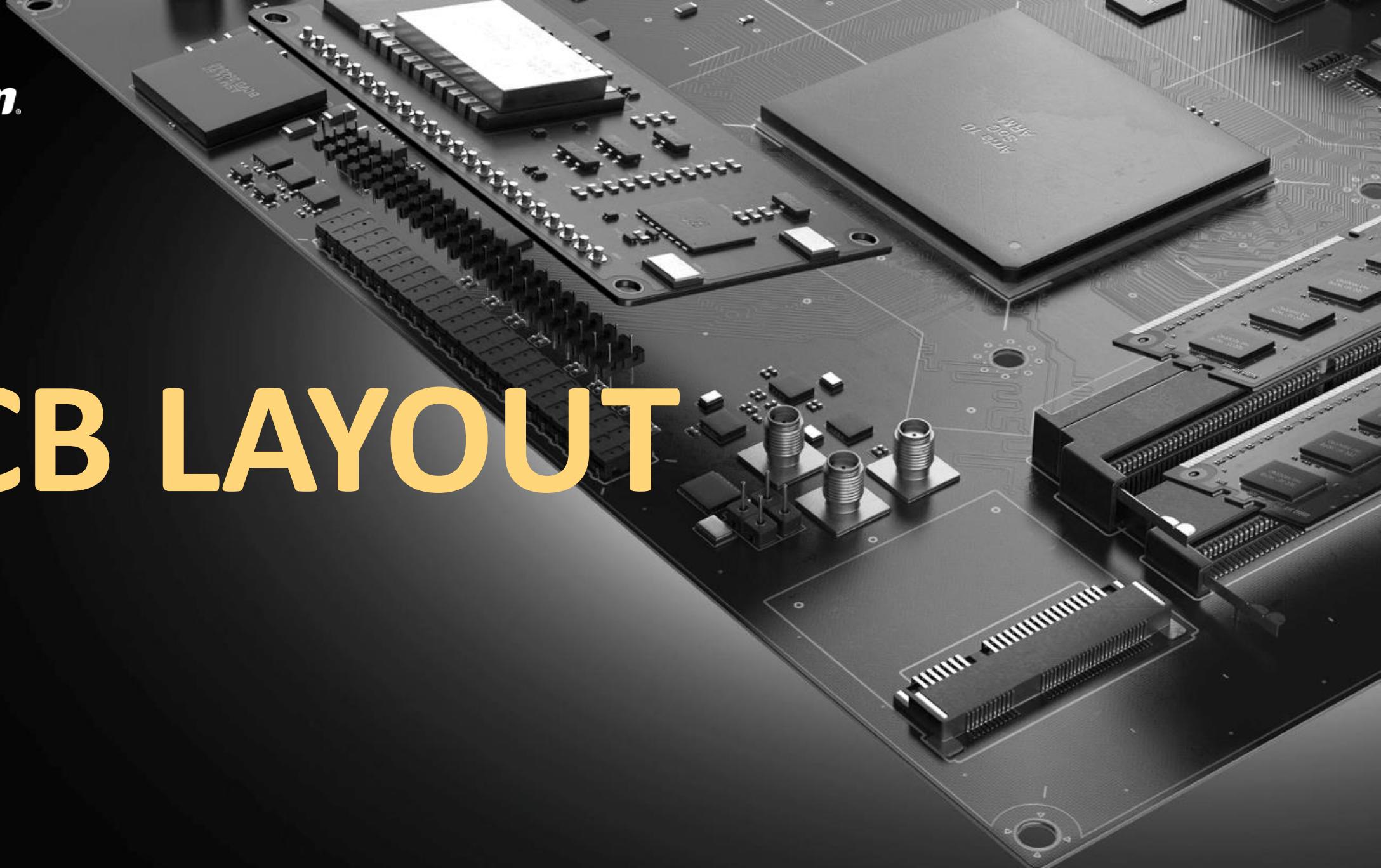
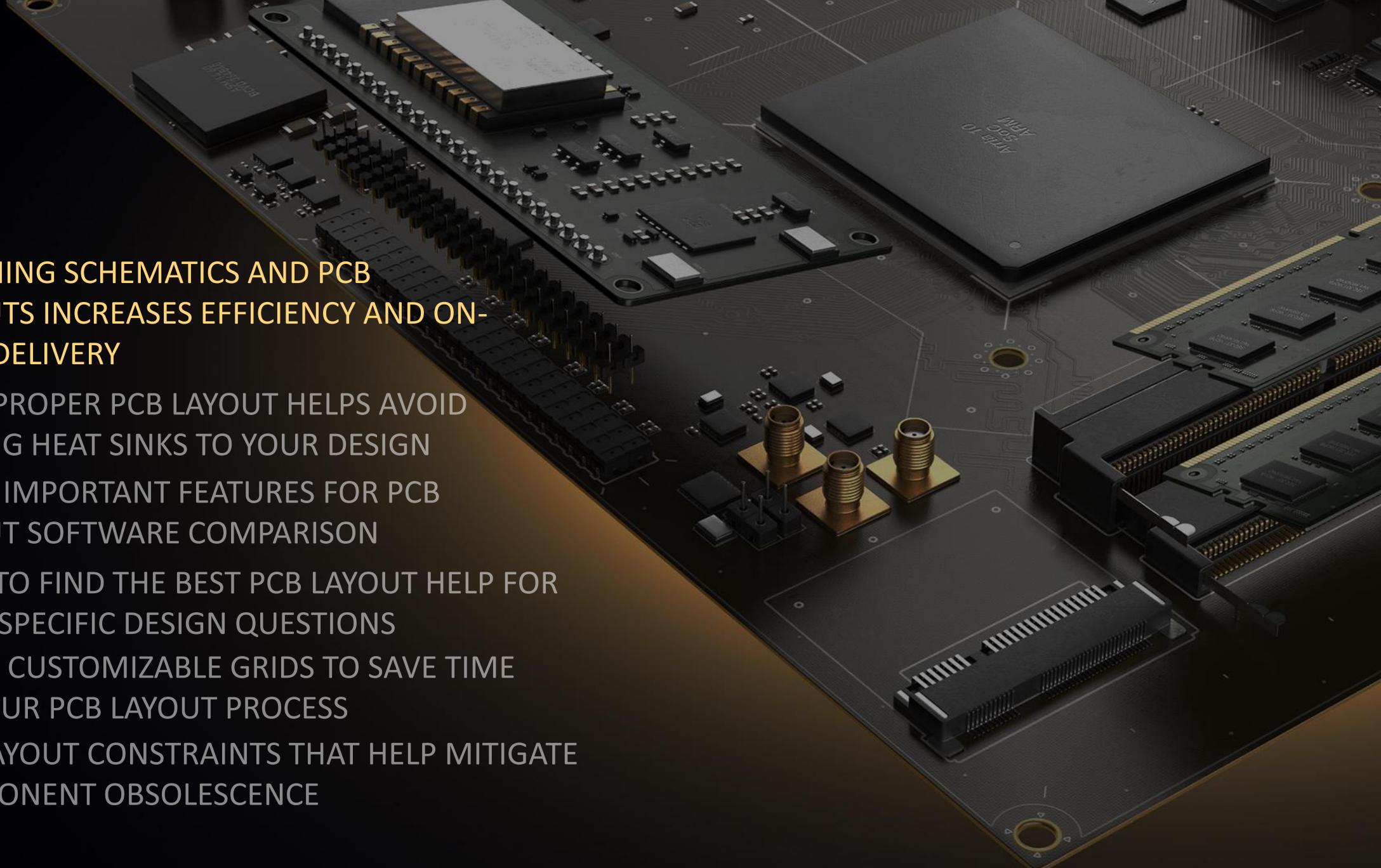


