Advanced Tools For Expert Power-Supply Designers

Texas Instruments' WEBENCH Power Designer now contains three new advanced tools that will be particularly beneficial to experienced power supply engineers. These advanced tools offer extensive design control, analysis and trouble-shooting capability to create complex power-supply designs for industrial, automotive and communications equipment. The new tools include WEBENCH Compensation Designer, WEBENCH Simulation Export and advanced options in WEBENCH Visualizer (Fig. 1.)

While WEBENCH is still simple to use for both novices and more experienced but time-pressed engineers, its three new advanced tools offer experienced power-supply design engineers extensive control over complex designs, along with the ease of exporting simulations to CAD platforms from Altium and Cadence Design Systems.

Crafting a power-supply solution for complex design requirements is an iterative and time-consuming task. The new advanced options in WEBENCH Visualizer include a set of easy-to-use controls to specify complex design requirements, such as manufacturability, component constraints and design control. Now engineers can quickly find solutions to accurately match their advanced design requirements.

In pursuit of greater manufacturability, power supply designers can now specify component size, their preferred distributor, and even choose to include only components in stock at a distributor, according to Jeff Perry, manager of TI's WEBENCH team. He also elaborates on the options designers now have for specifying component constraints.

"Designers can set preferences for maximum height, include ceramic capacitors, include shielded inductors, and specify weighting constraints for solution ranking (footprint vs. efficiency vs. price vs. BOM component count)," says Perry.

Similarly, designers can now specify electrical parameters such as switching frequency, external synchronization frequency, softstart time, peak-to-peak V_{OUT} ripple, and peak-to-peak inductor current ripple. They can also add a post ripple filter, according to Perry (Fig. 2.)

The Compensation Designer tool can predict and automatically correct errors in the control loop resulting in a stable power-supply design. This quick "fix-it-for-me" feature is a valuable tool for novices as well as more-practiced engineers with time pressures. Meanwhile, Compensation Designer also offers power experts a manual mode in which they can tune the control loop for more bandwidth and stability in their designs (Fig. 3.) (Wanda Garrett's article in the April 2015 issue of How2Power Today goes into detail on the different ways designers can use Compensation Designer, see "Automated Tools Improve Frequency Response In Switching Regulators.")

The Simulation Export tool moves the power-supply schematic into the user's preferred simulation environment. With just a couple of clicks and no intermediary software, WEBENCH Power Designer quickly exports a complete design to the TINA-TI simulator or Altium Designer and Cadence OrCAD and PSpice tools. WEBENCH Simulation Export joins TI's WEBENCH Schematic Export and PCB Export tools, which enable engineers to create their power supply design and easily download the layout directly to five popular CAD tools.

"With the addition of simulation export capability to WEBENCH Power Designer, engineers no longer need to manually recreate the schematic in OrCAD Capture and gather and enter the SPICE models into the PSpice solution, or worry about errors that plagued the manual process," says Josh Moore, product marketing director for the OrCAD product line at Cadence. "Now, the complete simulation netlist and SPICE models created with WEBENCH Power Designer can be easily and instantly downloaded via WEBENCH Simulation Export to Cadence OrCAD Capture and simulated with the PSpice tool."

For more information, read Wanda Garrett's blog, "New advanced WEBENCH tools empower the expert power supply designer," watch a video to learn more about the new WEBENCH advanced tools, or start a design at www.ti.com/advpwr-pr.

