



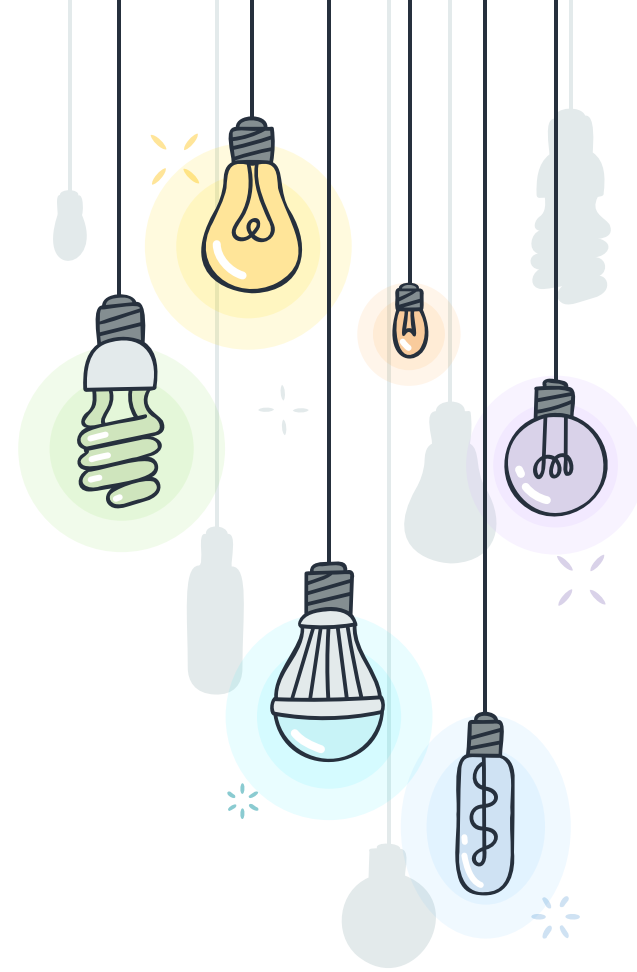
Christopher Knott - UX Case Study



Product Overhaul

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HELLO!

I am Christopher Knott

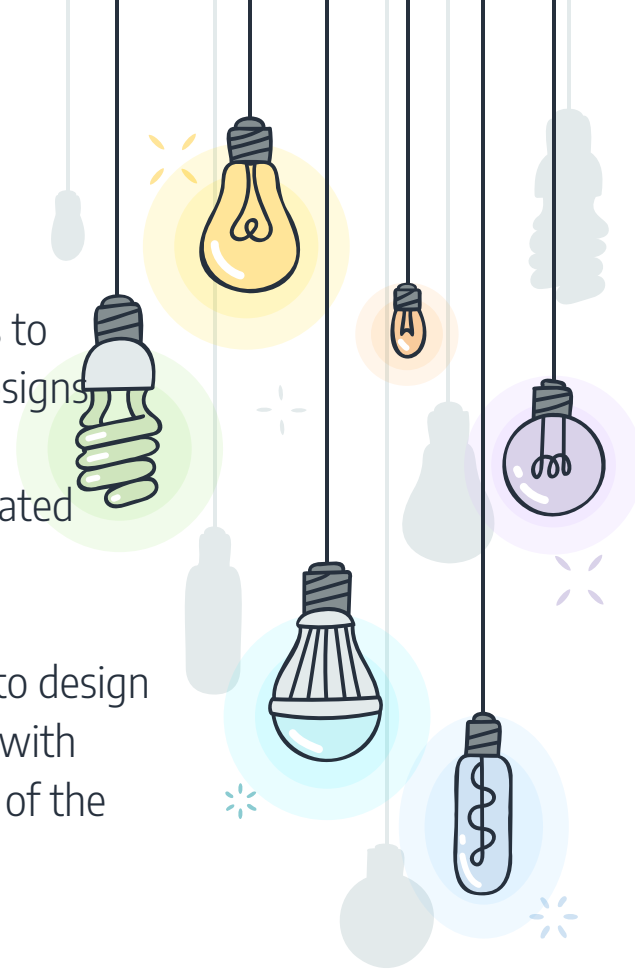
This is a quick overview of a product redo for Texas Instruments for their WEBENCH Power Designer