**Altium**®

# PCB LAYOUT



1. SYNCHING SCHEMATICS AND PCB LAYOUTS INCREASES EFFICIENCY AND ON-TIME DELIVERY
2. HOW PROPER PCB LAYOUT HELPS AVOID ADDING HEAT SINKS TO YOUR DESIGN
3. MOST IMPORTANT FEATURES FOR PCB LAYOUT SOFTWARE COMPARISON
4. HOW TO FIND THE BEST PCB LAYOUT HELP FOR YOUR SPECIFIC DESIGN QUESTIONS
5. USING CUSTOMIZABLE GRIDS TO SAVE TIME ON YOUR PCB LAYOUT PROCESS
6. PCB LAYOUT CONSTRAINTS THAT HELP MITIGATE COMPONENT OBSOLESCENCE



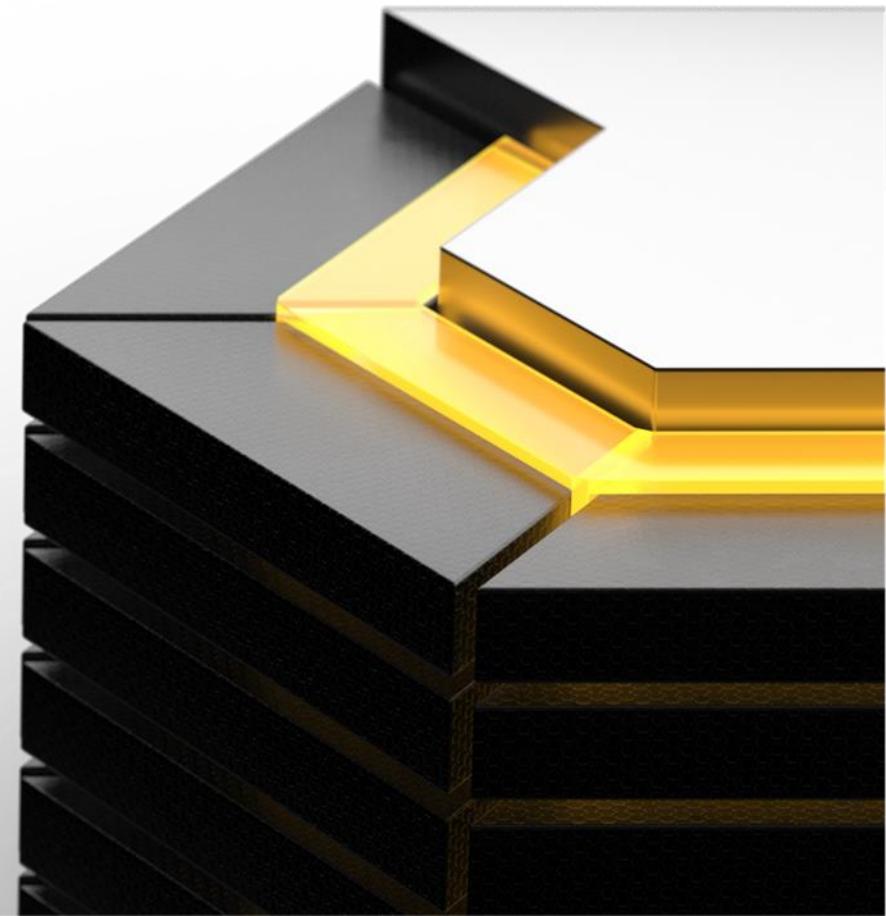
**1. SYNCHING SCHEMATICS  
AND PCB LAYOUTS  
INCREASES EFFICIENCY AND  
ON-TIME DELIVERY**



## A Unified Data Model Approach

It is important to take a big-picture approach to the PCB layout design through detailed schematics. A Unified Data Model helps with this, allowing users to seamlessly integrate multiple aspects of the design process, including:

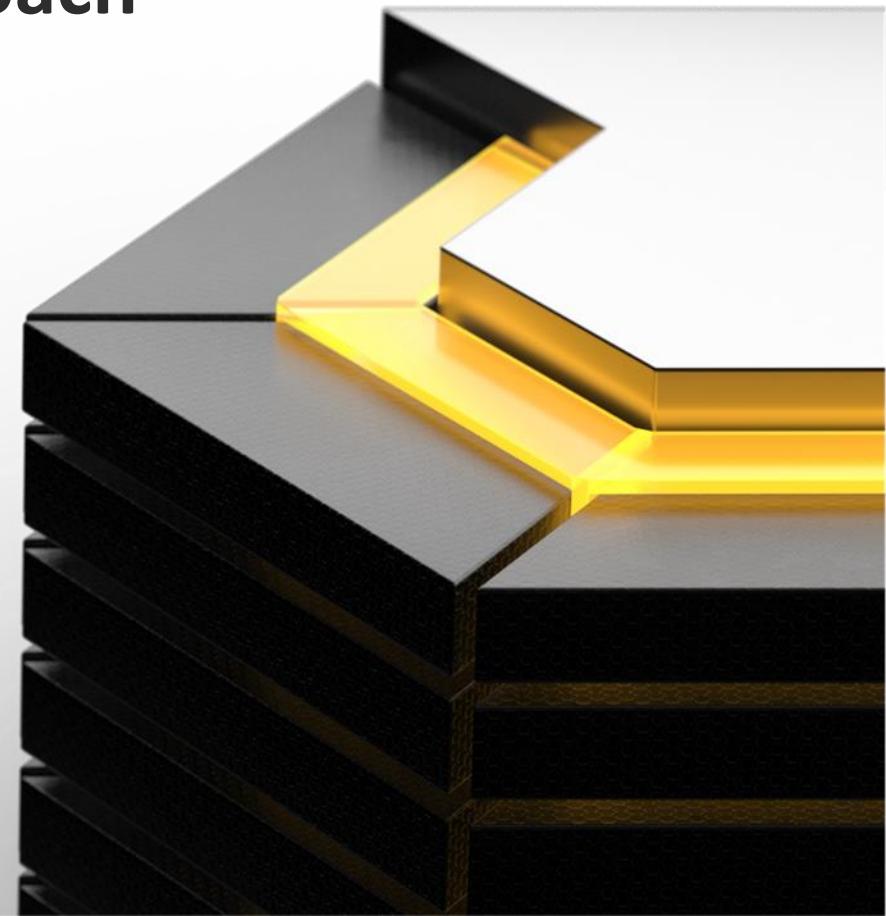
- Schematic symbols
- PCB footprint
- Supplier procurement info
- SPICE models



