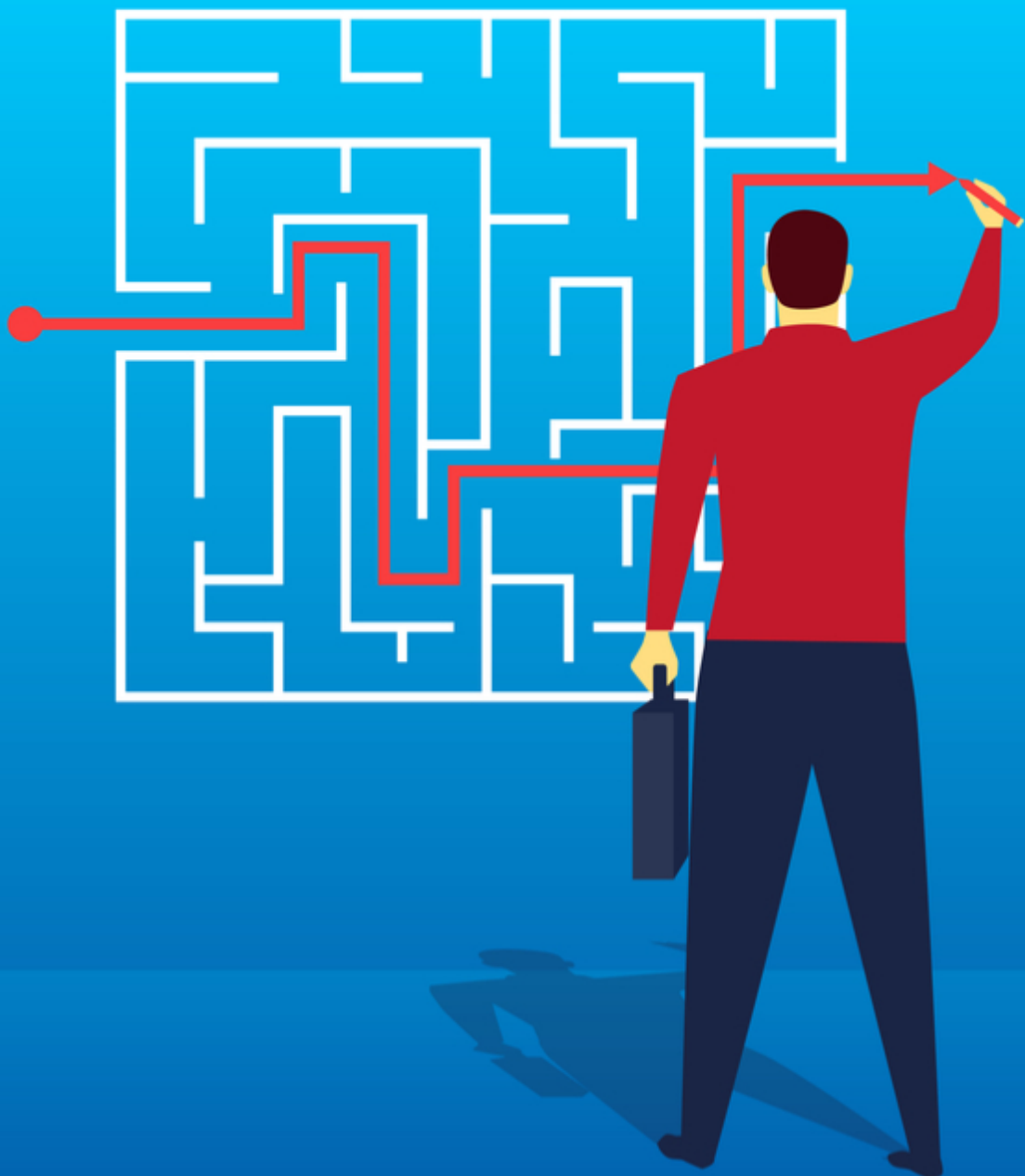
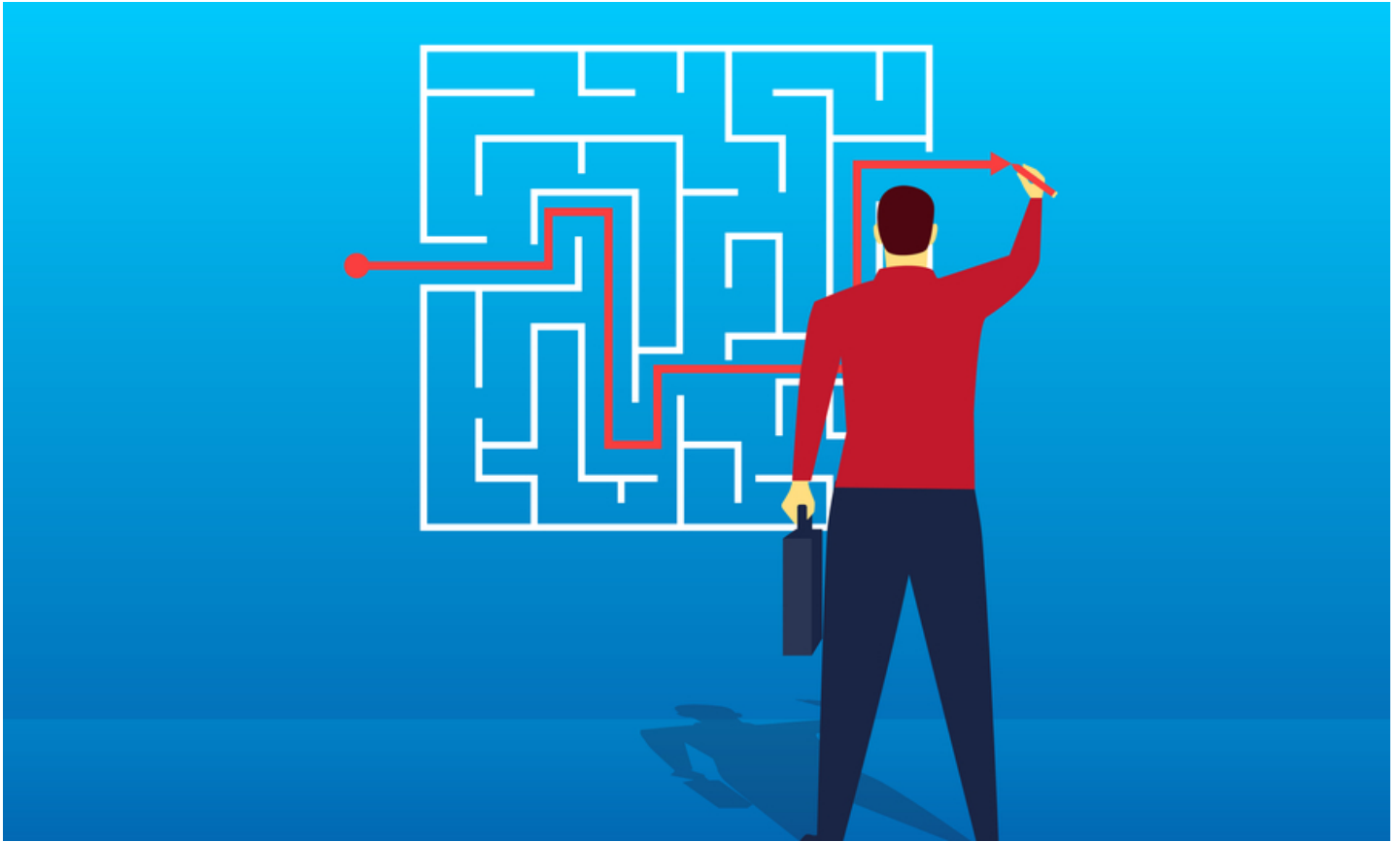


Altium[®]

PCB Design Career & Team





PCB DESIGN CAREER & TEAM

Have you ever thought about being a circuit board designer? Perhaps you are already studying towards an engineering degree or you're an electronics technician or maybe doing some kind of CAD drafting. It could be you're not even in the electronics industry, but it intrigues you. If any of this has caught your interest, keep reading to learn about what it means to be a PCB designer, what kind of education will help you, and what the future holds for our industry. You may discover that you have a talent for designing a circuit board.