You can find me at chrisknott2000@gmail.com



* PROJECT BACKGROUND

- + Texas Instruments has an online application that allows users to create new Power designs, and then simulate and test the designs
- + Most electrical products require carefully converted and regulated power in order to function appropriately
- + Webench Designer provides electronics engineers the ability to design these power products by using an online tool that integrates with many parts, and also allows for simulation and virtual testing of the new designs



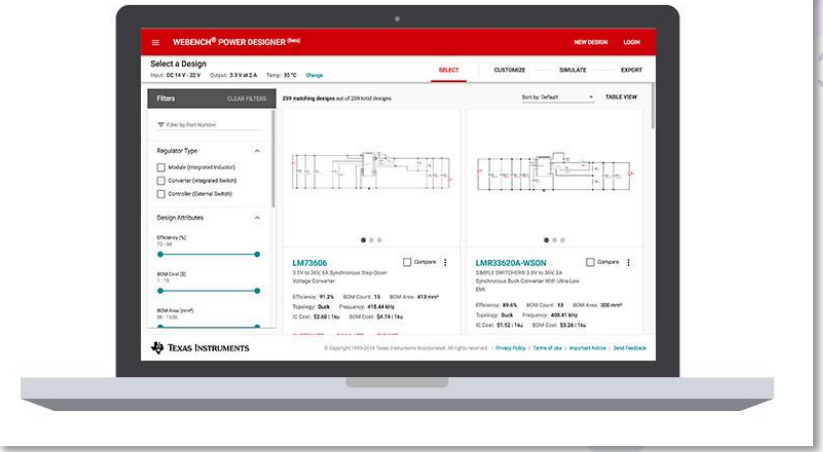


The product and its high level improvements can best be summarized by using the Texas Instruments actual website for this product:

Easy power supply design. Select. Customize. Simulate. Export.

The new improved WEBENCH Power Designer makes designing power supplies easy.

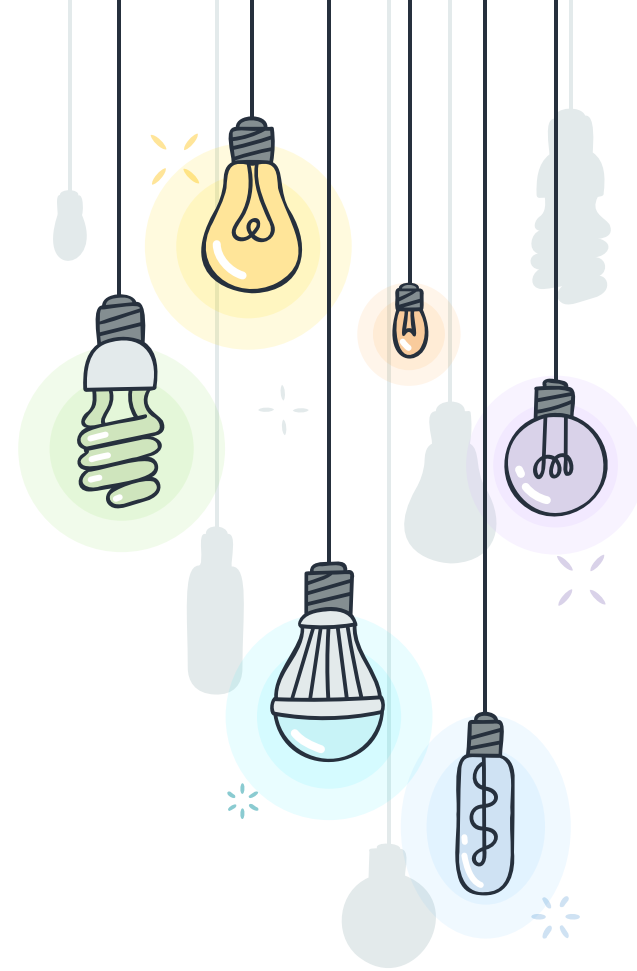
- Intuitive form inputs
- New improved layout
- Simulate, optimize, export, repeat...



