

Design data management: the lingua franca of electronics design

Darya Bronston's company [DKB Resources](#) has designed PCBs that are on Mars. So she and her team know a lot about reliability, designing to a budget, designing to immovable deadlines (spacecraft launch windows), complying with customers' design standards (in this case, effectively the US Government) and doing all this while making sure her company maintains a healthy P&L sheet.

In an exclusive interview with Altium, Ms. Bronston talks about how her company makes all these parts mesh in the real world, while still having fun (and making sure that every penny counts).

DKB Resources has been in business for a little over 10 years. Much of what the company does centres on researching and developing specialized PCBs for customers that include the Jet Propulsion Laboratory (JPL), NASA, Raytheon, Teradyne, Northrop Grumman, and other companies in the US aerospace sector. What sets DKB Resources apart is its commitment to customer support,

accepting the challenges of bringing new products to market and making existing products more efficient. This self-declared commitment to quality and support is underscored by the fact that over 99.8% of the boards produced by DKB Resources fire up correctly the first time current is turned on.

"I think this really speaks to the levels of quality and attention to detail we bring to every project," says CEO Darya Bronston. "Because we work with so many projects that push the edge of technology, and yet also need to rely on proven technology - often with lives depending on what we do - there is no second chance, no room for error."

"Double checking, rules and requirements play their part. But we're not just having data checked by engineers. If it were just engineer to engineer, that would be an easier proposition."

As she puts it, Ms. Bronston and her team are not just speaking in Italian to Italians. "It's like speaking Italian to someone who speaks Chinese. One of the things I like about Altium Designer as a tool is the ease with which we can export different types of data - PDFs, DXF, mechanical data, and the actual design Gerbers - for in-depth and visual review at all levels by clients."

DKB Resource's engineers, working in Altium Designer, are able to read and interpret information engineer to engineer, but also effectively and productively (as well as quickly and openly) with program managers, procurement managers, and administrative support managers.



*Darya Bronston
CEO, DKB Resources*

Ms. Bronston recognizes that she's not selling to and supporting a single person or a single personality type. Instead, she and her company are selling across a range of departments inside her customers' facilities. This all supports making a successful product in ways that go beyond the perhaps more obvious (though no less complex) task of creating the board itself.

"A lot of companies achieve and experience this," she says, "but I don't know whether they recognize this is fundamentally a language issue, so that communication truly becomes the key to being successful."

This notion of a common language available to the broad designer-customer 'ecosystem' is the connecting thread that runs through how DKB Resources manages its design processes, and how the company maintains efficient design practices without losing that all-important, and very accountable, focus on quality.

For example, having a common language helps DKB Resources deliver on quality, and do so the first time with minimal turn-around problems. "It's crucial for the company to be able to use design guidelines, rule sets and requirements across different projects," says Darya Bronston.

The company maintains golden libraries and golden templates that are specific to individual customers. One example is the 600-plus page rule book of requirements and guidelines for bread boards, engineering modules and flight modules provided by JPL for flight projects as well as the recent Mars Science Lab ([MSL](#)) program. For this, DKB Resources was awarded a certificate of quality and trust from JPL and NASA.

"Through Altium Designer, we have been able to create a DRC check specific to the JPL flight requirements. This allows us to run automated design checks against entire designs specific to JPL requirements. When we said we had created this for them in Altium Designer, and could even provide an exported file they could also use themselves within their own Altium Designer-originated designs, their eyes lit up," says Darya Bronston. "It makes it very clear that all the requirements are actually being followed in a design. There are a lot of dynamic changes that take place, so it is a very fluid situation. We can go back and forth from project start, through engineering change orders, design rule checks, and track each set of changes using Altium Designer's change ID tool, we can do this efficiently, and ensure we get the design right."

Different views mean great creativity

Having different ways to view data in a design leads to greater creativity, according to Ms. Bronston. "Different people interact with software in different ways," she says. "And of course a design project demands alternative perspectives for engineering reasons. Electronics design is as much an art form as anything else. You're not just creating product and having components

talk to each other. There is an art to how circuitry interfaces. We're able to have cleaner, more structured designs which allow for fewer iterations.

"In another tool you might just get a down and dirty design and although this gets the job done, it may not get the job done in the most efficient or optimized way. Using Altium Designer, the multiple views allow us to drop to one or two design iterations instead of the two or three design iterations we experienced with other design tools."



Because the client engineers can see the same data clearly, and in different ways, DKB Resources engineers are finding that they have longer, more meaningful conversations with the client teams. In short, they are engaging with their customers in new ways, forging new relationships. "If you can show data in ways that are real, you can have more visionary conversations that get us further along a design path, and in many instances help us reduce or eliminate revisions."

DKB Resources believes that using Altium Designer has made the company more competitive. It sees improved profits and it believes its clients see improved profits too. Data comparisons, DRCs and double checking using Altium's 3D board design features all make for a shorter design cycle, which means less cost and more profit for everyone.