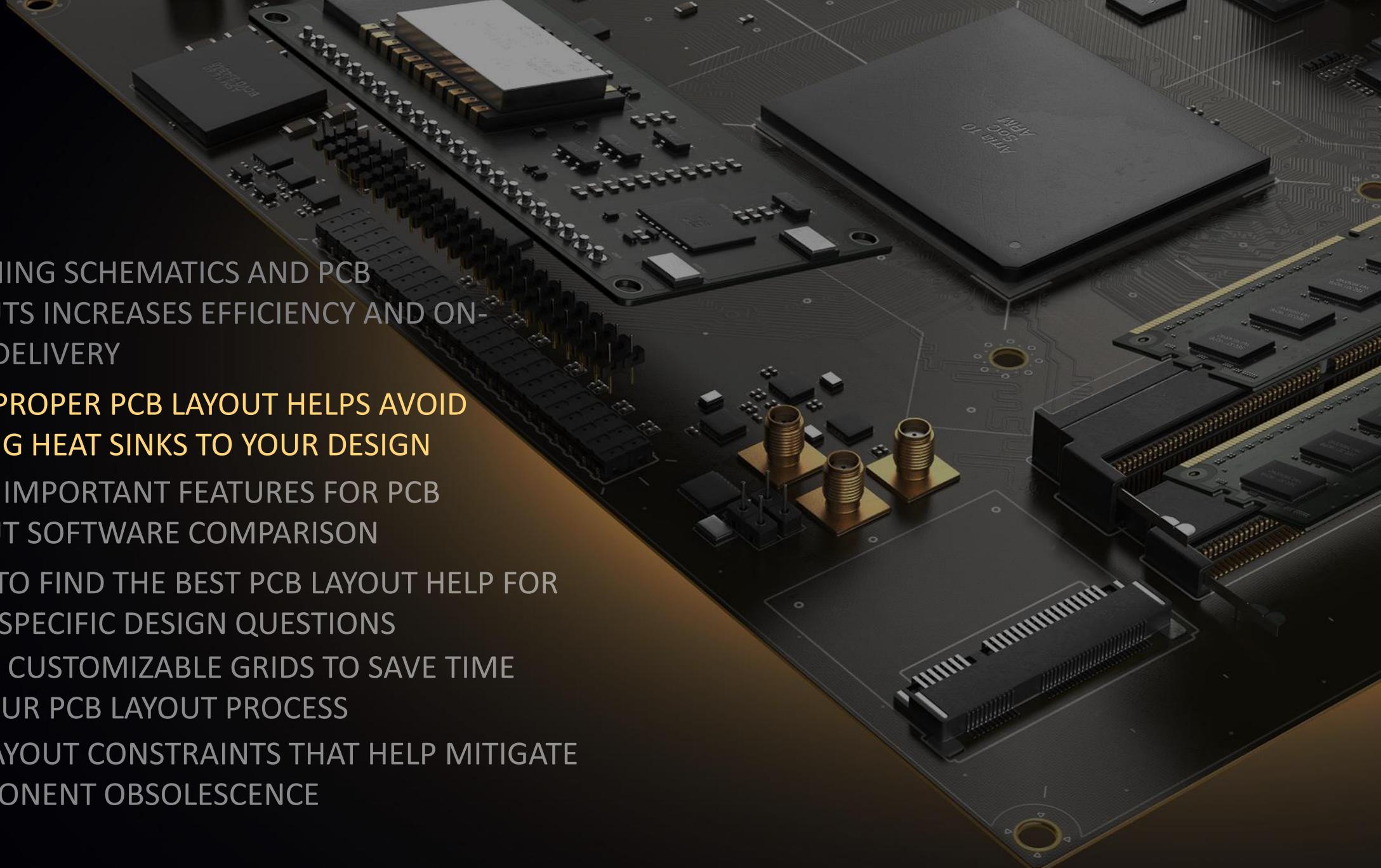
# Benefits to the Unified Data Model Approach

- **Simultaneous design:** Integrating schematics and PCB layouts through linking files and automated updates attacks both a big-picture and a more detailed approach
- **Time savings:** Taking necessary measures to effectively plan out schematics saves time in the long run
- **Money savings:** This approach is more cost-effective as it salvages time and labor devoted to correcting easily avoidable mistakes
- **Multiple team members:** This approach can help facilitate efficient communication of design changes between multiple team members
- **More time on design process:** Can help cut out time spent on administrative tasks that are not part of the product design process

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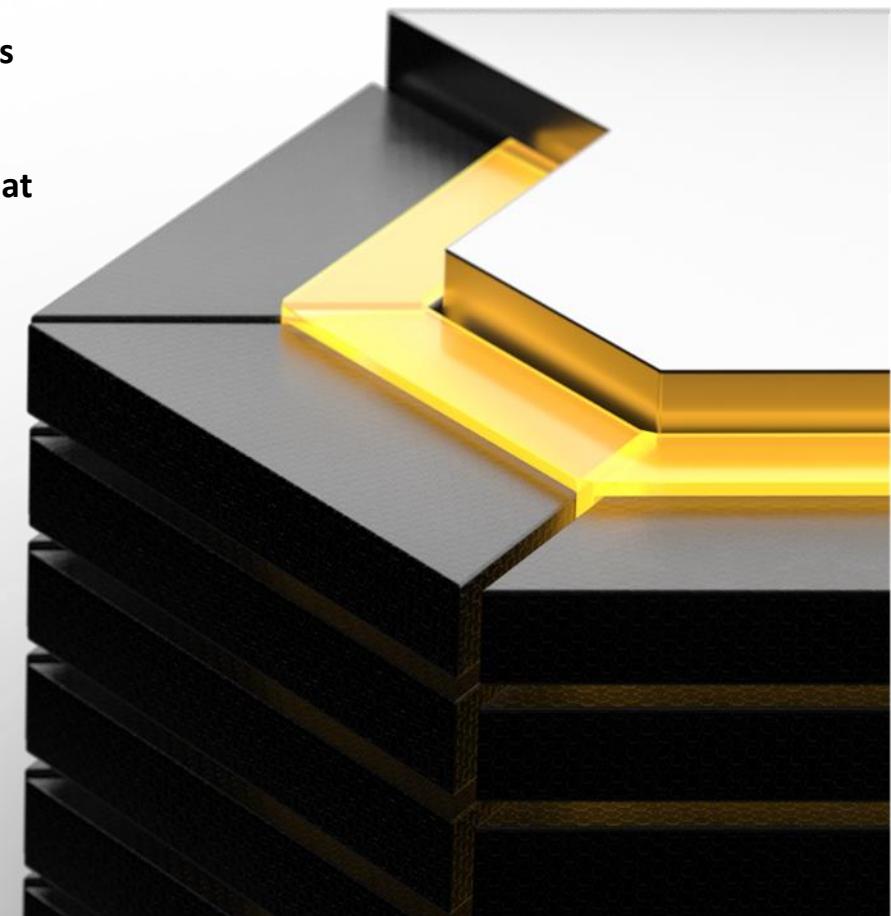
## 2. HOW PROPER PCB LAYOUT HELPS AVOID ADDING HEAT SINKS TO YOUR DESIGN



# Heat: a PCB's Worst Enemy

Excessive heat can kill components or drive them out of spec. However, it isn't always obvious when heat will be a problem. Heat mitigation issues can go undetected in testing, so it is important to design a PCB such that undesired heat transfer from external sources is not an issue. Since the location of PCBs varies depending on the device it is designed for, external heat sources can be located in three dimensions around your board. You should consider:

- **Isolating heat sources:** Keep heat generating subsystems, like the power supply, isolated in your layout so that they don't impact other components
- **Other PCBs:** There is a good chance nearby PCBs will have heat-producing or heat sensitive components on them
- **Physical parts:** Mechanical parts, wires and mounting frames may absorb and transfer heat from your PCB to other parts of the product
- **The enclosure:** Tighter spaces offer less opportunity for convective cooling and a higher chance of conductive heat transfer to other areas of sensitivity