* CHRIS' ROLE

My role involved the following:

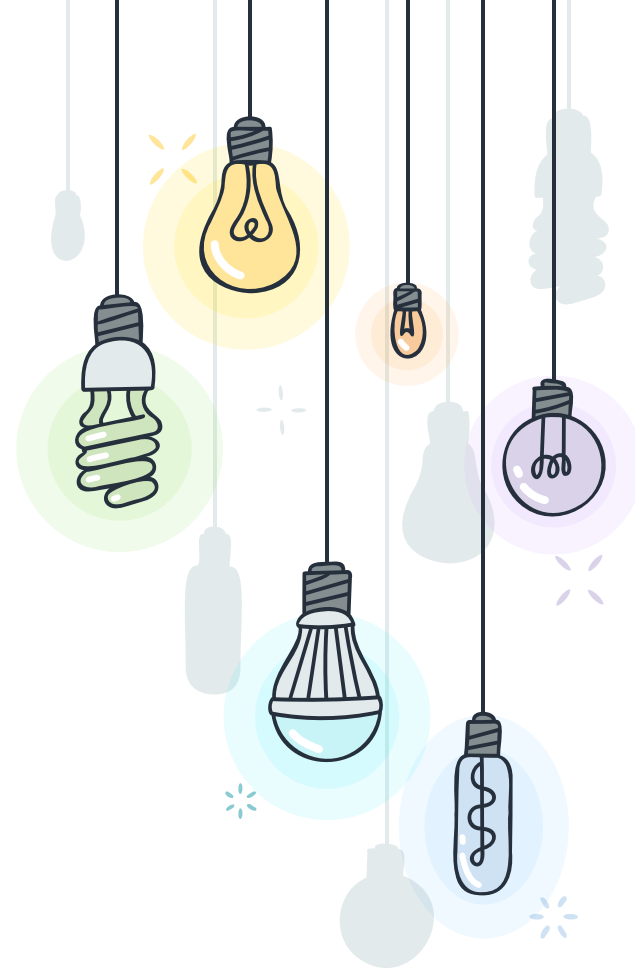
- ✗ Initially, the project was to be run by an external company and I was brought on just to act as an internal consultant for the project
- ✗ Given the high degree of electrical engineering knowledge required for a successful project, and the external company's inability to learn it, I transitioned from the UX SME into the full project owner and XA
- ✗ I created the new designs and provided instructions to the designers and developers that were on the project, seeing it through to the final build



* THE GOALS

The goals included the following:

- ✕ Overhaul the look/feel of the product
- ✕ Improve the usability and flow
- ✕ Create a UI that is scalable for growth
- ✕ Retain all of the current features while streamlining the usability
- ✕ Enable the application to be fully run on a responsive mobile experience
- ✕ Change the experience to fully SOA with online saving and sharing



BACKGROUND – THE HUMBLE WALL WART

All electronics devices require power. This power comes from the wall (e.g. 120 vac) and is converted into something more useful (e.g. 5 vdc)

This critical function is often the most overlooked part of an electronics design because engineers provide their early prototypes with clean power from a desktop power supply.

What normally makes it to market is a dirty power supply that was thrown together at the last minute. This can, for example, result in exploding batteries or glitchy behaviour from electronics devices.

This project enables engineers to design and simulate power supplies before they make it to market in the hopes of detecting problems early.