"Time is money. If we can all be more efficient, save time, deliver on time with quality products, and keep ourselves and our clients profitable, all of these are win-wins.

"For us, time does equal money. Every minute I can save is money on my bottom line, and money on my clients' bottom lines."

One of the biggest challenges DKB Resources faces is communication across a large group of client company departments. Engineers thrive on challenge and want to solve problems, without attention to time and dollars. Program managers are interested in schedule, time and costs. Management is focused on schedule and delays with oversight into the bigger program picture. Meanwhile, finance management cares most about cost and savings.

Communicating across this diverse group of people with their diverse interests is important. "The way that Altium Designer outputs data in different formats takes away the language barriers across this dynamic set of diverse departments," says Ms. Bronston.

"One of the biggest benefits we give our clients is how we manage data - we store data, we provide data, we research data, we take data and turn it into products. Altium Designer is a powerful asset for us, helping us more accurately and efficiently manage data received from clients as well as how we then get that data to our customers for review, and then receive that data back with whatever changes and feedback the client includes.

"The ease with which Altium Designer helps makes this information exchange happen has made my company more efficient by at least 50%. We can pass these time savings on in cost savings to our clients."

For something as fluid and as finely managed as a board used on a spacecraft, this back-and-forth of review and exchange can be continuous. To be able to print large amounts of documentation, and often, may sound trivial in the broader scheme of things. But if you have to print 20 pages of a design by configuring each page individually, a lot of time is wasted just driving the printers.

The engineers at DKB Resources know that Altium Designer allows them to configure once, push the button, and move on to valuable design work while PDFs and files are printing. Multiply this by the number of designs and the number of design reviews per week, and something as flexible as simple output management starts to make a difference.



The Curiosity Rover (image courtesy of NASA-JPL)

An example of this interchange is DKB Resources' current work on the Mars MSL Program, the next generation of rovers being readied for their turn on Mars.

"For the new rovers [JPL's MSL program] we were not able to borrow very much from any of the previous rover designs (Spirit and Opportunity), so there were a lot of brand new design requirements for a program that has yet to be proven. This contrasts with Spirit and Opportunity, where we were able to borrow many of the flight board designs from previous missions. This change in flow required many iterative changes and Altium Designer was hugely helpful in our tracking all of these many changes.

"One board in particular had 34 changes over a six week period. To be able to track those changes and know when they were implemented, be able to go back and forth and be able to talk accurately to each change, not just verbally but within the data, was hugely beneficial and made us look like stars.

"You also have a lot of different people reviewing data who have different requirements. Mechanical may say one thing, electrical will say another, program management will say another. So how do you find the compromise between these and have the ability to export different types of data to allow those conversations to happen more efficiently? Followed by providing potential solutions and ultimately creating Gerbers that can be tested by our clients?"

Having a common language, a common method of data management, a single view of a design, coupled with the high-speed and flexible output options, makes it possible to perform at a high caliber of excellence with extremely successful output of products.

What fires up the DKB Resources team is being part of history, being part of building an exciting future.

"It's phenomenally exciting to me to be part of changing how we're going to live in the future," says Darya Bronston.

Being able to focus on creativity, innovation and customer service is, in today's economy, vital. As Ms. Bronston puts it, "Given the economy today, how competitive everything is and how strongly everyone needs the price on things to be lower, there is no way to survive other than how we operate today."

Life on Mars, flying to the Moon, looking at the Earth

DKB Resources has been designing boards for JPL for over 10 years. The choice of Altium Designer was initially mandated by JPL, requiring DKB Resources to adopt the tool and ramp up very quickly to a level the company wasn't prepared for initially. Altium's support and the intuitive nature of Altium Designer meant DKB Resources got six engineers up to speed in six months and create boards for flight.

DKB Resources has provided support to JPL and NASA for the following programs: the [Mars Exploration Rovers - Spirit and Opportunity](#); [Phoenix](#) - the Mars surface probe that landed 18 months ago to continue the search for water on the red planet; the forthcoming [MSL Program](#), with the [Curiosity](#) Rover; the centre's X2000 Deep Space Systems Technology Program to invent and test new technologies for use on multiple missions; the [GRAIL](#) program to fly twin spacecraft in tandem orbits around the moon to measure its gravity field; and the Deep Space Network program, NASA's international network of antennas that supports interplanetary spacecraft missions, radio and radar astronomy, and constant monitoring of spacecraft as the Earth rotates. Other High profile programs where DKB Resources provided support include test boards for the [Raytheon Systems Exoatmospheric Kill Vehicle \(EKV\)](#), which is the intercept component of the Ground Based Interceptor (GBI), the weapon element of the Ground-based Midcourse Defense System; and the Raytheon Systems RAFAR Program, which provides cross-layer routing and channel access mechanisms for multi-hop wireless networks in mobile scenarios.