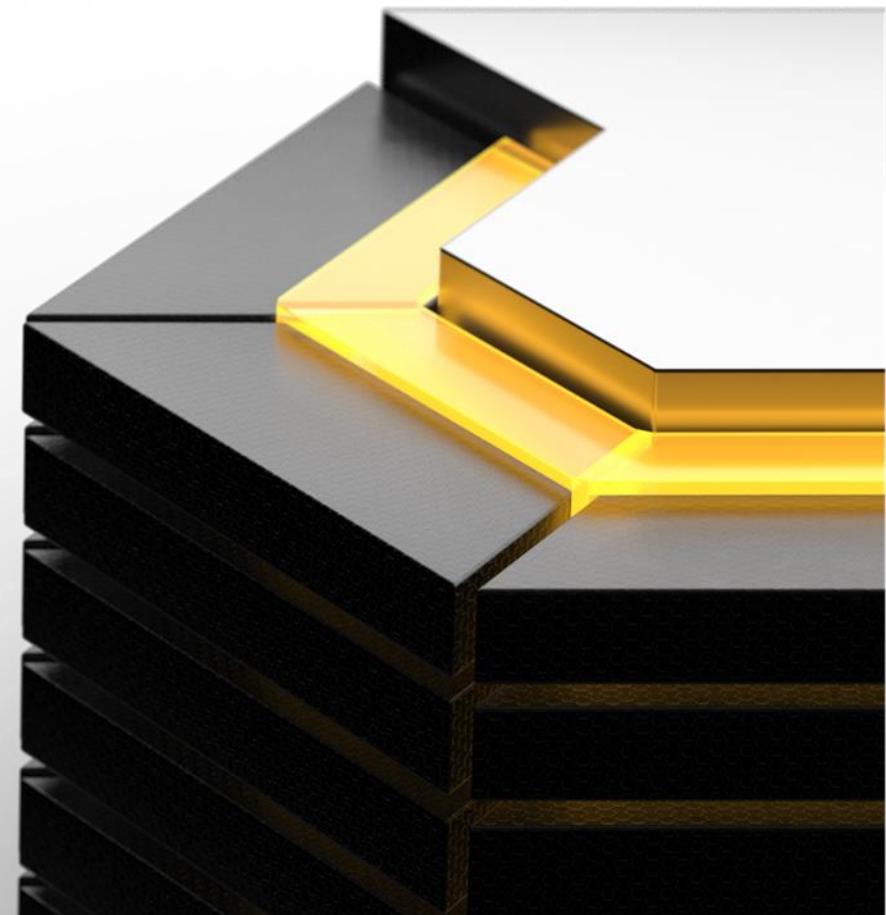


# Think in 3D When Designing Your PCB

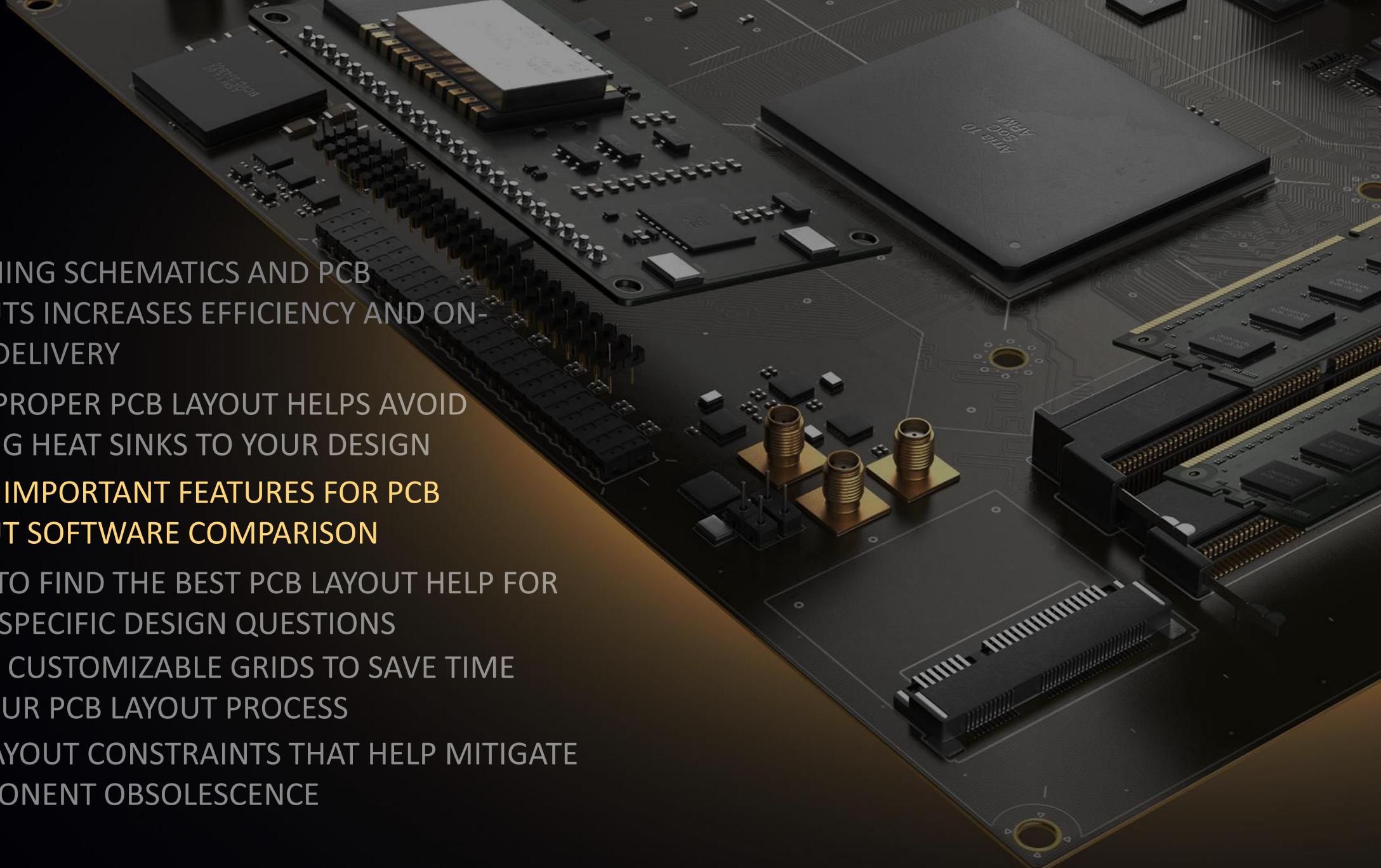
You are not designing your PCB in a vacuum and should always think of your design in three dimensions. Consider how your components will interact with each other and how they affect the space around the PCB.

- Review product design specs to see how your PCB is positioned in the product and which elements are close to it
- Make a note of anything that may be sensitive to heat before beginning your layout
- Consider how the PCB is positioned within the enclosure. Avoid putting heat-producing components where they will be unable to shed their heat if it is a tight fit