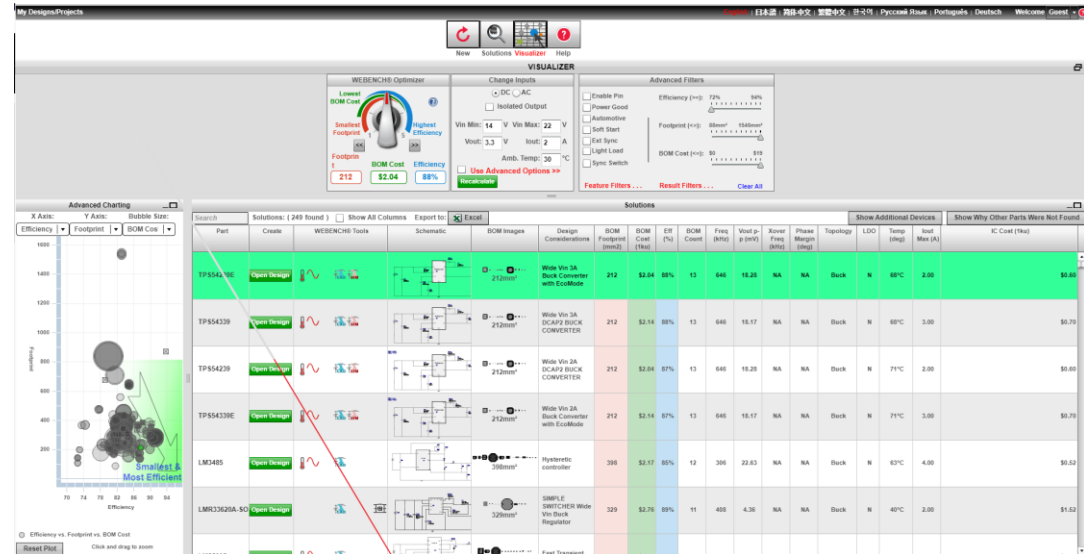


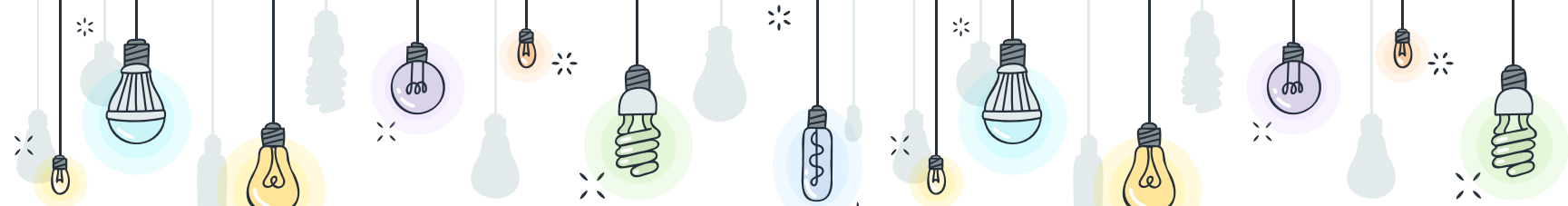
THE PROCESS – AUDIT CURRENT DESIGN

The current design was very much an “airplane cockpit” style of design.

Some of the key issues:

- No clear starting point
- Unintuitive skeuomorphic design elements
- Image diagrams were too small
- Primary buttons were not easily recognizable
- Product selection was done using an unintuitive visual graph



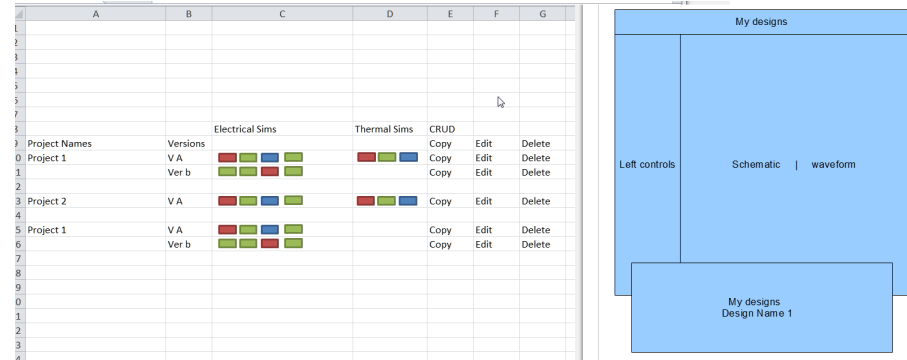


THE PROCESS – EVALUATE AND BRAINSTORM

We evaluated every component and task of the current application. This was one of the more difficult undertakings at Texas Instruments because we aren't electronics engineers

We had also identified the technology to be used: Material Design

Following these two steps, we began to brainstorm an initial implementation with the core user tasks



The image shows a spreadsheet on the left and a UI mockup on the right. The spreadsheet has columns A through G and rows 1 through 10. It contains data for 'Project Names', 'Versions', 'Electrical Sims', 'Thermal Sims', and 'CRUD' operations. The UI mockup on the right shows a 'My designs' header, a 'Loft controls' sidebar, and a main area with 'Schematic' and 'waveform' tabs. A 'My designs Design Name 1' box is at the bottom.

