CES Selector 2012 Release Notes

These Release Notes apply to the following CES Selector editions and to any customized CES Selector packages created by adding optional add-on data modules and software tools:

- CES Selector (Basic Edition)
- CES Polymer Selector
- CES Medical Selector
- CES Aero Selector

The Release Notes detail the enhancements in CES Selector 2012 compared with the previous release: CES Selector 2010.

What is new in CES Selector 2012?

CES Selector Software

1. A new capability has been added to flag / identify a **reference record**—for example, the material that you are currently using, in a selection project. You can set the reference record using the new 'Set…' reference dialogue in selection projects, or select the 'Set as Reference' option from the record right-click context menus (available in the browse tree, search results, selection results, chart labels and record datasheets).

- Reference record is flagged with a 'red pin' icon wherever the record name appears in the software (browse tree, results list, graphs, etc)
- Reference record is automatically added to the comparison table (see below)
- One reference record can be set for each data table in the database
- In limit stages, the values for the reference record are displayed next to the minimum/maximum entry boxes
- On charts, the reference can be quickly identified using a new 'Show Reference Record' option added to the graph stage toolbar
- Plot performance relative to the reference record (reference = 1) using a new 'Absolute values' / 'Relative values' option in the graph stage axis settings.
- Rank selection results based on relative values

Clear reference record/s by selecting 'Clear Reference' from the record right-click menus or selecting 'Clear' from the 'Reference Record' option listed under the 'Tools' button on the main application toolbar.

Benefits:

- *Simplify the specification of design constraints based on the performance of your existing material*
- *See how your existing material performs relative to other materials on selection charts and trade-off plots*
- *Identify rescaling factors using the relative values tool*
- *Explore possible material replacements and substitutions*

2. **Comparison Table**—you can now create a table that compares up to nine records. You can add records to the table by checking the 'Comparison Table' checkboxes in the selection project results list and generate the table by selecting the 'Comparison…' option under the 'Reports' heading. Alternatively, select the 'Add to Comparison Table' option from the record right-click menus (available in the browse tree, search results, selection results, chart labels, and record datasheets).
    - The comparison table displays all available data*, combined properties created in selection projects, links to reference datasets, and a link to the full record datasheet. (* except text and functional data, such as performance vs temperature charts)
    - The reference record is automatically added to the comparison table. This can be can be cleared / changed by clicking on the pin icon that appears when the mouse hovers over the record names in the table
    - When a Reference is set, the values for other records can be displayed as absolute values or '% Change' (relative to the value of the reference)
    - Properties that differ by greater than 10% (default setting—this can be changed) from the reference value are highlighted in orange
    - All values can be displayed as either range (where applicable) or average values
    - One comparison table can be created for each data table in the database
    - The comparison table for the selection project dataset is appended to the selection report

    Records can be removed from the comparison table/s by selecting 'Remove from Comparison Table' from the record right-click context menus, clicking on the delete icon that appears when the mouse hovers over the record names in the Comparison Table, or selecting 'Clear' from the 'Comparison Table' option listed under the 'Tools' button on the main application toolbar.

Benefits:

- *Rapidly identify the differences between materials*
- *Identify the risks associated with replacing your existing material—have any properties changed significantly? Have I overlooked any critical design criteria?*
- *Support both material replacement / substitution and rational selection projects*
- *Increase the level of documentation and traceability for your selection process*

3. **Eco Audit Tool**—the following developments have been made to the Eco Audit Tool:
    - New 'Eco Audit' button added to the main application toolbar
    - New capability to specify greater detail about the material, manufacture and end-of-life phases. Additional inputs include:
        i. Secondary machining / cutting processes
        ii. Amount of material removed by the secondary process
        iii. Joining and finishing processes
        iv. End of life recovery rate
    - 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 detailed pages of the *Eco Audit Report* have been refactored to simplify the display of user inputs and interpretation of results

Benefits:

- *Analyze the environmental footprint of a product in more detail*
- *Include the impact associated with the 'production' of direct 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*
- *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*
- *Closer alignment with PAS 2050 carbon footprinting standard*