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# 3. MOST IMPORTANT FEATURES FOR PCB LAYOUT SOFTWARE COMPARISON

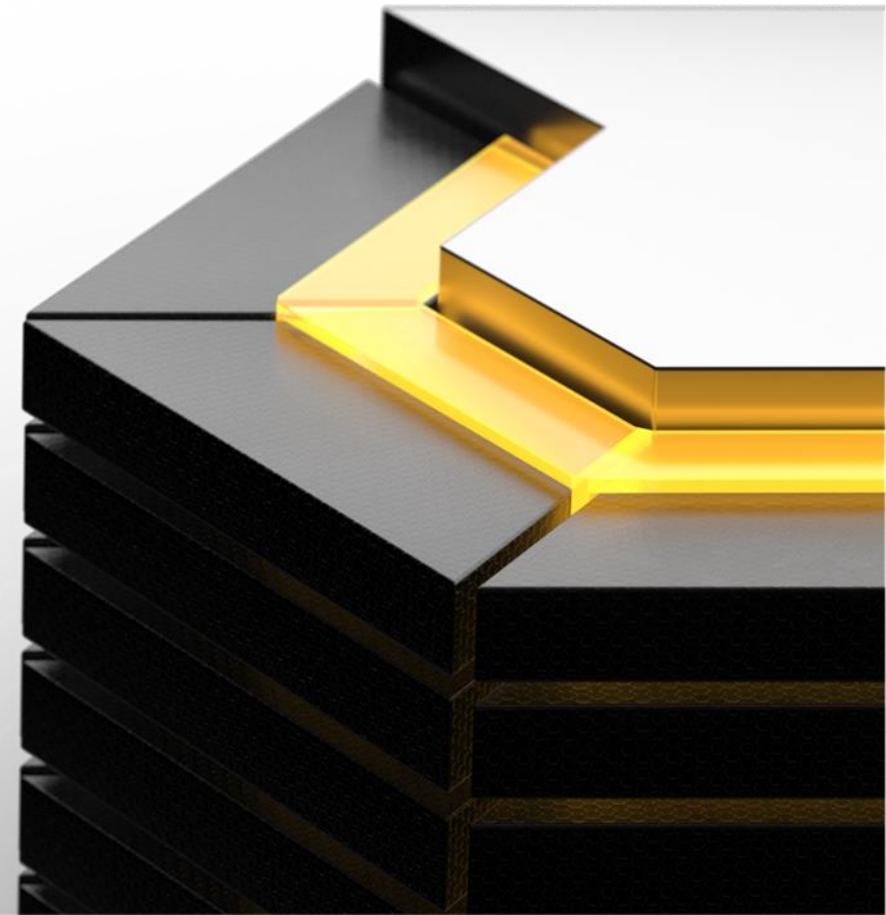


# Features to Look For

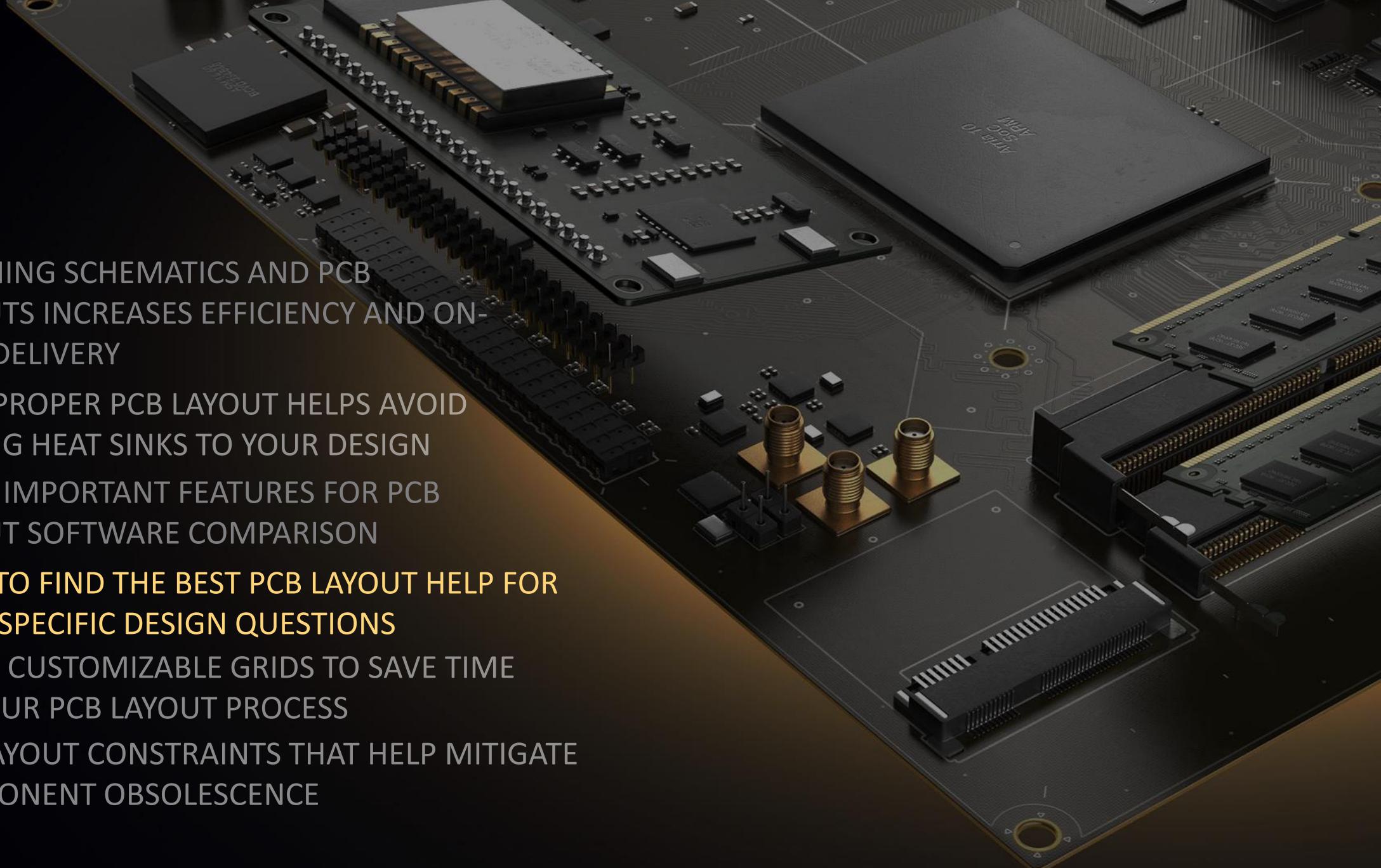
Here are a few things to look for when choosing your PCB design program:

- **Board size:** Lots of free tools have limited onboard space. You should ensure that your software supports enough space for your circuit
- **Advanced via design:** This is especially important if you are designing things like high-density interconnect boards or high-speed boards. You will need things like blind and buried vias, via-in-pads, microvias, and back drilling
- **Number of layers:** Most free and nearly free tools limit the number of layers you can use
- **3D modeling:** Important for importing models of your enclosure, generating models of your circuit, and seeing if they fit together
- **Power delivery network analysis:** It's easier to find a program that can do this for you instead of always relying on the power experts
- **Differential pair routing:** Your program should help you find the best path that routes differential traces to reduce length and preserve signal integrity