Join us as we discuss a variety of topics to help you with PCB Design Career & Team, including:

- How to Become a PCB Designer in Today's World
- PCB Designers for SpaceX and Beyond: Yesterday's Fiction, Tomorrow's Reality
- Optimize PCB Designs Before Product Development With Clear Client Requirements
- Pass the Baton Well to PCB Design Successors
- What Does it Take to Be a PCB Layout Designer?
- Practical Setups for PCB Design and Other Tips for Success
- Tips for Real-World PCB Design: Timing, Communication and Traceability

HOW TO BECOME A PCB DESIGNER IN TODAY'S WORLD



What did you want to be when you grew up? When I was a kid, I wanted to be Scotty on Star Trek. No joking, I really did. The idea that someone could fiddle around with electronic parts and blinking lights to create some gizmo that would save the day was really appealing. A few years later I tried to imitate Scotty by taking all the parts for a kit radio and soldering them together on a thin sheet of wood. Without realizing it, I had designed my first circuit board at the wise old age of 12 years old.

How about you? Have you ever thought about being a circuit board designer? Perhaps you are already in school and headed for an engineering degree. Or maybe you're an electronics technician or you are doing some kind of CAD drafting. Maybe you're not even in the electronics industry, but the idea of becoming the next Scotty sounds really good to you.

If any of this has caught your interest, keep reading. I'll tell you a little bit about what it means to be a PCB designer, what kind of education will help you, and what the future holds for our industry. You may never become an expert in warp drive on a starship, but you may find out that you have a talent for designing a circuit board.

WHAT EXACTLY IS A PCB DESIGNER?

Printed circuits became popular in the 1950s and the need for PCB designers to create those circuits took off. Originally circuit boards were designed, or "laid out," on a drafting board at four or even ten times the actual size using tape, knives, stickers, and a steady hand. When completed, those drawings would be recreated on film using a reduction camera, and that film would be used to make the PCB tooling at the fabrication shop. Today PCB layout is done on advanced Computer Aided Design systems (CAD), and their output is used to create the PCB tooling.

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The PCB designer will create the library models (footprints) for the parts that will be included on the print circuit board within the CAD system. Then the designer will create the circuit board design within the CAD system using the footprints that have been created. Once all of the required footprints have been placed on the board, the designer will connect all of the electrical connections using lines that represent metal in a process called trace routing.

A good PCB designer is part electrical engineer, part manufacturing expert, and part computer guru with a smidge of process engineer thrown in the mix as well. Mostly though, a PCB designer has to have the ability to see beyond the lines and shapes of components on their computer screen in order to visualize where the design is headed. A good PCB designer can create something from nothing while solving many different puzzles along the way.



Many companies are now requiring degrees for PCB design positions

WHAT KIND OF EDUCATION IS REQUIRED TO BE A PCB DESIGNER?

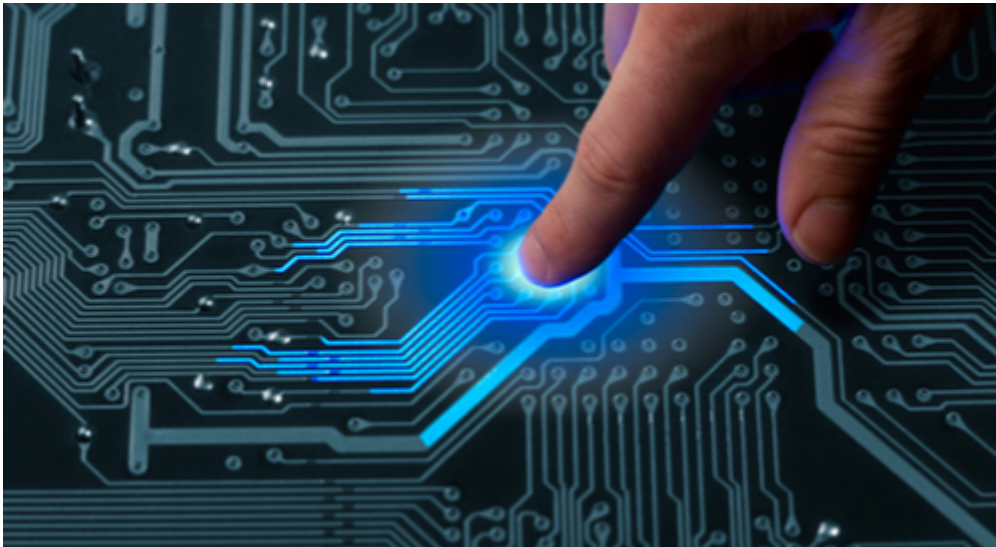
Many engineers are laying out their own printed circuit boards today. To become an electrical engineer or a mechanical engineer you will need a BS in those related fields. Traditionally though, PCB designers are those who do the layout of the board only without doing any of the engineering of the board.

For those who are doing PCB layout only, there isn't much out there in the way of a degree specifically in PCB layout. You will also find that there are still **many positions** that do not require the PCB designer to have a degree of any kind. However, you will have much better success as a PCB designer if you have a degree that includes courses in drafting, computer-aided design, electronic design, or other related areas of study. As PCB designs become more complex, more companies will begin to require degrees for their PCB designers.

There are many certificate courses that are very helpful for the PCB designer. Some companies offer specific PCB design and CAD

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training classes. There is also the IPC Certified Interconnect Designer (CID) course which is an absolute must for the new PCB designer.