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

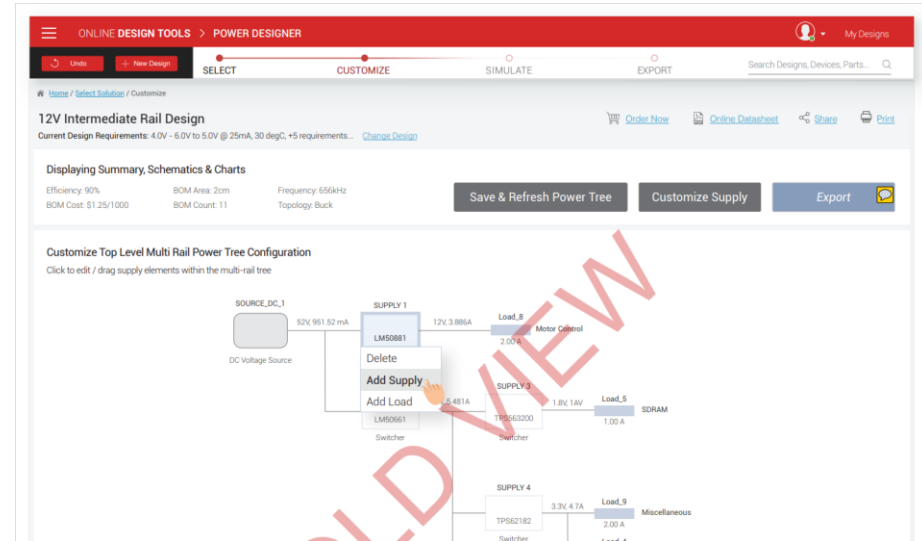
Project Names	Versions	Electrical Sims	Thermal Sims	CRUD		
Project 1	V A			Copy	Edit	Delete
	Ver b			Copy	Edit	Delete
Project 2	V A			Copy	Edit	Delete
Project 1	V A			Copy	Edit	Delete
	Ver b			Copy	Edit	Delete

THE PROCESS – EXTERNAL VENDOR

We spent significant time working with an external vendor because of their promised expertise in electronics, and in design

The PM was unable to communicate design direction with the vendor and I was brought in to take a different approach with them

While I was able to make measurable progress, we decided to take the project back inhouse. We made great traction after that

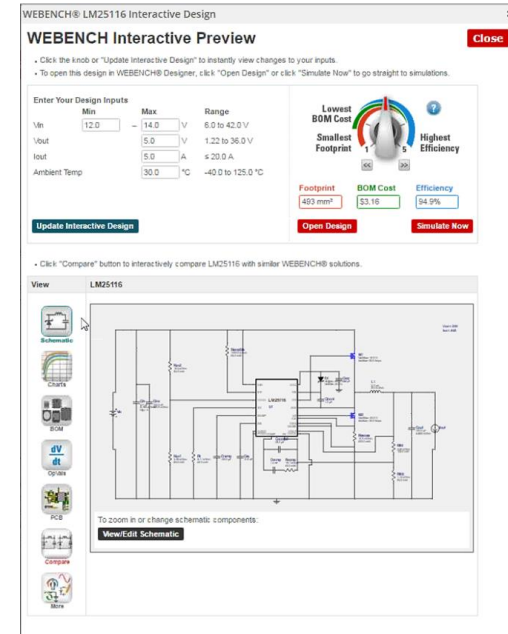


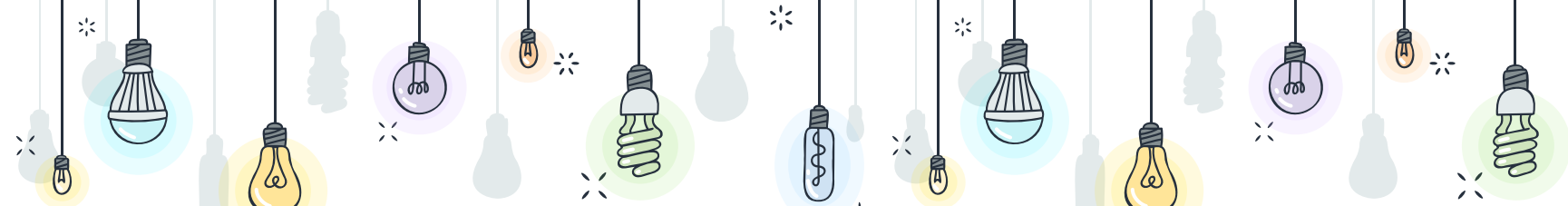
THE PROCESS – ENTRY POINTS

Throughout the TI.com internet property, there were a number of different entry points and tie-ins with the Webench Designer.

