



CES EduPack 2011 Release Notes

These Release Notes apply to the following product:

- CES EduPack™ 2011

The Release Notes detail the enhancements in CES EduPack 2011 compared with the previous release, CES EduPack 2010.

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What is new in CES EduPack 2011?

CES EduPack Software

1. **Hybrid Synthesizer** – New tool, available with the Level 3 Aerospace, Eco Design and Polymer databases, that predicts the performance of hybrid materials and structures. Accessed from the *Tools* option on the main toolbar, a 'wizard' enables users to specify the constituent materials and configuration details for the following hybrid systems:

- Sandwich Panels: symmetrical, or balanced, configurations
- Cellular Structures: open-celled foams and octet lattice structures
- Composite (Simple bounds): unidirectional fiber, quasi-isotropic fiber and particulate reinforced composites

Synthesized records, which are handled in the same way as user-defined records, are identified by a 'test tube' icon in the software and are added to a 'My records' folder, appended to the Browse tree, and saved with the project file.

Synthesized records, and their parent materials, can be highlighted on selection charts by selecting the 'Show Synthesized Records' option on the graph stage toolbar.

The number of 'synthesized' records is limited to two hundred and fifty.

In-depth information on the models and how to use the *Hybrid Synthesizer* is detailed in:

- The *Hybrid Synthesizer Help* accessed by clicking the '?' icon on the synthesizer model definition page
- The *Hybrid Synthesizer* white paper available in CES Help

Benefits:

- *Demonstrate the benefits in using hybrid materials and structures, relative to 'monolithic' or solid materials, particularly in lightweight design.*
- *Investigate and identify new hybrid systems that exhibit unique combinations of properties – show the potential to fill gaps in property space.*

2. Eco Audit Tool (standard version) – the following developments have been made to the *standard* version of the Eco Audit Tool:

- Revised end-of-life analysis. End-of-life phase split into two components: *Disposal* and *EoL potential*
- New option to *roll-up* sections of the *Product definition* interface. *Transport* and *Use* phases are rolled-up by default when the tool is launched
- New capability to *insert* rows in the Product definition grids. *Right-click* on the row header to insert, or delete, a row
- The *Eco Audit Report* can now be exported to Word, as well as Excel and PDF
- The detailed pages of the *Eco Audit Report* have been refactored to simplify the display of user inputs and interpretation of results

Benefits:

- *Understand product end-of-life more clearly. The new analysis allows the environmental footprint associated with the product's life cycle to be considered independently of potential benefits that are realized in future life cycles*
- *Introduce the tool to students with greater ease due to a simplified default view of the product definition screen*
- *Export a simplified report to a range of media for further analysis and reporting*

3. Enhanced version of the Eco Audit Tool – available with the Level 3 *Eco Design* database. Based on the '*Standard*' Eco Audit Tool, the '*Enhanced*' version enables users to specify greater detail about the material, manufacture and end-of-life phases. Additional inputs include:

- Secondary machining / cutting processes
- Amount of material removed by the secondary process
- Joining and finishing processes
- End of life recovery rate

The contribution from these factors are incorporated into the appropriate life phase and documented in the Eco Audit report. Full details of the calculations and assumptions associated with these additions are summarized in the Eco Audit help files.

Projects created with the '*Enhanced*' version of the tool are compatible with the '*Standard*' version and vice versa.

Benefits:

- *Perform a more detailed analysis of the environmental footprint of a product*
- *Include the impact associated with the 'production' of manufacturing waste - investigate the benefits of net-shape processes*
- *Investigate the contribution and significance of the various joining and finishing processes on the environmental footprint of a product*
- *Investigate the influence of expected end-of-life recovery rates on the benefit that can be realized in future life cycles – demonstrate the importance of end-of-life collection and recovery 'schemes' on the viability of the various end-of-life strategies.*

4. Enhanced Usability – the following new features facilitate use of the software:

- New capability to readily disable/enable stages in a selection project. Toggle stages on/off by checking the new check-boxes next to the stage name in the stage list. This allows stages to be temporarily removed from selection projects.
- Link window 'View' button updated to a radio button – reduces number of mouse clicks to change display between list and tree view

Benefits:

- *Improve understanding by enabling a quick visual demonstration of how a design constraint can influence candidate materials on property chart*
- *Reduce barriers to learning and using the software as efficiently as possible*

CES EduPack Information Resources

5. Enhancements to Environmental Data –The data for processes, electrical components and geo-economic properties has been reviewed and updated. Updates include the following, available in all databases:

- Primary processes:
 - Addition of 3 new shaping processes (replacement for 'Forging, rolling'):
 - Rough rolling, forging
 - Extrusion, foil rolling
 - Wire drawing
 - Rationalization of shaping processes quoted on material datasheets. For example, wrought processes for are no longer quoted for casting grades.
- Secondary processes:
 - 3 new machining processes (replacement for *Conventional & Polymer machining*)
 - Coarse machining
 - Fine machining
 - Grinding
- Number of 'Electrical components' increased from 4 to 22. Divided into 5 categories:
 - Batteries (7)
 - Components (5) - integrated circuit, cable...
 - Materials (4) - lead-free solder...
 - Subsystems (3) - hard disk, power supply...
 - Systems (3) - LCD panel, computer...
- 'Geo-economic' data revised and updated for records where the principal component is metal. Updates include:
 - Principal component
 - Abundance in earth's crust / seawater
 - Annual world production
 - Reserves
 - Main mining areas

Benefits:

- *Apply enhanced data in the 'standard' and 'enhanced' versions of the Eco Audit Tool*
- *Simplify the specification of shaping processes in the Eco Audit tool*
- *Support the teaching of Eco Design and Green Engineering*

6. Video tutorials - 'Bite sized' tutorials that demonstrate the key functionality and content of CES EduPack. Five new tutorials added for this release:

- Eco Audit (standard) – updated
- Eco Audit (enhanced)
- Hybrid Synthesizer
- Browse – Low Carbon Power
- Browse - Elements

Benefits:

- *Enable yourself/your students to get the most out of CES EduPack*
- *Reduce start-up and familiarization time with the databases and software tools*

7. General enhancements to EduPack Materials and Processes Database:

- All material prices updated
- Default Browse subset changed to *All materials*, from *All bulk materials*
- Selection subsets *mirror* Browse subsets
- New 'Material form' attribute – 8 options: (6 composites: Uniaxial, biaxial, quasi-isotropic, long fiber, short fiber and particulate. 2 forms: coated/laminated structures and wires)

Benefits:

- *Work with the latest material price data*
- *Ensure that you/your students do not miss out records in the database - raises the profile of records not included in the 'All bulk materials' subset, such as 'Fibers and particulates', 'honeycombs' and 'magnetic materials'*
- *Experience greater consistency in use of Browse and Selection modes*
- *Filter the database based on composite or material form*

8. New Core Materials subset containing all materials commonly used as the central core in sandwich panel structures. Includes all the primary properties required to select core materials (such as; shear modulus, shear strength and compressive strength). Includes the addition of 117 new records to the *Hybrids* folder.

- 86 honeycombs:
 - Aluminum
 - Aramid / para-aramid
 - Glass fiber reinforced phenolic & polyimide
 - Impregnated paper
 - Stainless steel
 - Polycarbonate (PC)
 - Polypropylene (PP)
 - Polyetherimide(PEI)
- 24 rigid polymer foams:
 - Polyetherimide (PEI)
 - Polyethylene terephthalate (PET)
 - Polyurethane (PU)
 - Styrene acrylonitrile (SAN)

- 7 natural materials:
 - End-grain balsa
 - Cork board

Benefits:

- *Enable the optimal selection of core materials for sandwich structures*
- *Support the Hybrid Synthesizer sandwich panel model, enabling the prediction and optimization of lightweight sandwich panel structures*

9. New Low Carbon Power Edition – Includes a new *Low Carbon Power Systems* level 3 database. Main features include:

- New *Low carbon power systems* table containing 15 records for standard and low carbon power generation systems
 - Biomass
 - Coal
 - Geothermal (deep & shallow)
 - Hydroelectric (earth dam & steel reinforced)
 - Natural gas
 - Nuclear fission
 - Solar PV (poly-silicon & single crystal)
 - Tidal (barrage & current)
 - Wave power
 - Wind power (land-based & offshore)
- Records include information:
 - Description of power source
 - Capital intensity (construction & fuel)
 - Area intensity
 - Material intensity
 - Energy / CO₂ intensity (construction & fuel)
 - Capacity factor
 - System efficiency
 - Life
 - Current installed capacity
 - Growth rate
 - Delivered cost
 - Links to material records in the MaterialUniverse database
- Includes the Standard level 3 Material and Process Universe

Edition also includes the Level 3 *Nuclear Power* database

In depth information on this database is provided in the *Materials for Low Carbon Power* white paper available in CES Help