The future is bright for PCB design

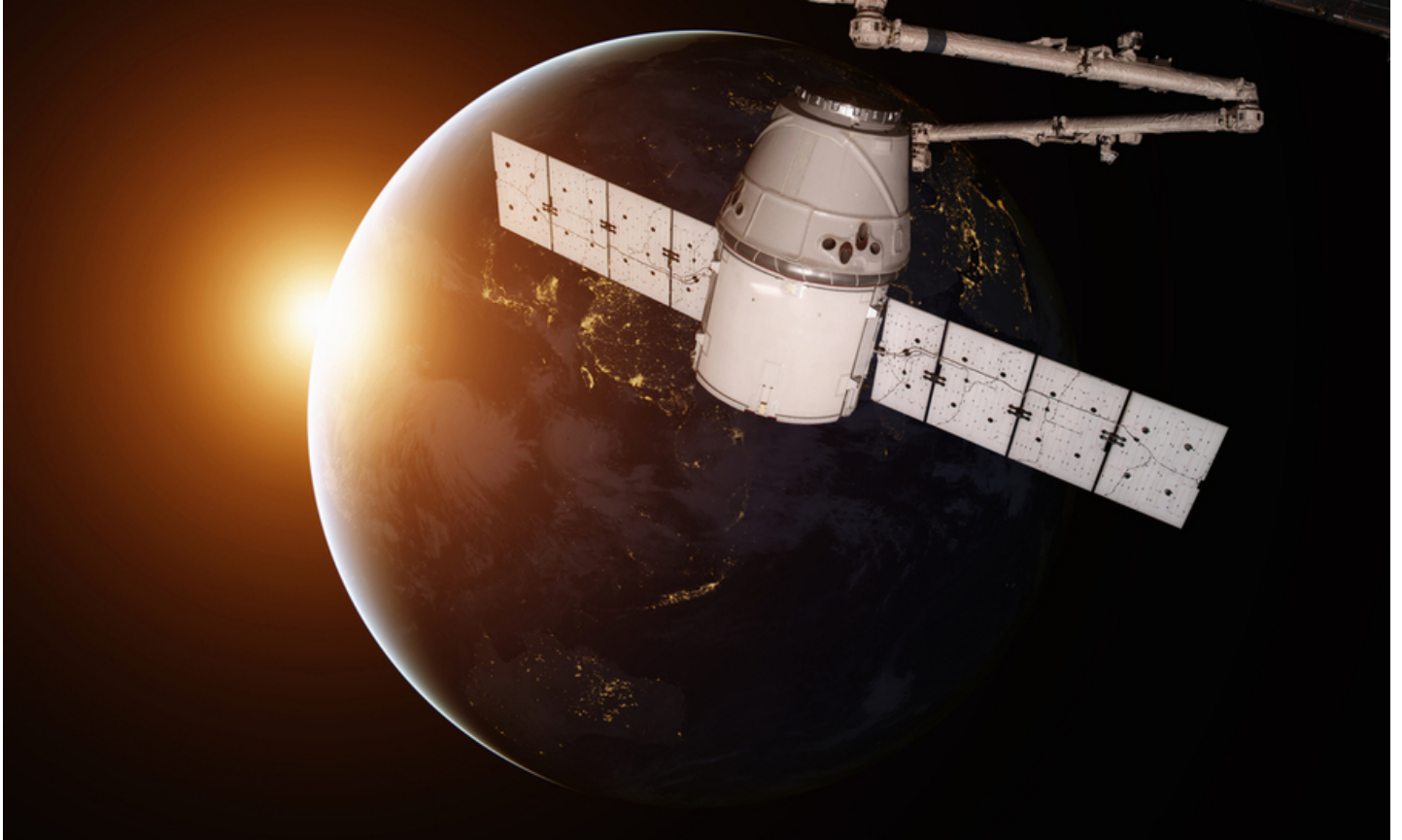
WHAT IS THE FUTURE FOR THE PCB DESIGNER?

The need to design current and evolving PCB technologies is growing. With more and more electronics such as IoT becoming everyday parts of our lives, the future of electronic design is very bright. However, the pool of experienced PCB designers is shrinking as many designers are approaching the age of retirement. The industry needs more PCB designers, and those that are currently involved are reporting that their [compensation and job satisfaction is on the rise](#).

Do you have a passion for creating things and making them work? If so, then designing printed circuit boards may be what you are looking for. If you are ready to start a career as a PCB designer, take a look at Altium. [Altium Designer](#) is PCB design software that is made for engineers and PCB designers to create world-class PCB designs. Not only will the software help you with all aspects of your design, but Altium offers [training](#) on its software that will help you to hit the ground running.

Would you like to find out more about how Altium can help you to step into the world of PCB design? [Talk to an expert at Altium](#).

PCB DESIGNERS FOR SPACEX AND BEYOND: YESTERDAY'S FICTION, TOMORROW'S REALITY



I've wanted a career in engineering for as long as I can remember. There were people who could MacGyver something out of nothing and I wanted to be one of those people. I'm sure that watching science fiction on TV added a lot to that. I mean, who wouldn't want to manipulate technology and control immense power like "Scotty" on Star Trek? I found out that I'm not alone in those dreams—apparently, *Scotty was the inspiration* for much interest in engineering.

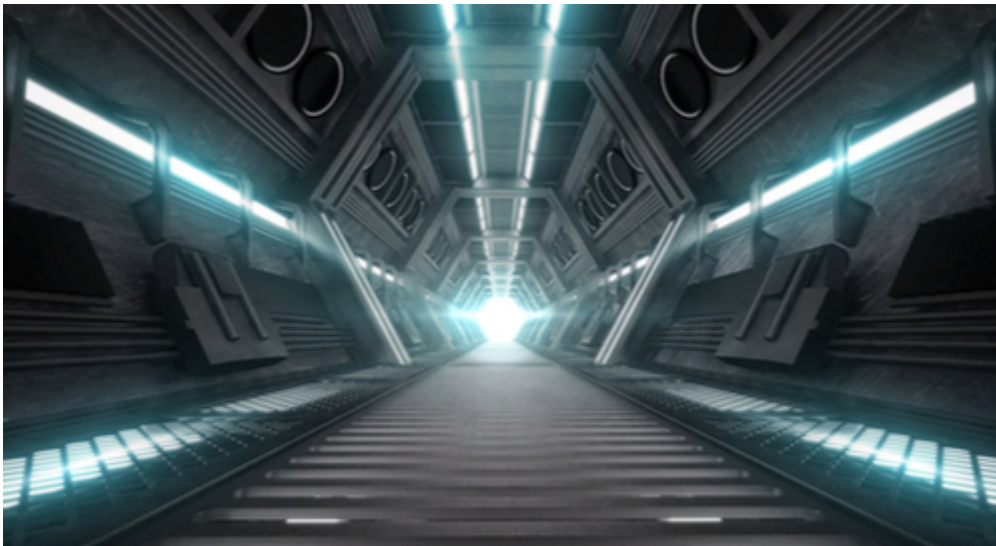
Back then science fiction was not the staple of entertainment that it is today, my parents only tolerated my interest in it. Who would have guessed that those of us who dreamt about spaceships would one day be on the forefront of designing them? Here we are though, and to say "the sky's the limit," has never felt more achievable. Many amazing technologies are being designed now such as driverless cars, robotics, IoT devices, and spacecraft.

It takes more than dreams to design this level of technology though. To design tomorrow's technologies in today's industries is going to take designers who can step up into new challenges. A thorough knowledge of their field is an obvious requirement, but these designers also need to be flexible enough to not be boxed in by that same knowledge. It will also take designers who can use the tools of the trade to be able to make one small step a reality.

DESIGNERS WHO ARE KNOWLEDGEABLE

SpaceX, one of the most recognizable brands designing tomorrow's technologies, is a good sample for the kind of knowledge and experience that PCB designers should be equipped with when reaching for the atmosphere. Designer positions look for designers with experience in RF design as well as designs utilizing high pin-density components. Designers with experience in PCB CAD libraries and library configuration management are also highly sought after.

Further experience being sought after includes mixed analog and digital designs, experience with power supplies, different high-speed design techniques, and understandings of design for manufacturability (DFM), specifications, standards, assembly, and testing principles. What an earful! It sure sounds like they are wanting the moon, but I suppose that's not a bad thing if you are in fact aiming for the moon with your products.



Designing tomorrow's technologies will require out of the box thinking

There's much more that goes into PCB design than simply having the knowledge and experience to make your designs function, though. Oftentimes, design problems will force you to think of creative solutions to problems you've never encountered directly before. Being able to communicate effectively and problem-solve will keep your designs rocketing forward.