We needed to catalogue the different versions of entry points and create an integrated strategy for all of the instances

For examples: any replacement for the skeuomorphic elements would need to be consistently implemented



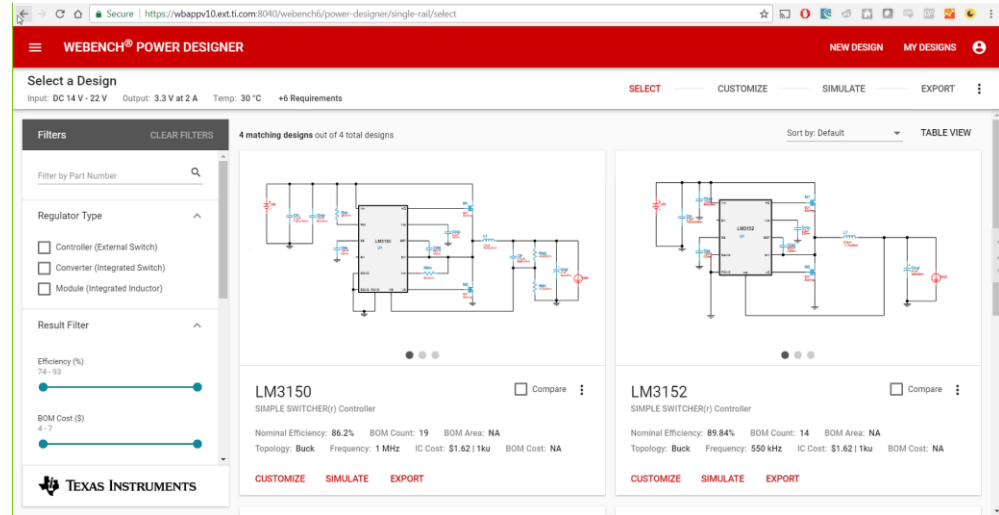


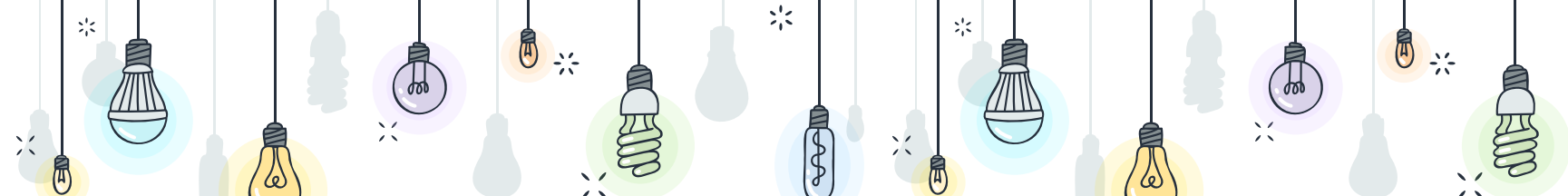
THE PROCESS – IN-APP NAVIGATION

We spent significant effort to create a design that would be pseudo-stepped

We wanted to replace the cockpit design with something that could be used as a stepped experience for newbies, but one that didn't force the steps for more advanced sessions

We achieved this with the “Select, Customize, Simulate, Export” primary navigation

