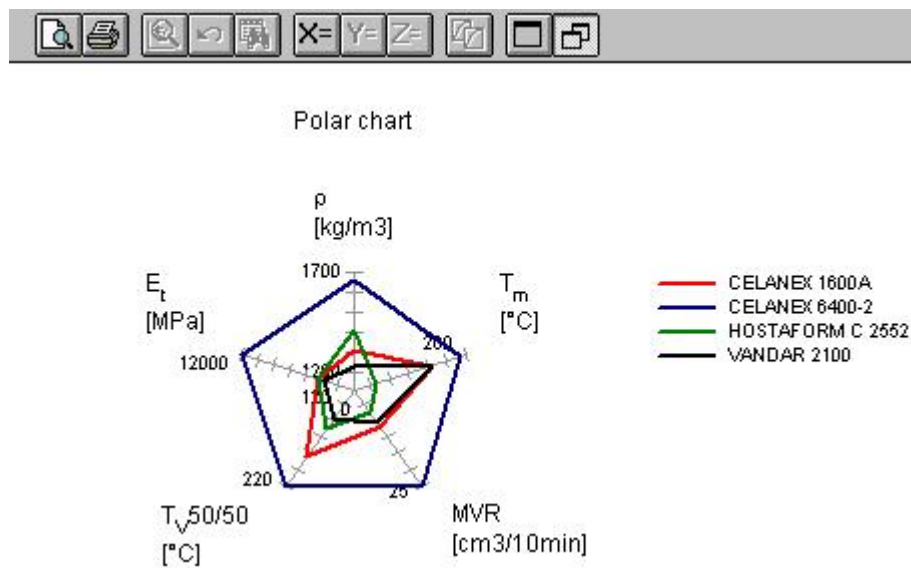


Figure 3. Graphical comparison of multiple materials using polar diagram functionality

Data for Product Design

CAMPUS has a wealth of engineering data for design calculations and CAE simulations:

- Tensile stress vs. strain curves over a wide range of temperatures
- Tensile creep modulus vs. time curves at ambient and elevated temperatures at several stress levels
- Shear modulus vs. temperature data
- Melt Viscosity vs. shear rate within the recommended processing temperature ranges
- pvT diagrams
- Specific heat vs. temperature curves

Multi-point data has been available in CAMPUS since 1989, beginning with version 2.0 in response to the request from users. The content and presentation formats have been continuously upgraded since then. For example, the thermal parameters essential for

processing simulation, pVT data and DSC curves were included in the latest version 4.1. Through close cooperation with designers and CAE program vendors, CAMPUS has taken a leading step in making direct interface to CAE programs a reality. Today, dynamic data exchange with CADMOULD and ABAQUS programs is already available. Similar interfaces to other leading processing simulation and structural analysis programs are in advanced stage of development.

One of the unique features included in CAMPUS is the curve overlay function to facilitate comparing multi-point data for up to 10 materials (Figure 4).

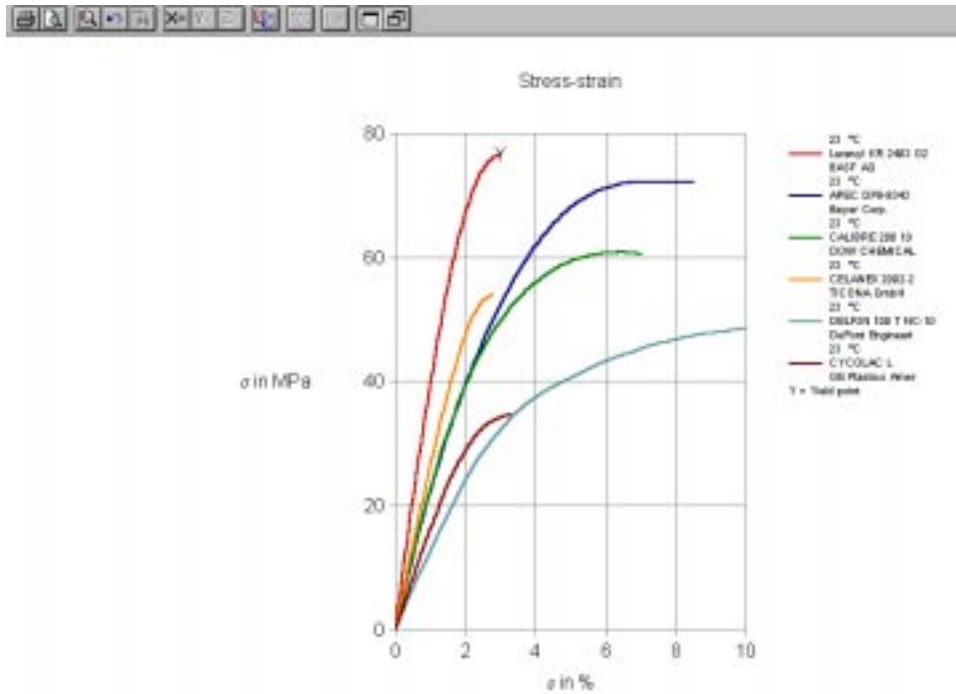


Figure 4. Comparing stress-strain curves of multiple materials using curve overlay function

MCBase - Convenient tool to create comprehensive material information system with CAMPUS data

A commercially available merge program MCBASE, allows the user to create a customized comprehensive product information system on their computer system, combining data on more than 6000 products from different participating resin suppliers into a single searchable datapool. This convenient program, available from The Madison Group (www.madisongroup.com) and M-Base GmbH (www.m-base.de) for a minimal fee offers the same query and display capabilities as CAMPUS and additional search features by producer and polymer family.

To exploit the growing use of internet and intranet technology, special internet versions of MCBASE, based on Java with full functionality - all graphical features and search options of CAMPUS - is now available to the designers.

CAMPUS is indeed the most powerful database available to the designers with the comparable and highest quality data. For more information on CAMPUS and the MCBASE merge program, please visit the CAMPUS website (www.campusplastics.com).