DESIGNERS WHO ARE FLEXIBLE ENOUGH TO THINK OUTSIDE OF THE BOX

Obviously, designers of emerging technologies will need a wide range of knowledge and experience; however, the distinguishing feature of many of these designers tends to be in their abilities to think and act proactively. Letting a simple error in your design

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hinder the testing and prototyping of large-scale projects can be easily avoided with the right foresight and design for stability.

PCB design methodologies are what you'll need to be focusing on most, here. Knowing exactly how your tools function, and how well you can utilize everything available to you for a quick and solid design without having to backtrack, reach into separate tools, or try to manage the organization of multiple software functions.

For any of these emerging technologies and especially for space flight, PCB designs will need to get smaller, more robust, and yet handle more functionality. This will require different materials and higher density designs. To build these designs will require advancements in the fabrication, assembly, and test processes. It is the PCB designer who will need to be able to adapt to and champion these new methodologies and processes in order to create their next level designs.



Advanced design tools will be needed to conquer the design challenges of tomorrow's technologies

THE NEXT GENERATION OF PCB DESIGN TOOLS WILL BE NECESSARY FOR THE CHALLENGES OF SPACE

We already know how design cycles are being compressed in order to meet the overall product needs, and that is a trend that will only intensify. With the need to co-design multiple board projects for these emerging technologies, the need for tools that can provide design solutions is becoming more and more important. A designer whose fluent in the latest design tools and can understand how to optimize their methodology for speed, security, and potency is pivotal.

To help keep the design on schedule and the engineering team focused, **PCB CAD tools** now feature the ability to work within a unified design environment. This allows the design group to work on all phases of the design within the same environment without having to interface between different schematic and layout tools. CAD tools also now give you the ability to design multiple system

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boards at the same time within the same environment.

Enhancements in [PCB design software](#) will give you the edge that you need when working on tomorrow's technologies, and for features like a unified design environment and multi-board designs, [Altium Designer 18](#) has just what you need.

Don't let the wrong software environment keep you slow and trudging along. Upgrade your workflow and start building for tomorrow by [talking to an expert at Altium](#).

OPTIMIZE PCB DESIGNS BEFORE PRODUCT DEVELOPMENT WITH CLEAR CLIENT REQUIREMENTS



I swear I clearly heard my son asking for a McFish in his Happy Meal. But when he insisted that he asked for nuggets, I had no choice but to buy another set, although I strongly suspected he was just after the toys. This may not exactly be what you'd call "good parenting" but it is a great example of how misunderstandings can occur when you don't get requirements jotted down on paper.

While the cost of not paying attention to my son simply cost me another Happy Meal, similar mistakes in electronics design can result in massive financial losses. Before you start an electronics design project, especially for an application you're unfamiliar with, ensure that you get the complete requirements from your client. Here's how you can best protect yourself against unforeseen circumstances:

UNDERSTAND RELEVANT APPLICATIONS, THEN MOVE TO PRODUCT DEVELOPMENT

When I started running my own design firm, I thought I could disregard the big picture as long as I understood how the internal logic of the product works. However, knowing which relays are triggered at what time is not enough to create a functional product.

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You can't afford to rely on assumptions when it comes to electronics design projects. Be sure to have an in-depth discussion with your client and take time to understand the project and how the design is being applied. You may need to brush up on basic knowledge of the field that the product is applied in. For instance, if you're designing **environmental sensors** for agriculture, then you might need to start looking up optimum climate requirements for plants.

USE A SPECIFIC REQUIREMENTS CHECKLIST

Once you have a general idea of how you will approach the design, you should construct a **specific checklist** to ensure that every **single requirement** is confirmed with your clients. Details like the number of inputs, **communication interfaces**, and memory arrangement should be finalized before designing begins.

Do not neglect common components like power requirement or PCB size limitations. If your design needs to follow any specific mounting hole coordinate, this is the best time to ask. You do not want to end up with hundreds of PCBs that do not fit the enclosure.



Instead of trusting yourself to remember, use a checklist.

GET AN OLDER VERSION OF THE PRODUCT FOR REFERENCE

A proper working sample tells a better story than hours of discussion. If you're designing complex controllers for **industrial process automation**, you might want to ask your client to let you observe similar controllers in action. It will eliminate any guesswork or future interrogation of clients as questions pop up down the line.

Don't be afraid to request a sample of an alternative version of the controller that you plan to design. Having a reference while designing is useful, especially for an industry where you have no previous experience. Even without any prior experience in the field, I have built reliable medical gas panels by referring to other models in the market.

DRAFT A SCHEMATIC

Instead of rushing to create the perfect design, quickly draft out a schematic of the electronics product. As you do so, you may discover areas where you are unsure or lack knowledge. As a designer, you are bound to encounter some situations you're unfamiliar with. If your uncertainty relates to specific industry knowledge, get clarifications from your client before proceeding further.

CREATE A COMPLETE PROJECT SPECIFICATIONS DOCUMENT

When you're sure whether all the project requirements are fully addressed, create complete project documentation that contains the general overview, timeline, technical specifications, and [the basic design diagram](#). Before you start your design, walk through the document with your client and ensure that you are both on the same page.

The worst thing that can happen to a designer is having to make major revisions to a design when a client insists that you misinterpreted their requirements. For this reason, it's important to clearly detail all specifications based on mutual agreement. Before getting started, don't forget to ask your client to approve the document detailing all project requirements.



A complete project specifications document will be the guideline for your design.

FULFILL CLIENT REQUIREMENTS MORE EFFICIENTLY WITH PCB DESIGN

SOFTWARE

If you've done a great job with the schematic draft, you can start transferring the circuit from a schematic to a PCB. A powerful PCB design software like [Altium Designer](#) can efficiently match your schematic to footprints from its library, no matter how large or complex the design. With such an [advanced design tool](#), you can finish your designs without constantly worrying about forgetting client requirements.

Need more advice on managing an electronics design project? [Contact an expert at Altium today.](#)

PASS THE BATON WELL TO PCB DESIGN SUCCESSORS



Have you ever walked into a new job, first-day energy rolling through your shoulders, only to sit down and look at the notes left from the person who last had your job and know exactly what the problem was: poor organization. Poor organization is usually pretty noticeable in any work process; however, it takes on its most detrimental final form when you are trying to train someone based on the poorly organized leftovers of someone else.

Early in my career, I landed a job as a design engineer; I was ecstatic to pour through the source code for their complicated electronics only to realize that I was going to spend a lot of time trying to get through such poorly organized code. It took me a whole week just to identify a single line I was looking for. But, in a way, having that experience was a slap-in-the-face for me: I promised myself to make the life of my successors easier regardless of firmware or hardware design. By staying proactive and using some critical methods for organizing yourself, you ensure that nobody stumbles or drops a thing when passing the baton.

MAINTAIN CLEAR AND CONCISE DOCUMENTATIONS

I think a fellow PCB designer will understand more than most that there's a particular thrill that can get the better when you start working on a new project. Sometimes it can even feel more harmful than productive to slow yourself down in order to do the necessary step of preparing detailed project documentation. But from a proactive approach, if you have any hiccups in your design process whatsoever, detailed project documentation will be the first thing you wish you had. Specifying the purpose and functionality of the hardware and its specific requirements such as memory, [communication interfaces](#), the types of inputs or outputs of the

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design will be crucial in saving future-designers valuable time in going through your work and learning from what has worked in the past, and where problems were encountered.