4. **Hybrid Synthesizer**—the following developments have been made to the Hybrid Synthesizer, which was introduced in CES Selector 2010:
    - New 'Synthesizer' button added to the main application toolbar
    - Sandwich panel model—relative contribution of shear deflection in the core to the flexural stiffness has been added to the flexural modulus values
    - Sandwich panel model—expected failure mode has been added to the in-plane yield strength value
    - Composite (Simple Bounds)' model–added price calculation (based on the price of the material constituents)

Benefits:

- *Direct access to the Hybrid Synthesizer from the main application toolbar*
- *Establish the contribution of core deformation to the flexural stiffness of sandwich panels—Identify whether the specification of a higher performance core material is likely to result in an increase in panel performance*
- *Establish whether failure in the face-sheets or core is promoting panel failure under in-plane tensile load conditions*
- *Consider the price of synthesized composites in the early stages of design*

5. **Enhanced usability—**the following new features facilitate use of the software:

- 'Show user-defined records' button added to the graph stage toolbar—you can readily identify the position of user-defined records on charts
- Tooltip added to record labels on charts. This displays the range and average values for the properties plotted on the chart, providing direct access to the datasheet values and, when used in combination with the 'Relative Values' setting, displaying re-scaling factors
- Default values have been added for compositional attributes (value = 0%). This enables the database to be correctly filtered based on maximum composition levels
- Default chart axis scales have been added to attributes to prevent materials with zero and negative values being excluded from charts. This has been set to linear for Galvanic potential and Minimum service temperature

Benefits:

- *Simplify use of the software and enhance your user experience*

Data Modules

MaterialUniverse data

6. Updated **Material prices**—new prices for all 3,000+ materials in the Material Universe, generated using an enhanced version of Granta's price model. Details of the material form represented by the quoted prices have been added to the Price 'Design note'

Benefits:

- *Use up-to-date prices, reflecting current differences between material types and classes*
- *Get greater clarity on the form represented by the quoted price*
- *Apply in cost reduction initiatives*
- *Apply in trade-off studies, e.g., cost vs mass; plastic vs metal*

7. Enhancements to **Environmental Data**—a comprehensive review and update has been carried out on the following environmental data:

- Primary material production: Embodied energy and CO_2 equivalence values
- Recycling: Embodied energy and CO_2 equivalence values
- Water Usage values
- 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:

- *Support the developments made to the Eco Audit Tool*
- *Simplify the specification of electronic sub-assemblies*

8. Seventeen new grades of **automotive steels** have been added to the MaterialUniverse— these are mainly found in a new *Very low carbon steel* folder. They include 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 for automotive steels in materials selections and comparisons*
- *Get more comprehensive data coverage for steels*

9. **Cast steel** and **cast aluminum** grades have been revised and updated.

- 9 new cast steel records added
- 40 new cast aluminum records added (25 records withdrawn or superseded)

Benefits:

- *Enhanced coverage of cast metal alloys*

10. A new **galvanic potential** attribute has been added for all conductive materials. This quotes the open-circuit potential for the material in salt water (3.5% sodium chloride) relative to a saturated calomel reference electrode.

Benefits:

- *Identify the likelihood of galvanic corrosion between dissimilar metals during early stages of design*
- *Improve study of corrosive environments*

11. The **food contact** attribute has been updated and coverage has been extended to more materials. There is a new 3-point rating scale: *Yes*, *Conditional* and *No*. This rating is based on the material's compliance with a number of protocols and directives relating to food contact use (listed in the food contact design note). In cases where a material is flagged as *Conditional* a note is included on the datasheet that explains the conditions.

Benefits:

- *Improve study of food contact*

12. Datasheets for **polyamide-based records** have been updated to represent the conditioned state. Density, mechanical and electrical properties have been updated to represent material conditioned at 50% relative humidity and 23°C. Other properties remain as the dry as-molded condition.