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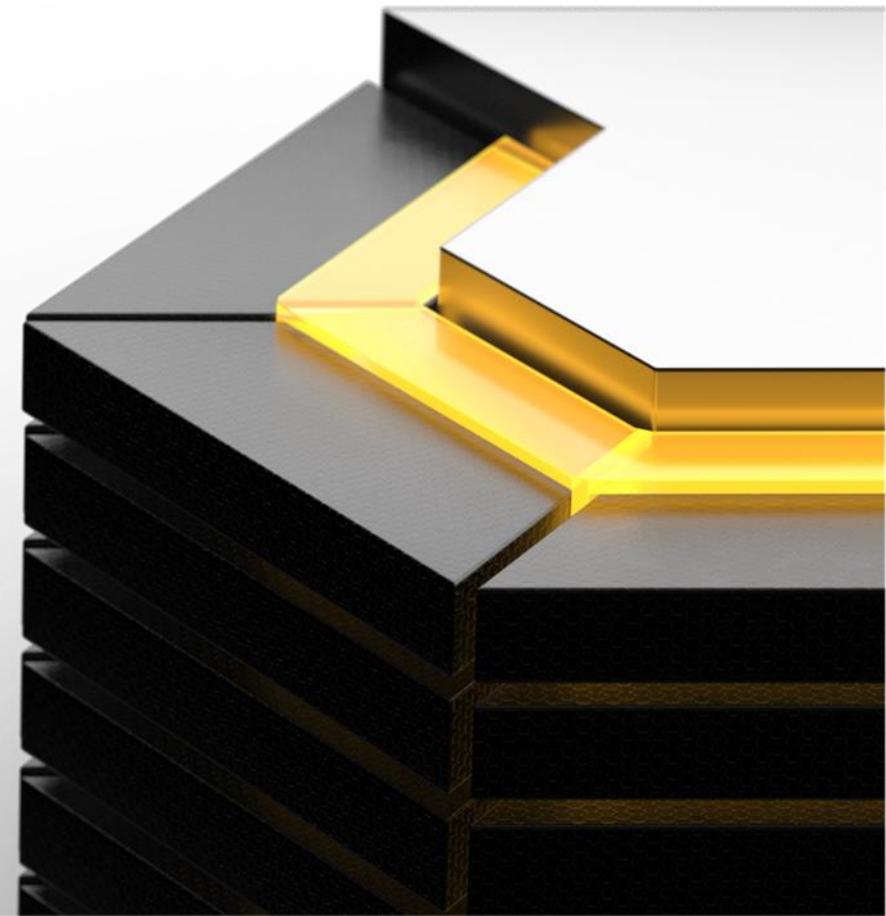
# 4. HOW TO FIND THE BEST PCB LAYOUT HELP FOR YOUR SPECIFIC DESIGN QUESTIONS



## Offline Resources

**At some point, everyone needs help with either a design, a CAD tool function, or a manufacturing query. There are helpful resources online and offline that designers can keep in their pockets to draw from. Some tips for getting help offline include:**

- Putting your pride behind you and reaching out to your professional network. There is no shame in asking for help
- Going to your friends, family, and non-professional associates for help too. Sometimes the solution to your problem is staring you in the face, and you need someone detached from the problem entirely to point out the errors in your thinking

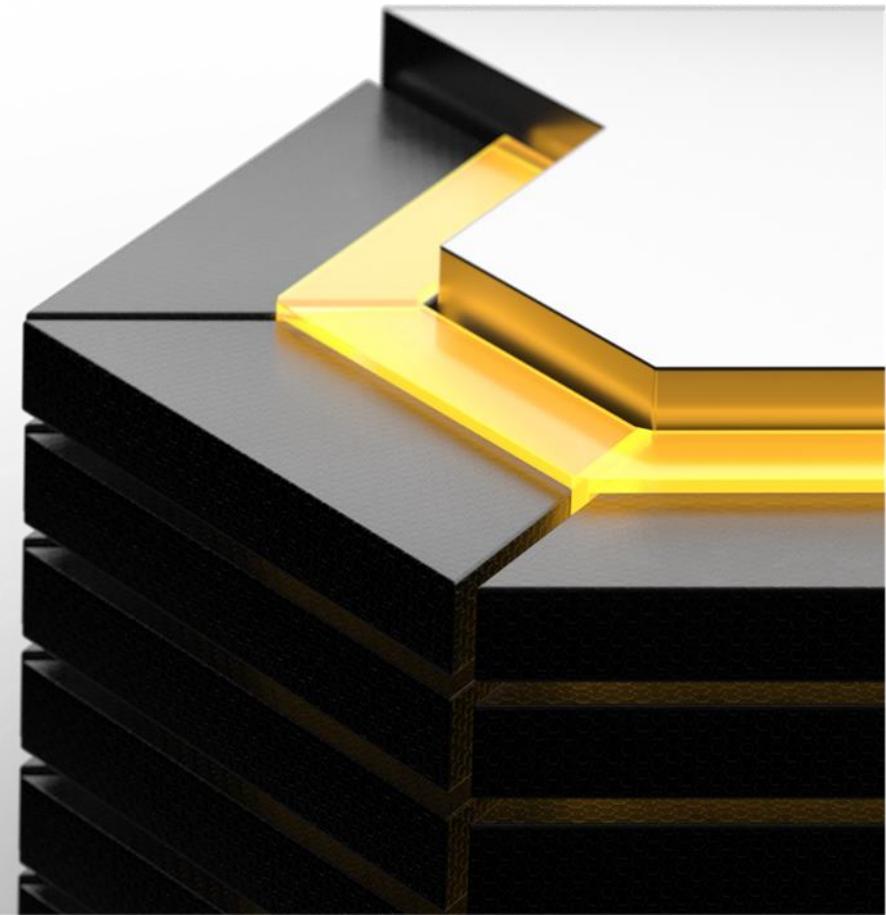


# Online Resources

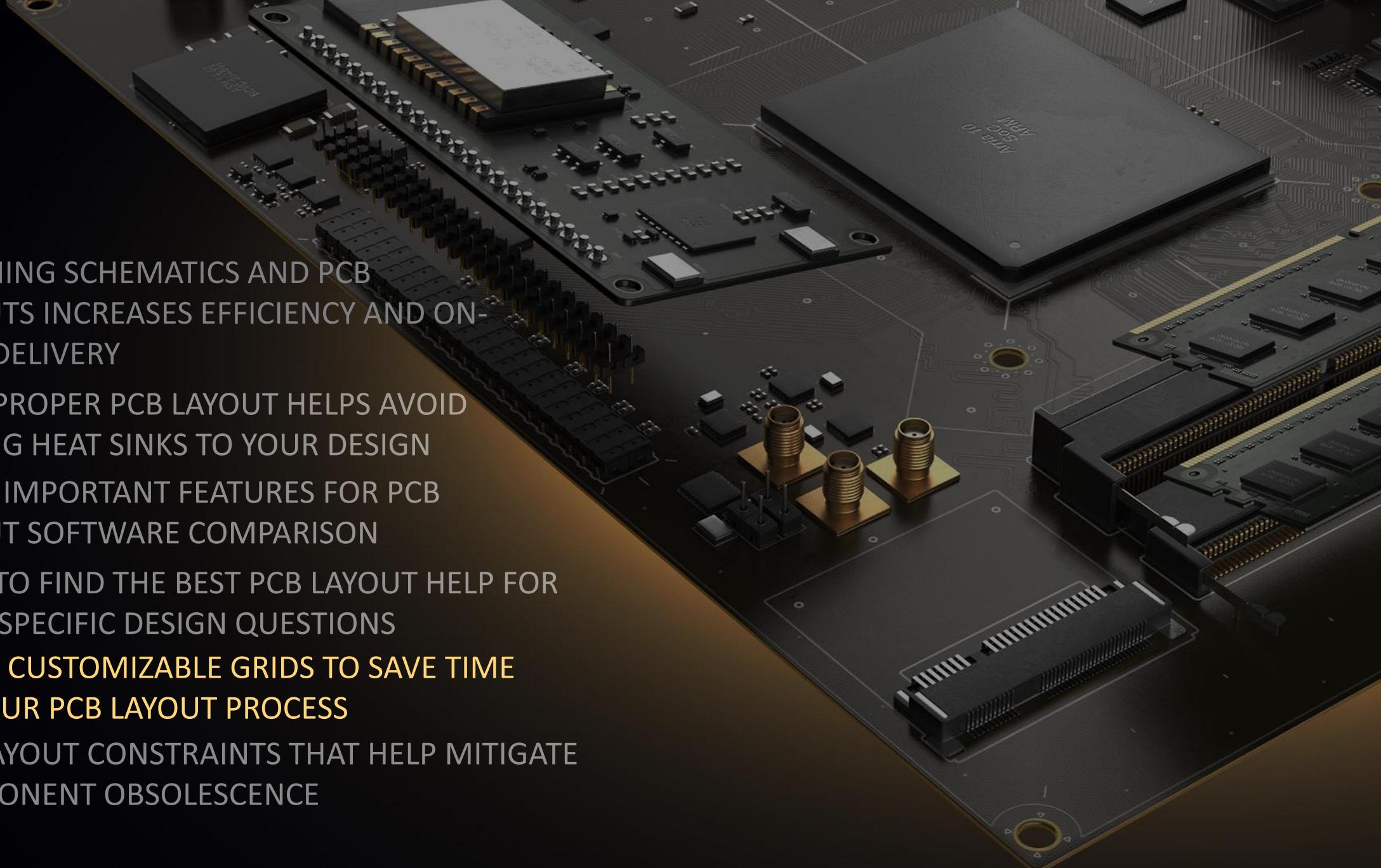
**Some resources and tips for getting help online include:**