You can also help your successor in saving precious time by organizing the datasheets of the components you've used in the design. While there is no need for datasheets for every single capacitor or resistor, your successor will be happy for the datasheets of the microcontroller and logic integrated circuits (IC) neatly saved in a folder.

Furthermore, there are bound to be revisions in your designs due to either mistakes or changes in requirements. Keeping the revision number on the PCB itself helps to identify which version the product belongs to. However, that means little for your successor if the changes made in each revision is not properly documented. Making a revision changes documentation note is not complicated. Note down the revision number, the cause of any amendment and the specific part in the schematic where the amendment is made. You'll be surprised how a simple effort in documentation could help your successor in avoiding your [past design mistakes](#).

DESIGNING WITH A MODULAR APPROACH

While my day one nightmare was squeezing thousands of coding lines in a single page, yours might be having a single schematic document with thousands of components. Lack of structure can result in your successor wasting precious time trying to visualize and compartmentalize the entire design. This is why I prefer a [modular approach](#) to my hardware design.



Keep things simple with a modular approach

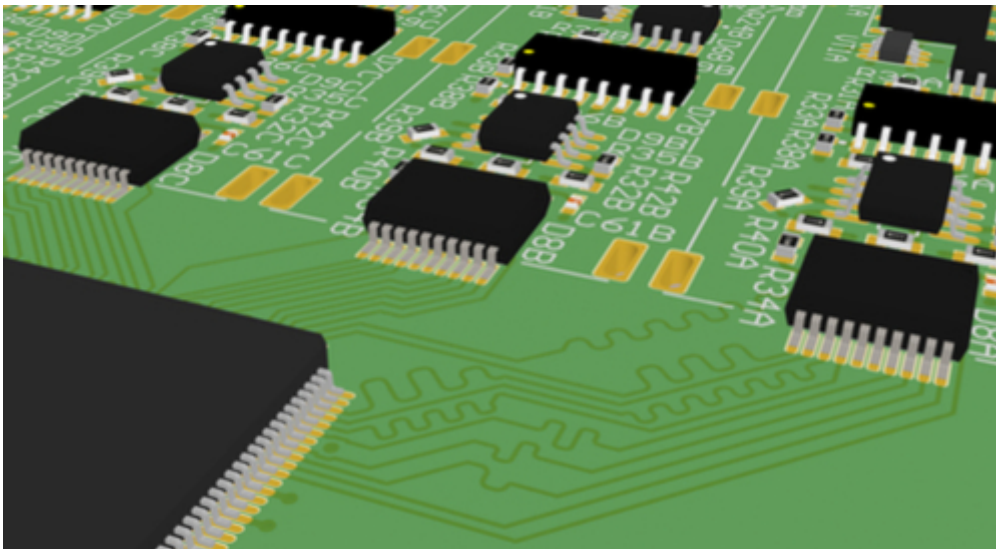
Organizing your schematics into separate blocks such as power, microcontroller, memory, input, and output not only benefits your successor but also service technicians who are trying to pinpoint faulty components from your design. It's a given that you'll be working with complicated designs; however, with the proper organizational structure in place, you can make it so that your designs

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don't require weeks of preparation to read and understand. A single glance at the overall block diagram should be all it takes to identify the major modules in the design.

KEEP COMPONENTS LIBRARIES UPDATED

While PCB design software does have its set of component libraries, you may need to create custom libraries for some components occasionally. It's important to keep the custom component library updated with the part number, manufacturer and the associated footprint. What's more important is that you are passing the custom libraries over to your successor as well. The last thing you'll want is getting a call from your successor asking about missing libraries when you've moved on.



Don't lose the custom components library you created

HANDLING OVER THE LATEST MANUFACTURING BOM LIST

In some positions, a hardware designer's responsibility goes beyond designing electronics product. Some engineers may be tasked with sourcing the right components to meet production budget requirements. Creating and updating a Bill Of Material (BOM) list can be a painstaking effort as it involves numerous suppliers and **constant price changes**. If you're going to leave a good impression as you leave your current position, an updated BOM list is definitely the icing on the cake.

Of course, a great **PCB design software like Altium** helps make project handover easier with its ability to build component libraries with their complete specifications for generating your BOM list with a single click. With real-time component pricing and availability updating, **Altium's ActiveBOM** will be able to keep your design outputs organized for all to see.

Still worrying about smoothly passing over your multiple projects to the next designer? [Get more tips from Altium's experts now.](#)

WHAT DOES IT TAKE TO BE A PCB LAYOUT DESIGNER?



In the movie “Men of Honor,” Robert De Niro portrayed Billy Sunday, a Navy diving instructor with a challenging pedagogical method. He motivated his student divers by describing how hard their job would be to prepare them for the difficulties of their tasks. He concluded his speech by saying, “I don’t know why anybody would want to be a Navy Diver.” His honesty, in this case, wasn’t intended to be demotivating—sometimes a job takes a certain type of person, one who is willing to do work that others won’t.

There have been days that I’ve thought the same thing about my own career: “I don’t know why anybody would want to be a PCB layout designer.” But even with the adversity, I only have to remind myself that I can and am doing things with my skills that most other people can not. My experience and visually-oriented mind can imagine how components need to be arranged on a circuit board in order to create an efficient design. Furthermore, I know how to use the tools at my command to connect the components and make the circuit board function as it should.

The job can be challenging and demanding at times, and most of the people you know and interact with won’t have much of a clue as to what it is that you are actually doing. But on the other hand, you will get to experience an incredible feeling of accomplishment when you see your design working as it was intended. I don’t know why you would want to be a PCB layout designer—only you can know that reason, but I imagine that you’re here because you’re interested in pursuing and finding creative solutions for difficult designs. So dive in, and if you find your treasure then you know you’re in the right field.

COMMON CONFUSIONS OVER PCB LAYOUT DESIGNERS

It never ceases to amaze me how often people misunderstand what it is that I do. Especially when I describe myself as a “PCB Designer,” it is not unusual to get a blank stare in return. Even my coworkers don't always seem to have much of an idea as to what it is that I do, or am doing when I complete my work. There are others who have point blank demanded I tell them why in the world anyone would want to do something like this.

Much of my job appears to just be moving lines and shapes around on a computer screen, to the untrained eye; however, I promise, to anyone wanting to know more about what the PCB designer they work with does, this is hardly a game. We're not 'creative time wasters,' and we're not relics from an older system. Being able to effectively assuage these concerns, too, is part of the job expectations for a PCB layout designer.



Most people have no idea what a PCB Layout Designer actually is

THE ATTRIBUTES OF A PCB LAYOUT DESIGNER

Unlike in video games where you can minimize and maximize your attributes to focus solely on the skills you need, being a PCB designer requires some of the most diverse combinations of skills that I know of. A large part of the designer's role is to utilize their creative thoughts to problem solve board design challenges; however, this creativity is only enabled if a layout designer has the technical capacity to enact their ideas. Here is a list of what I find to be important traits:

1. **Great attention to detail:** When your job entails trying to map solutions to minor adjustment changes, or has you working with materials that don't fill your whole palm, you need to be able to focus on the details.