Benefits:

- *Select and compare polyamides using data that is more representative of the material's in-use performance*
- *Compare in-service performance of polyamides relative to other less moisture-sensitive polymers*

13. Other **Miscellaneous** enhancements to MaterialUniverse:

- **Composition detail** section has been split into two categories:
    - *Composition detail (metals, ceramics and glasses),* categorised by elements, oxides etc
    - *Composition detail (polymers and natural materials),* categorised by base material, additives and fillers
- **Default values** have been added for all composition attributes (value = 0)—enables database to be correctly filtered on maximum compositional content
- **Trace** compositional content is represented by 1e-9% (changed from 0)
- **Updated folder names for wrought aluminum alloys** now include main alloying elements. For example, '7000 series (Zn-alloyed)'
- ***All materials*** and ***Woods*** **subsets have been added to Selection Projects—**provides consistency between browse and selection subsets and supports the use of the Hybrid Synthesizer

Benefits:

- *Simplify searching and selecting materials based on composition*
- *Enhance your user experience*

CES Aero Selector

14. **New Firehole Composites data module—**data covering over 300 continuous fiber reinforced polymer composite grades drawn from manufacturers, leading testing labs, and research institutions. Compiled by Firehole Technologies Inc, this includes data on unidirectional and multi-axial laminates tested under various conditions (e.g., room temperature dry, elevated temperature wet...) with information on constituents, suppliers, and reinforcement forms. Linked to equivalent records in the MaterialUniverse.

Benefits:

- *Apply data on individual grades of continuous fiber reinforced polymers*
- *Use this data with the rational selection methodology—simplify the identification of specific commercial grades and suppliers of this class of material*

15. **MMPDS data module**—updated from MMPDS-04CN1 to MMPDS-05. Access to the latest aerospace design data. Incorporates the following updates:

    - 6 new Aluminum grades: 2196-T8511-Extrusion, 2198-T8-Sheet, 7075-T73-Extruded bar/rod/shape, 7075-T73510-Extruded bar/rod/shape, 7075-T73511-Extruded bar/rod/shape, 7136-T76511-Extrusion)
    - 3 Aluminum grades withdrawn: 7075-T76-Extruded bar/rod/shape, 7075-T76510-Extruded bar/rod/shape, 7075-T76511-Extruded bar/rod/shape
    - 1 new stainless steel: AM-355 SCT 850, sheet
    - AISI 303 records withdrawn
    - Some heat treatments for AISI 316, 321, 247 withdrawn (15 withdrawn, 3 new)

Benefits:

- *Access the latest design allowable for aerospace alloys and fasteners*

CES Polymer Selector

16. **Updated CAMPUS data module**—the CAMPUS® Plastics data module has been updated with the latest CAMPUS ISO comparable standards information.

    - New Information on approx. 5,700 resins from 20 leading vendors

17. **Updated IDES Plastics data module** – the Granta IDES Plastics database has been updated with the latest information. Includes new grades and updates to manufacturer details to account for mergers and acquisitions in polymer manufacturing.

    - Approx. 83,000 datasheets for specific resin grades
    - Approx. 800 suppliers worldwide
    - Approx. 65,000 ASTM and 35,000 ISO datasheets
    - Hyperlinks to ASTM datasheets on IDES website

    The data for dry and conditioned polyamides/nylons has been split into two datasheets to enable better filtering and comparison based on material condition.

Benefits:

- *Access to the latest CAMPUS and IDES data*
- *Simply the identification of specific commercial grades and suppliers for polymers*

Add-on databases

18. New **StahlDat SX** data module: the complete Register of European Steels (known as the 'Stahl-Eisen-Liste' in German). Includes data for over 2,500 steels, their specification, chemical composition, mechanical properties, material forms and suppliers. Plus temperature dependent properties for over 450 of these from the publication SEW 310.

19. Updated **ASME BPV Code** data module—the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Part II-D. A leading source of standards information and specifications relating to materials for use in boilers, pressure vessel, and power plant components. Updated

from the 2007 to the 2010 version, includes 270 new records (notably 90 titanium and 70 nickel alloys) and enhanced display of functional data charts.

Benefits:

- *Access the latest steel standards*
- *Improve support for manufacturing companies utilising steel grades*

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 the CES Selector system, its data or documentation.

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

Alternatively, email: support@grantadesign.com