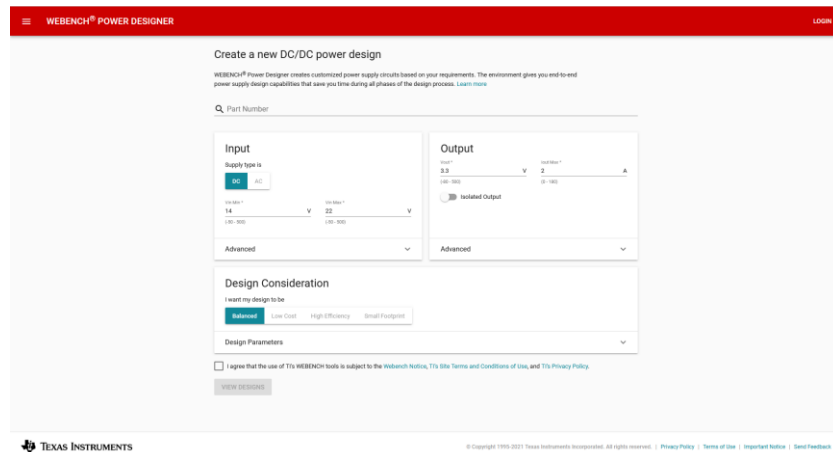




THE PROCESS – SINGLE ENTRY POINT

We created a simple new entry point for Webench that was similar in feel to other products we had created on TI.com

The use of **Input, Output, Considerations** was a key feature of the TI.com website and greatly simplified the start of the tool (vs the cockpit design)



THE PROCESS – RESULTS VIEW

We provided a stepped view where the first step allowed the user to select from existing designs. Some key page features are:

- Table view vs List view
- Slider controls
- Filter controls
- Customize, Simulate and Export directly from the results list
- Select and Compare designs

The screenshot displays the WEBENCH POWER DESIGNER interface. At the top, there's a red header with the logo and navigation links like 'NEW DESIGN' and 'LOGIN'. Below the header, a 'Select a Design' section shows input/output parameters and a 'Change' link. The main area is divided into a left sidebar with filters and a main content area showing a list of matching designs. The filters include 'Regulator Type' (Module, Converter, Controller), 'Design Attributes' (Efficiency, BOM Cost, Footprint, Switching Frequency, Output Ripple), and 'Sort by: Default'. The main content area shows two design cards. Each card includes a circuit diagram, a title, a brief description, and key specifications. The first card is for the LMR51420X, a SIMPLE SWITCHER 4.5-V to 36-V, 2-A Buck Converter. The second card is for the TPS62933, a 3.8-V to 35-V, 3-A, 250-kHz to 2.2-MHz, low- I_{Q} synchronous buck converter. Both cards have 'Compare', 'Customize', 'Simulate', and 'Export' buttons.

WEBENCH® POWER DESIGNER

Select a Design
Input: 14 V ~ 32 V Output: 3.3 V @ 2 A Temp: 30 °C Change

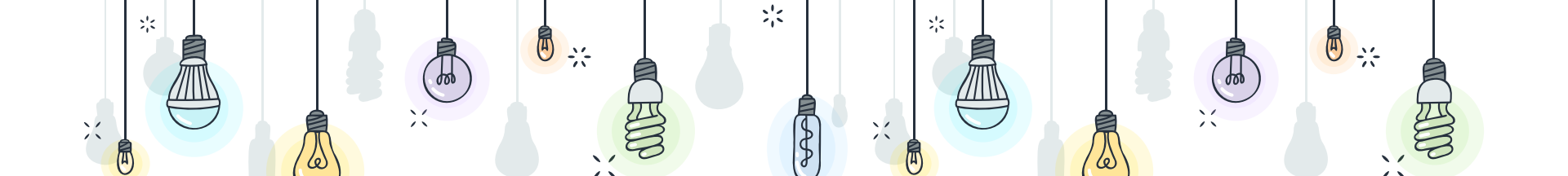
Filters CLEAR FILTERS
Filter by Part Number
Regulator Type
☐ Module (Integrated Inductor)
☐ Converter (Integrated Switch)
☐ Controller (External Switch)
Design Attributes
Efficiency (%) 70 - 94
BOM Cost (\$) 1 - 10
Footprint (mm²) 91 - 1000
Switching Frequency (kHz) 10 - 2000
Output Ripple (mV) 0 - 200

298 matching designs out of 298 total designs
Sort by: Default TABLE VIEW

LMR51420X
SIMPLE SWITCHER 4.5-V to 36-V, 2-A Buck Converter in SOT-23-6 Package
Efficiency: 90.8% BOM Cost: \$1.46 Footprint: 280 mm² BOM Count: 10 Topology: Buck
Frequency: 500 kHz IC Cost: \$0.58 / 1ku
CUSTOMIZE SIMULATE EXPORT