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2. **Keeping up-to-date on industry trends:** In an industry where new technology is constantly popping up, and new software is enabling more efficient and smart design solutions, ignoring industry trends will mean more work for you down the line.
3. **Learning new design techniques:** While this seems to be one of the most common-sense needs for a PCB Layout Designer, it can be easy to make a habit of your layout designing by finding a few techniques which work and applying them to your layouts. But this may encourage continuous errors, or enable new errors to pop up as your layouts become more complex.
4. **Long hours:** Just like with any job, it is good to keep a strong idea of what you need to get done, and when it needs to get done. But sometimes, even with the best priority management, you will have to complete designs and work extra hours to meet deadlines.
5. **Common ground problem solving:** The biggest wrench in many of these plans is the amount of time a layout designer will spend managing others and managing design demands from multiple sources. As a designer, you will need to **manage and balance** those that you work with. Often you will be the rope in a tug-of-war between engineering and manufacturing, and it will be up to you to find a solution that will satisfy both sides.

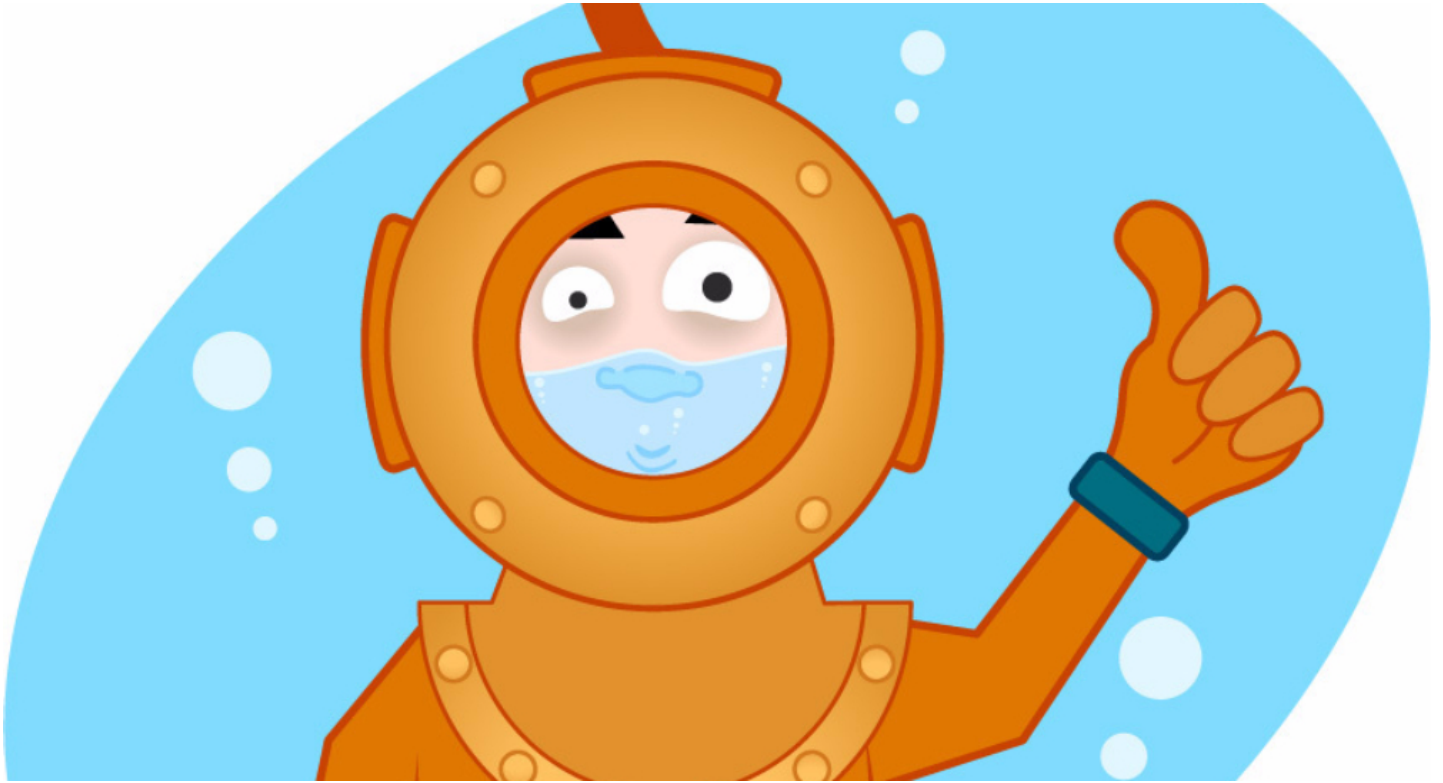
HERE'S THE TREASURE AT THE BOTTOM OF THE OCEAN

After everything that I've said so far, you may also be wondering why anyone would want to be a PCB layout designer. It still might not be for you, but these are some reasons why I love PCB layout design:

- **Your work will challenge you:** Designing a circuit board so that it meets the manufacturing specifications and works as it is intended will keep you on your toes.
- **You will be exposed to new ideas:** Technology is constantly changing, and you will always looking at better ways to accomplish your task.
- **Decent working conditions:** More than likely, you won't be designing boards outside in the rain or snow. While that might not be everyone's goal, it certainly is one of mine.
- **Good salary:** Most PCB layout designers make a good salary, and it isn't uncommon to make a great salary. While I can't give specific numbers, I hope these superlatives can offer some guidance.
- **Seeing what you create come to life:** One of the greatest joys that I have is in seeing the designs that I create come to life in the products that my company markets. There is nothing better than seeing an appliance, computer, or cell phone work because it contains a PCB in it that I've designed.

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- **Creating hardware:** Although most people won't understand what it is that you do, most everyone will be impressed when you can show them what you've created. I have a wall at home where I've hung examples of some of my PCB designs, and I always get questions about what they are and what I do. It is no small joy of mine to tell their stories.



Some of the largest challenges you'll face will feel like the most rewarding to complete.

I am a PCB layout designer because I love it. I get to do something every day that is challenging, fulfilling, and rewarding. How about you? Are you ready to step into the world of PCB design and enjoy the same experiences that I have described? If you are, then you will need to work with design tools that can enable you to be successful from the start.

PCB design software, like [Altium Designer](#), is intuitive for the entry level designer and powerful enough for the veteran designer. Whichever end of the experience spectrum that you are at, Altium Designer can help you to be a success.

Find out more about how Altium can help you by talking to an expert at Altium.

PRACTICAL SETUPS FOR PCB DESIGN AND OTHER TIPS FOR SUCCESS



My father did not say a lot as he was a quiet man armed with a subtle wit, but he was very wise. He's been gone for many years now, but I will always remember how he modeled for us a consistent perseverance in getting the job done and getting it done right. Every night, regular as clockwork, he would go through the house to make sure that all of the doors and windows were locked. This was his regular practice to make sure that his family was protected. He was never late for work, and he always worked a full shift making sure to get his job done.

Over the years his examples of perseverance have been a great inspiration for me. I tend to approach life, and especially difficulties on the job, as he did: "What is the problem? What do we need to fix the problem? Let's go and fix the problem!" It's easy to get involved with long-term goals, and large projects; however, sometimes your attention is needed for repairs, or you have to backtrack to resolve an issue. These might slow you down, and serve as impediments from your big goal, but keeping yourself humble is key in addressing your problems in a manageable way. This line of thinking has helped me a lot in figuring out the best ways to prepare myself for success in designing printed circuit boards.