- Making sure you're using specific search terms. Chances are, someone else has had this problem before and have shared it online
- Web forums are often a helpful resource, but beware of biased information. You may have to do some digging to get the information you need
- Blog articles and FAQs hosted on professional sites are great resources for getting started on your search for a solution. These are also reviewed prior to being published to ensure credibility
- White papers are some of the most thorough resources, though they may either be overkill or the perfect fit
- Use the support services offered by your CAD vendor, whether it's web-based, e-mail, or phone support

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# 5. USING CUSTOMIZABLE GRIDS TO SAVE TIME ON YOUR PCB LAYOUT PROCESS

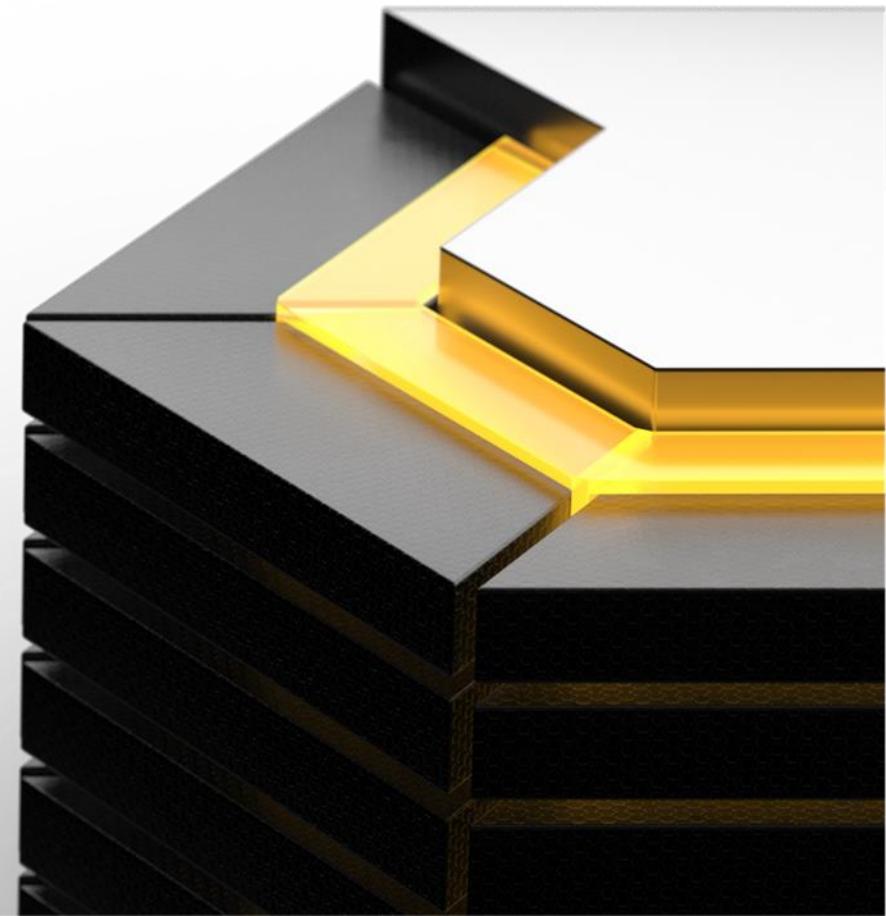


# Using Grids to Speed Up Design Process

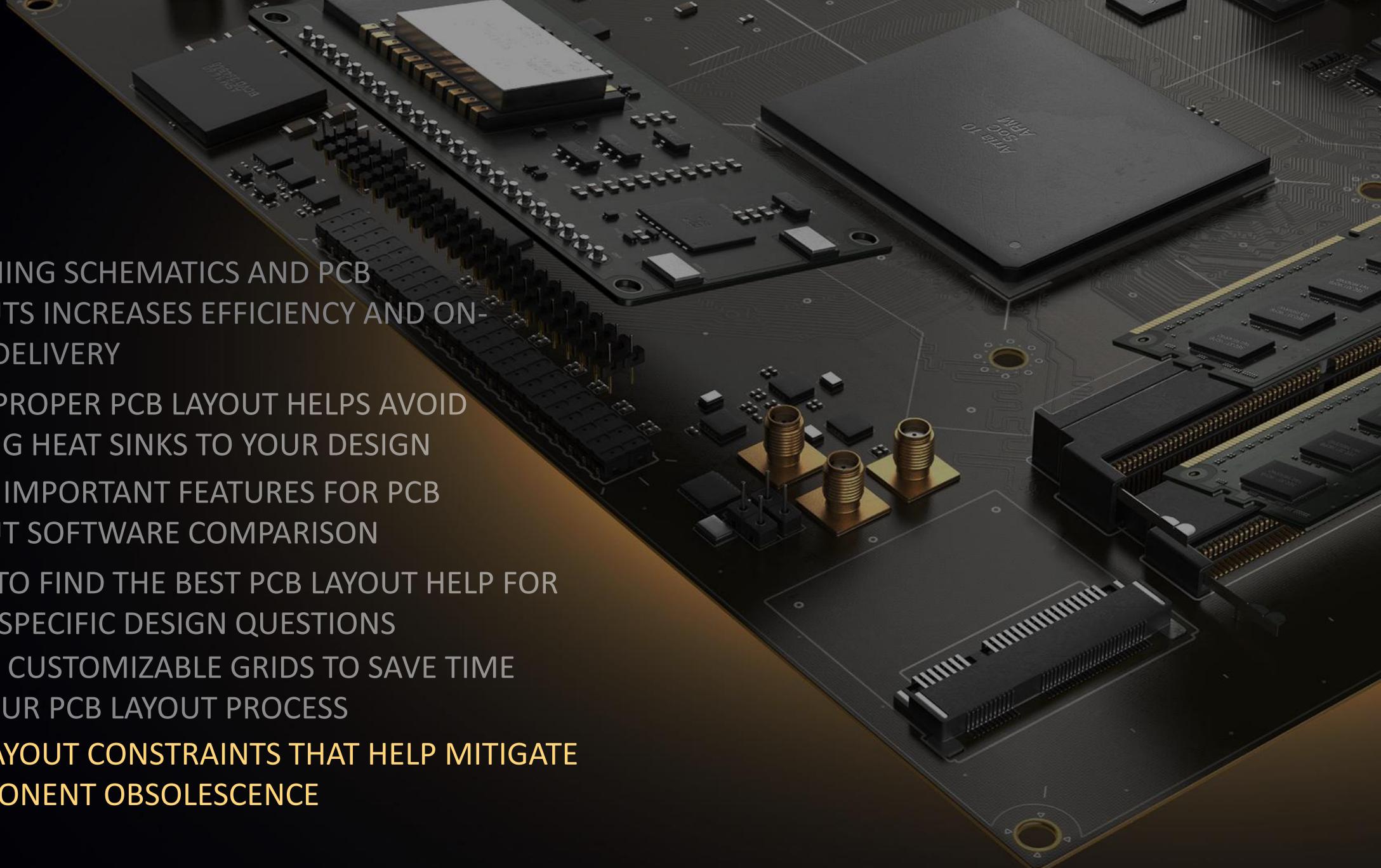
Relying on a single grid size can require frequent step change, unit of measure changes, and potentially even changes to the board origin location. However, customizable grids can help resolve this complicated and manual process.