TPS62933
3.8-V to 35-V, 3-A, 250-kHz to 2.2-MHz, low- I_{Q} synchronous buck converter in SOT-583 package
Efficiency: 96.8% BOM Cost: \$1.57 Footprint: 186 mm² BOM Count: 12 Topology: Buck
Frequency: 1.35 MHz IC Cost: \$0.67 / 1ku
CUSTOMIZE SIMULATE EXPORT

TEXAS INSTRUMENTS
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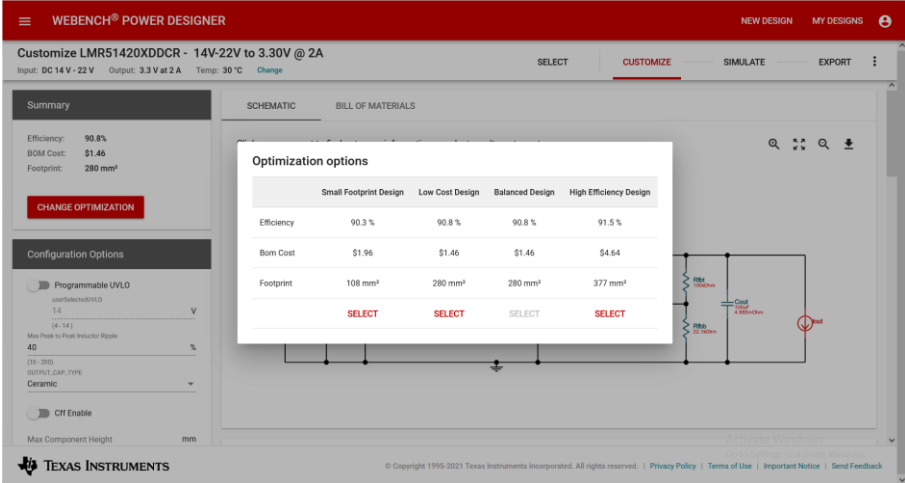
THE PROCESS – END OF SKEUOMORPH

All skeuomorphic elements were replaced by modern intuitive Material Design elements

Simple overlays and intuitive button based CTA's were used

Users intuitively understood the intended behaviour of the application

All user based actions had expected and immediate results



The screenshot displays the WEBENCH® POWER DESIGNER interface. The main title is "Customize LMR51420XDDCR - 14V-22V to 3.30V @ 2A". The input is "DC 14 V - 22 V" and the output is "3.3 V at 2 A". The temperature is "30 °C". The interface includes tabs for "SELECT", "CUSTOMIZE", "SIMULATE", and "EXPORT". A "Summary" panel on the left shows "Efficiency: 90.8%", "BOM Cost: \$1.46", and "Footprint: 280 mm²". A "CHANGE OPTIMIZATION" button is present. Below the summary is the "Configuration Options" section, which includes "Programmable UVLO", "Max Peak to Peak Inductor Ripple", "Output Capacitor Type", and "CFF Enable". The "Optimization options" table is shown, comparing four design goals: Small Footprint Design, Low Cost Design, Balanced Design, and High Efficiency Design. The table lists Efficiency, BOM Cost, and Footprint for each design, with a "SELECT" button for each. The "High Efficiency Design" is selected, showing an efficiency of 91.5%, a BOM cost of \$4.64, and a footprint of 377 mm². The background shows a schematic diagram of the power converter circuit.

	Small Footprint Design	Low Cost Design	Balanced Design	High Efficiency Design
Efficiency	90.3 %	90.8 %	90.8 %	91.5 %
BOM Cost	\$1.96	\$1.46	\$1.46	\$4.64
Footprint	108 mm²	280 mm²	280 mm²	377 mm²
	SELECT	SELECT	SELECT	SELECT



CONCLUSION

This project resulted in a significant uptake in customer usage.

TI was better able to market the product within TI.com because of the thought that was put into the cross marketing

Customer completion of designs increased very significantly as a result of the new simplified, stepped interface