Fig. 1. Texas Instruments has enhanced the capabilities in WEBENCH Power Designer, the company's power IC selection and power design tool set, making it more helpful for experienced power supply designers. The new WEBENCH Compensation Designer makes it easier for designers to adjust control loop performance and WEBENCH Simulation Export makes it easier to port a power-supply schematic into the user's preferred simulation environment. Meanwhile advanced options in WEBENCH Visualizer give designers the ability to specify more design parameters.
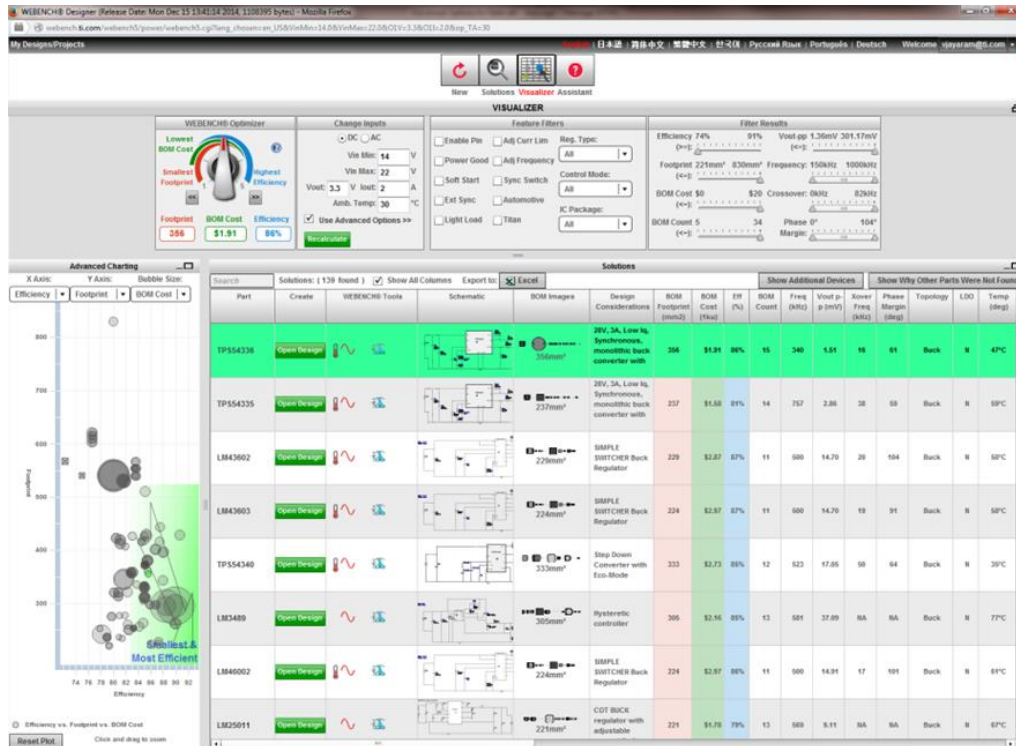
Fig. 2. Advanced tools in WEBENCH Visualizer enable designers to view custom solutions by specifying switching frequency, V_{OUT} and inductor ripple, and softstart; to set component constraints such as min package area and max height; to specify IC features such as external sync, light load efficiency, enable pin and control mode (voltage or current) and to customize the sort/ranking order of possible power solutions.
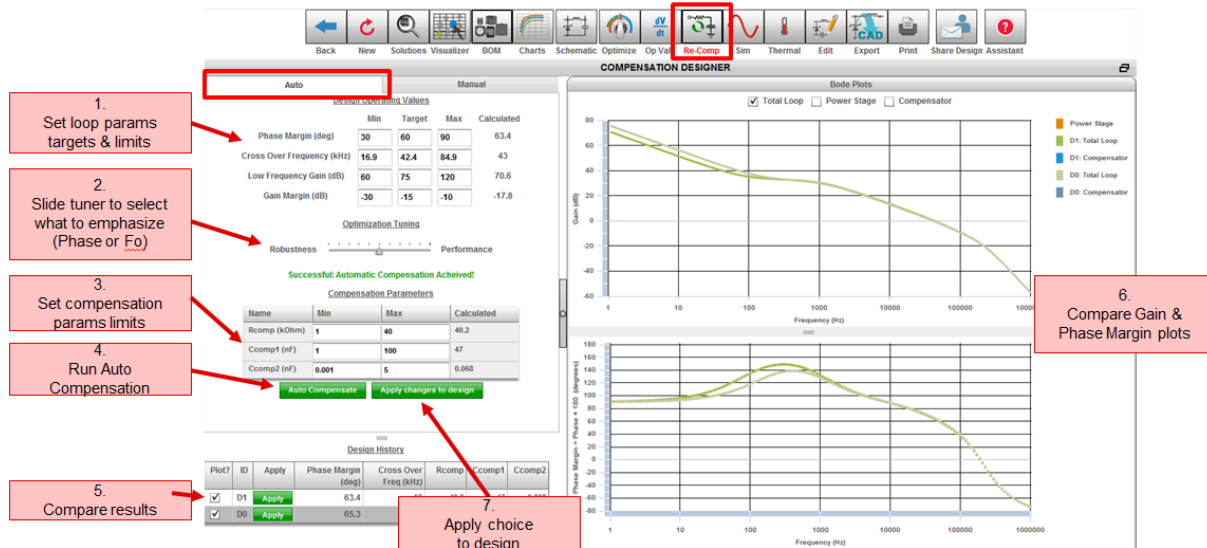
Fig. 3. With WEBENCH Compensation Designer, users have different options for predicting and adjusting control loop performance. A quick "fix-it-for-me" feature will adjust compensation component values automatically; while a manual mode offers advanced power experts the ability to tune the control loop for more bandwidth and stability in their designs.