Benefits:

- *Support courses considering the development of low carbon power generation systems*
- *Investigate the benefits and limitations of the various power systems - illustrate their impact on material supply/resources, land usage, delivery cost (price, energy and CO₂), etc.*

10. New data for **Stainless alloys** added to the MaterialUniverse – The following; processing, ferromagnetic and corrosion data has been added to records in the *Stainless alloys* subset:

- Processing properties – ranked on a four point scale (excellent, good, fair, not recommended)
 - Cold forming
 - Hot forming
 - Machinability – speed
 - Weldability – MIG
 - Weldability – plasma
 - Weldability – SAW
 - Weldability – TIG
 - Brazeability
- Magnetic properties:
 - Ferromagnetic?
- Corrosion resistance (relative to other metals):
 - Pitting resistance equivalence number (PREN)
 - Pitting and crevice corrosion
 - Stress corrosion cracking
 - Intergranular (weld line) corrosion
 - Inorganic acids
 - Alkalis
 - Humidity / water
 - Sea water
 - Sour oil and gas

Benefits:

- *Aid the selection of materials for corrosion-resistant applications, such as components for the chemical, food processing and oil/gas industries*
- *Rank stainless alloys based on their processability and corrosion resistance*
- *Support the teaching of Chemical Engineering*

11. 17 new grades of **Automotive Steels** added to the MaterialUniverse - mainly found in a new *Very low carbon steel* folder. Includes data on *Work hardening exponent (n)* and *Strength coefficient (k)*. Grades include

- Very low carbon steel:
 - Bake hardening (cold rolled)
 - Complex phase (cold rolled)
 - Drawing quality (cold & hot rolled)
 - Dual phase (cold rolled)
 - Ferrite-bainite (hot rolled)
 - High strength low alloy (cold & hot rolled)
 - Interstitial free (cold rolled)
- Low carbon steel:
 - Martensitic (hot rolled)
 - Transformation induced plasticity (cold rolled)

- Medium carbon steel:
 - Twinning induced plasticity (cold rolled)

Benefits:

- *Support the teaching of automotive engineering*
- *Study steels in more detail due to more comprehensive data coverage*

12. New 'BMC' and 'SMC' records – dataset for polyester-based BMC (bulk molding compound) and SMC (sheet molding compound) revised and expanded

- 3 new BMC and 16 new SMC records
- Records categorised by glass fiber loading level and flammability rating

Benefits:

- *Study this class of composite molding compound in more detail*
- *Support selection of materials for applications requiring mass-produced composite components, such as electrical housings, vehicle panels, etc*

13. Specialist databases – updated to the latest versions

- **Updated CAMPUS data module.** - The CAMPUS[®] Plastics data module has been updated with the latest CAMPUS ISO comparable standards information.
 - New Information on approx. 5,300 resins from 19 leading vendors
- **Updated IDES Plastics data module** – the Granta IDES Plastics database has been updated with the latest information. Around 2-3% increase in number of grades and update to manufacturer details to account for mergers and acquisitions in polymer manufacturing
 - Approx. 79,000 datasheets for specific resin grades
 - Approx. 725 suppliers worldwide
 - Approx. 63,700 ASTM and 32,000 ISO datasheets
 - Hyperlinks to ASTM datasheets on IDES website

Benefits:

- *Access the latest CAMPUS and IDES data*

Teaching Resources

14. The Teaching Resources have been updated as follows:

- Updated Powerpoint lectures, available on the teaching resources website
- Updated *Getting Started Guides* (English, French, German and Spanish)
- New format and more comprehensive site

The teaching resources website can be accessed at www.grantadesign.com/education/ by selecting "Get teaching resources" from the "EDUPACK COMMUNITY" part of the left hand

menu. You will need to input your user e-mail address and password (supplied to authorized users with the CES EduPack license agreement) when requested.

If you need a reminder of your password, or your access to the site has lapsed, please contact: support@grantadesign.com.

Benefits:

- *Get updated teaching resources compatible with the latest features in CES EduPack – helps you to make the most of CES EduPack and saves time in updating existing courses and setting up new exercises.*
- *Easier to browse and search resources*

Feedback

The expert staff at Granta Design can provide advice on database design issues, and can provide a consulting service to help with major database development projects. Granta Design would welcome your feedback on any improvements you would like to see in CES EduPack, its data or documentation.

Please, send your ideas by using the 'Feature Request' button on the main CES EduPack toolbar

Alternatively, email: support@grantadesign.com