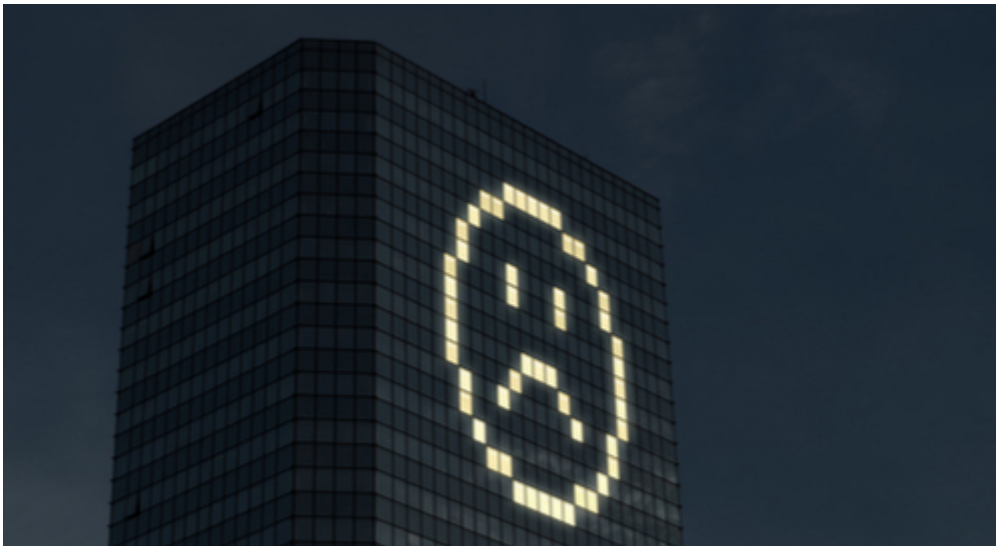
You can help your productivity in PCB design starting with the things you interact with on a daily basis: your hardware and work-area setups. But just as important as the physical items you interact with is the culture and environment that you're working in. Making sure to understand your personality, what motivates you and what makes you demotivated can be critical to understanding how to make the most out of the situation that you're in. At the end of the day though, you're the PCB designer who has the technical skills that only a small portion of the world have.

HARDWARE, THE FIRST PRACTICAL SETUP FOR PCB DESIGN

The first thing that pops to mind when you talk about setting up the perfect workstation is the kind of hardware that you are using. Sure, I've had my share of geek outs over computer setups and new machinery, but there is no right answer here as far as which machine and/or setup is the best choice. The rule of thumb is, get as much computer as you can: as much memory, speed, 64-bit, and whatever else is available that you can afford. The more horsepower that you can harness for your CAD system, the better off you will be.

As far as the rest of the hardware goes, it really is a matter of personal choice. You obviously need a keyboard and mouse setup that will handle the job, but aside from that, you need to use what works best for you. I have seen situations where people were practically shamed into using a different mouse than they were familiar with in order to keep up with current trends. At the same time though, don't be afraid to try new hardware either. You never know what new innovation will be exactly what you need to be more productive.

I also recommend that people should get as big of a monitor as their work-area allows, and if all possible use multiple monitors. It almost seems as if some designers take pride in being able to squint at a small monitor; I, for one, take pride in having good eyesight and would really prefer not to ruin that. If you can, go large and get more than one. It is very helpful for me to be able to slide my applications around to different monitors. It helps my organization, and it helps me to focus better on what's right in front of me.



If where you work is crushing your soul, it might be time to leave

AVOID THE TRAP OF A NEGATIVE ENVIRONMENT

It seems silly, but sometimes you need a reminder: you, above all, are a human being who requires certain emotional and interpersonal relationships for your success. Everyone operates differently within their sociality; however, there are many jobs which simply do not make it easy for you to feel good about working there. I'm talking about places that, at the end of the day, you feel particularly drained and exhausted, and after a week you feel like you've lost a month of your life. Maybe the company is on a downward turn, or maybe they don't believe in employee growth or a positive work-life balance. Whatever the problem is, it creates in you a dread instead of a desire to report to work and you find yourself counting down the hours each day until you can escape.

With as many industry-hours as I have behind me, I've known more than my fair share of people in environments like this. As they're sharing all of the problems they have with their jobs, they usually start telling me something like, "I have nowhere else to go," or, "I don't have the skills to find another job." And at this point is where I have to interject: first, thoughts like this are an excellent sign that you are currently in the wrong place—a thriving, positive work environment will usually boost your confidence not leave you feeling helpless. Second, you are always capable of learning new things and you have a particularly strong skill set if you're in the PCB design industry to begin with. The biggest tip for success is to find somewhere that will positively challenge you to be successful.



You can do this!

YOU CAN DO THIS!

As I said above, a negative environment will often cause you to think poorly of yourself and your abilities. I have been there, and I bet many of you have as well. Before you can escape the confines of a bad workplace environment though, you have to escape the confines of your own negative thinking. Is your self-confidence low and you've found that you are no longer believing in yourself? Now, I don't have any experience in psychology or mental-health-help, and it is always beneficial to seriously talk to someone about

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bettering your mental health.

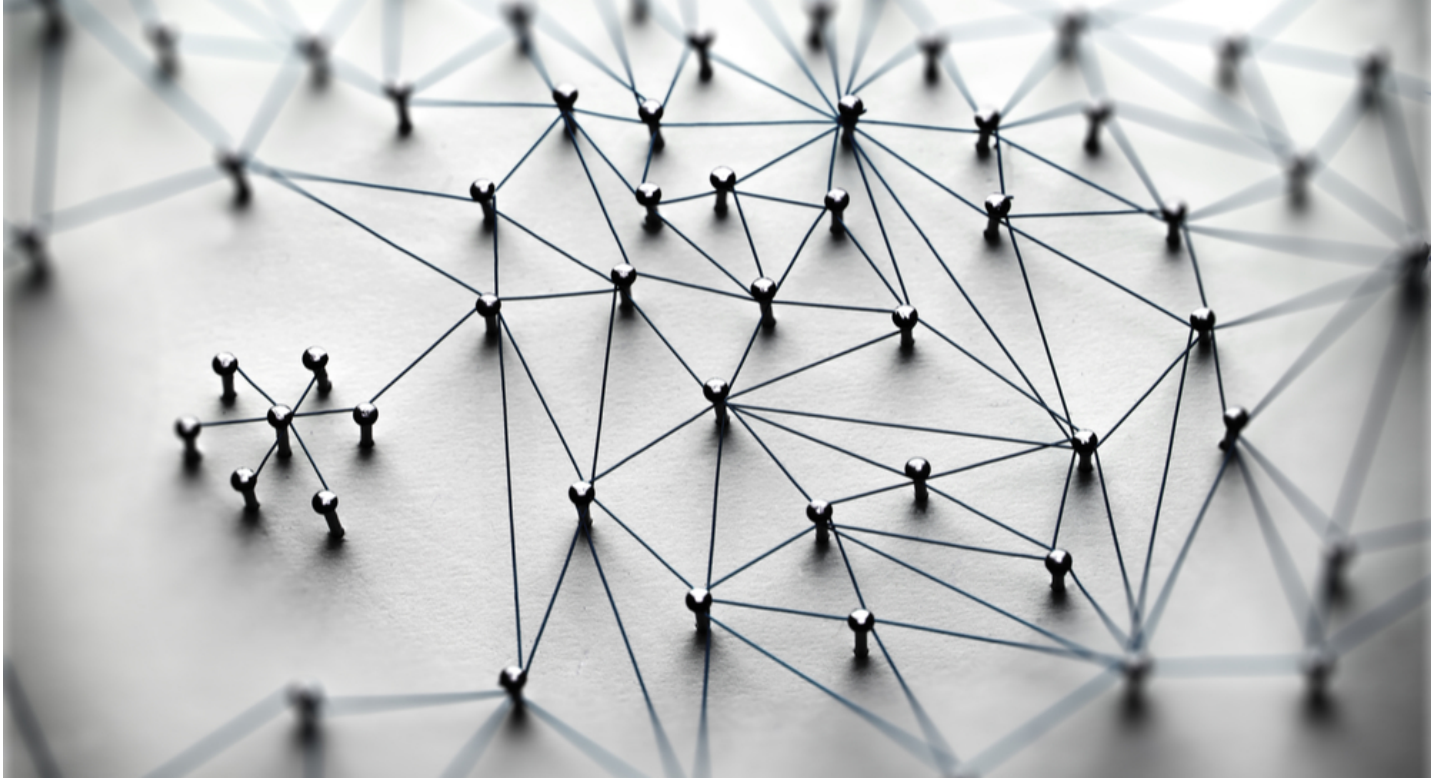
But the chances are that if you are reading this that you are either an electrical engineer or a PCB designer and as such, you have a skill set that allows you to do something that very few people in the world can do. There is demand out there for your skills, even if you don't see it from where you are at. The tip for success here is to lift your eyes out of the trenches and start focusing on the horizon. You've got a lot to offer the world.