- Components of a specific grid can help speed up the component placement and alignment process, helping to achieve optimal component density
- Since most component footprints are defined in millimeters, one or more dedicated, user-defined metric grids can be defined to accommodate component placement
- These grids can be specified to be active only when in component placement mode and to remain disabled and invisible when routing traces

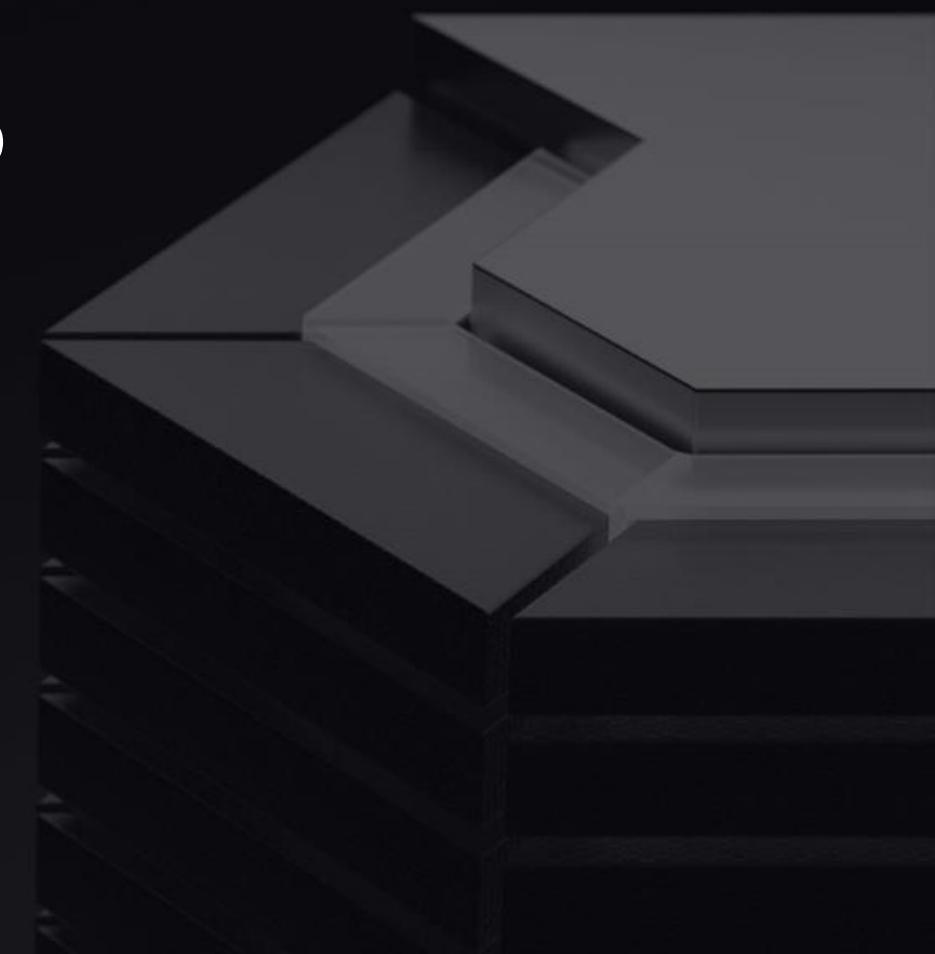
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# 6. PCB LAYOUT CONSTRAINTS THAT HELP MITIGATE COMPONENT OBSOLESCENCE

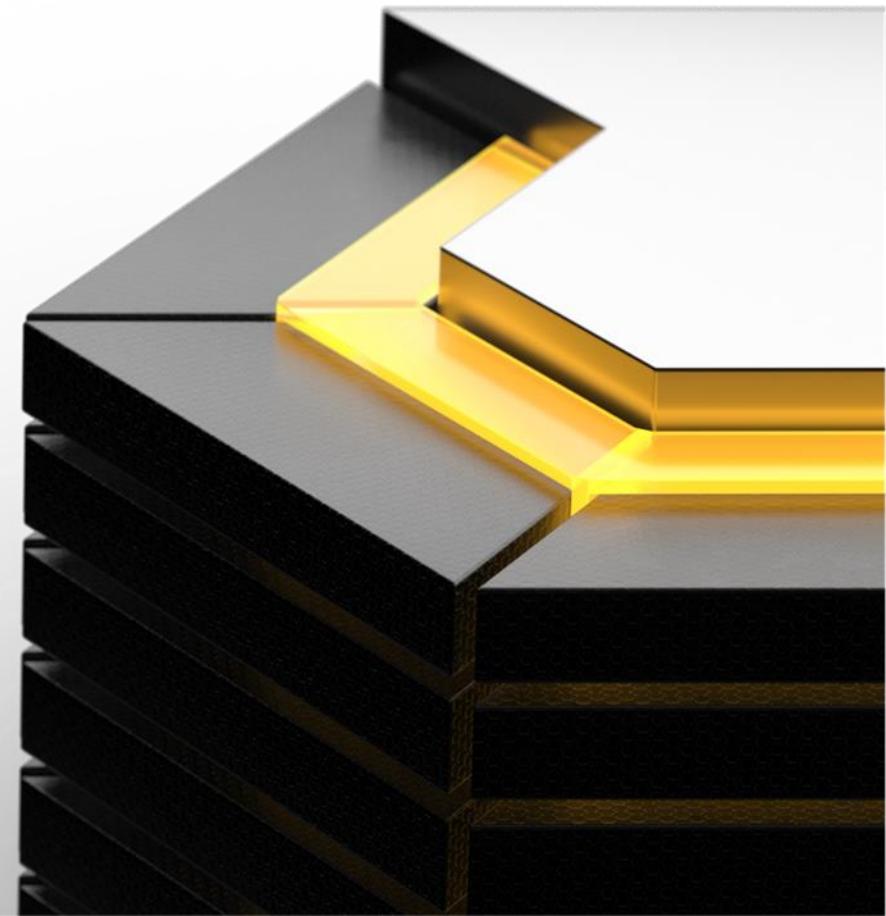


# Considering the Tradeoffs

Once a circuit design is finalized, finding the best way to use the allotted space for a layout requires making many decisions about tradeoffs which will have a large effect on the quality of the product throughout its lifetime. Some suggestions regarding these important considerations include:

- Plan on extra time for routing tight spaces; Small spaces require careful planning.
- Pay attention to cost vs. benefit with respect to time spent adjusting your layout.
- It is good practice to prioritize arranging components in a geometric fashion that reflects the functionality of the circuit rather than trying to save space.
- It is also good practice to ensure that your PCB's layout is flexible for redesign, especially if your design is meant to have a long lifecycle.

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Thanks for your attention!