Another factor that can drain your self-confidence is using software that is difficult to use, doesn't give you the functionality that you need, or robs you of productivity. I have seen many designers throw in the towel because their frustration level has gone through the roof trying to use their current software.

By finding [PCB design software](#), that is intuitive to use and has the power and functionality of multiple design technologies, like [Altium Designer](#), you can take the first step to bettering your work environment. This will help you to grow in your skills as a designer, and to complete your work correctly and on time.

Would you like to find out more about how Altium can help you to grow as a PCB designer? [Talk to an expert at Altium.](#)

TIPS FOR REAL-WORLD PCB DESIGN: TIMING, COMMUNICATION, AND TRACEABILITY



I love food; I love the preparation, finding the ingredients, adding the minute adjustments of seasonings and salt, and cooking multiple courses at once. But when I first started cooking for myself, I prepared each part of the meal individually. I found it immensely difficult to keep track of the different dishes and ensure none stuck to the pan—or went without stirring for too long. So I sacrificed time and did each task individually.

What my cooking came down to was that there were too many activities dividing my attention, and no simple way to keep track of them all. Often there were multiple people in the kitchen at once which only brought more chaos to the already-tumultuous task. But when my dinner preparation began eating up the majority of my evenings, I sought a solution: I started setting timers. Anyone going in and out of the kitchen knew how much longer something would be cooking for, and I could keep track of the different needs of each dish. It immediately reduced my stress from trying to time my many dishes and made it easier for the others to plan their meals. Let's face it—the last thing you want when you're hungry is a delay from someone else.

Wherever you're working, and whatever you do, you probably have many things vying for your attention as well. We call it by many names: multitasking, juggling, having too many irons in the fire, constantly shifting gears. These terms for competing demands are often good descriptions for the job of a PCB designer. You may be work with an engineering team that is pushing boundaries or as a contractor with multiple clients. Or, iterative design processes that require testing can leave projects in the lurch for days to months.

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Priorities can shift for many reasons in the middle of a project, requiring management to adjust a department's course to match. These twists and turns can actually help to keep a job interesting when things go smoothly, or they can make it miserable when they don't. In order to keep things running well, you should consider focusing on three general areas.

TIMING—AND GOOD PERSONAL NOTES

Timing and notes may seem like an odd mix, but it does take some time to make good notes. Stopping halfway through complex design calculations or in the middle of laying out an involved portion of a PCB can make picking such tasks up again risky and even necessitate starting over. It's easy to neglect a section when coming back to power calculations or to have lost track of the master plan for the perfect routing strategy, so try to take a little extra time to get to a good stopping point if you can. Politely letting customers or management know about the risks associated with such changes in schedule when appropriate can help to keep you in good standing and might buy you a little time as well.

When you do reach a stopping point, taking clear notes about past issues, the current status of the project, and the direction in which it is going can help to resume course when the time comes. Remember to leave blank pages for future entries in your engineering notebook for when things pick back up. Take advantage of your design software's capabilities, [such an ability to associate useful files with a project](#). To make sure your file structure is clearly named and somewhat intuitive, try to imagine if someone else could find what you are looking for.



Making your notes easy to access keeps your team on track

TEAM COMMUNICATION

The fact that priorities can change quickly is a big part of the reason why companies prefer to hire individuals with excellent communication skills. When jumping from one task to another, crazy things can happen. Breakdowns in communication can lead to mixed-up budget allowances, conflicting goals related to time-frames, and even the confusion of technical requirements of different designs. Needless to say, such happenings can cause serious setbacks. Good enterprise resource planning software makes this specter less daunting, but only when people actually use it.

In the buzz of activity and change, it can be easy to forget the first step of making any workflow change: keeping all the team members in the loop. Taking a few minutes to explain why things are happening is a good way to try to alleviate frustrations that changing plans—and losing efficiency—can cause. Even if it means having to support an argument you might not agree with, the effort can help make team members feel more valued. Having a clear goal and idea for the project's reprioritization also enables team members to understand what they're working towards.

Timely communication among team members or clients regarding events that affect a project's deadlines are also very important. Changes due to supplier backlogs, parts shortages, design difficulties, and other unforeseen events can really shake things up. *Disseminating such information as completely as possible* will help reduce further surprises since it is often difficult to know the effect such changes can have on every member of a team, or on a customer's plans.



Whether it is by email, messenger, or can, keep communication open

TRACEABILITY: TRACKING CHANGES TO IMPORTANT DATA

A dynamic workplace will sometimes have many people looking at one project over its lifetime, and it is important to be able to display changes that you or others make. Such traceability is very useful when resuming a project, or even when coming back to a different part of a large project. [Integrated BOM and component library functionality](#) can help you track changes to important documents. The fact that this information is recorded automatically whenever changes are made means that more resources are made available by the same amount of work. These records can be viewed offline as well as in the cloud, allowing for maximum flexibility when it comes to team operations and customer interactions.

Inside the design department, knowing who made a library change is the first step to finding out why, which greatly helps to streamline communication. Knowing when a change happened might even answer such a question before it needs to be asked. Access to these resources can help purchasing track down answers for contract manufacturers when placing orders. Billing departments for third party clients can be given the ability to use BOM-related information to answer questions as well. Whether looking at a component library or at a BOM, traceability features can save time and prevent errors.

By creating an environment in which your team members can effectively communicate with each other, you can save precious time and encourage a healthier, more efficient team-environment. Using software that works for you to make notes of changes and encourage easy communication makes establishing this environment that much easier. Save yourself the future frustration by using [the BOM software CIIVA](#), and find out more information by [talking to an expert at Altium](#).

ADDITIONAL RESOURCES

Thank you for reading our guide on PCB Design Career & Team. To read more Altium resources, visit the [Altium resource center here](#) or join the discussion at the bottom of each original blog post:

- [How to Become a PCB Designer in Today's World](#)
- [PCB Designers for SpaceX and Beyond: Yesterday's Fiction, Tomorrow's Reality](#)
- [Optimize PCB Designs Before Product Development With Clear Client Requirements](#)
- [Pass the Baton Well to PCB Design Successors](#)
- [What Does it Take to Be a PCB Layout Designer?](#)
- [Practical Setups for PCB Design and Other Tips for Success](#)
- [Tips for Real-World PCB Design: Timing, Communication and Traceability](#)