



Product development is a complex and time-consuming process. Getting it right, the first time limits the risks of costly redesigns and delays in revenue opportunities. Mechanical Engineering covers the entire process of architecture, design, development, and production of complex products. It lies therefore, at the basis of all hardware design.

In the mechanical engineering step of the development process, all (physical) prerequisites are determined and documented. Factors such as thermal conditions, housing dimensions, and appearance are considered. Based on these prerequisites, AimValley's mechanical engineering team starts with the actual physical design of the circuit board in collaboration with the layout (primary placement). When this step is completed, it is up to our hardware engineers to start working on the board layout. Only when this layout is ready, will the mechanical engineer continue with the integration of the mechanical components of the system.

### Why Mechanical Engineering Matters

Mechanical engineering is one of the most important subdivisions of engineering and plays a vital role in AimValley's electronic designs.

From simple board designs to NextGen high-speed designs up to 800G, it all starts with the ability of our mechanical engineers to convert your high-level product requirements into tried and tested products.

At AimValley we develop our mechanical designs in step with the demand for smarter products – we prioritize innovation & sustainability.

### Applications

- High-Speed Digital Design
- High-Speed Backplanes
- Smallest Form Factor Design
- Harsh Environments

## Design considerations

Whether we are involved in turnkey development of your NextGen product or assist in design modifications of your existing products, many factors drive the requirements for a mechanical design. Here are some of the factors that our engineers take into account.

### Thermal Design

When designing for the mechanical housing of a product on system level, we consider not only how a chip, PCB and components (re)act in an enclosure, but also how this enclosure (re)acts within the overall system.

Cooling and Airflow are both components of the thermal design and address items such as:

- Chassis airflow and direction, ensuring that the circuit board, mounted components, and Radio Frequency-shielding do not create airflow 'dead spots'.
- Ensuring that module cavities are of sufficient size and line-up with the overall system cooling design.
- Passive cooling, achieving sufficient cooling, even when minimal/no airflow is generated.
- Heatsink design, where power is drawn away from components

### Heat/Fire-resistant Design

The ability to operate during certain levels of fire and not act as additional fire load, for example as required in NEBS3 applications.

### Kinematics Design

The arrangement, velocity and size of the moving parts in the system determine the successful operation of the end product.



### Strength & Ruggedness Design

Sufficient mechanical strength and ruggedness, are especially important where the intended location of the product indicates possible direct impact from vibrations, shock and earthquake. These aspects are considered for the entire product life-cycle, from operational use up of the work to packaging and transportation. Specific attention is given to environmental factors, such as the operating temperature range, moisture, humidity, and exposure to direct sunlight.

### Interoperability Design

The ability for removable modules to connect with existing connectors, including hot-swappable modules that provide redundancy and serviceability.

### Electromagnetic Emissions

Mechanical housing designs act as a Faraday cage when electromagnetic emission shielding is required. Determining the extend of the effect, is key to the design.

One of the most important aspects is the balance between thermal behavior and EMC-shielding. As components become smaller in size but dissipate more, this aspect of the mechanical design is becoming more complex.

Dealing with Next Gen high-speed designs while at the same time creating an EMC-boundary and ensuring sufficient component cooling, makes the life of a mechanical engineer complex and challenging.

### Mechanical Engineering & Factory Introduction

Because of the nature of the work, our mechanical engineers have a close working relationship with our Factory Introduction team. Both are focused on the manufacturability of the end product in the factory. The interworking of both teams reinforces optimization. Both teams look at the labor intensity considered, the different types of components applied in the design, and the sheer number of components used. Saving you both time and money!

### AimValley's Mechanical Engineering Expertise

- High-Speed digital transmission
- Optical and electrical interface design from 2 Mb/s up to 800 Gb/s and beyond
- Optical interface design for Gigabit Ethernet
- Single board and embedded CPU system designs based on NXP processors & ARM CPUs
- Large system backplanes with multi-layer mixed signal technology and complex stacks
- Optimized electromagnetic & environmental design
- Mechanical stress, vibration and shock resilience analysis
- Compliance testing and certification
- Power Supplies
- Thermal Dynamics



## Why AimValley?

AimValley is a reliable provider of Factory Introduction since 2003, delivering solutions for:

- High-speed data processing applications
- Complex FPGA-based accelerated systems
- High-speed, low power hardware equipment
- Robust embedded software
- Early adopter of Acceleration Technology

## Joint Development

Based on your requirements, we design solutions and ways to jointly implement them (complete products or only part of the development).

## Fast-Track Development

Taking advantage of re-usable designs and IP enables us to develop your solution on a fast track.

## Innovative Solutions

AimValley is continuously looking for alternative and optimized ways of designing high-tech products. We have an extensive patent library.

## Phased Approach

Our design process is structured to successfully take your product from concept to production and flexible enough to allow you to leverage any of our services on a standalone basis.

## Certification

AimValley is experienced in certifying products or systems, such as EMC/ESD, CB and CE.

## Life Cycle Management

We offer life cycle management for the design and/or the product. This includes maintenance and component obsolescence management.

## Quality Focus

- Outstanding track record of on-time delivery
- Best in Class Designs – Time, Budget & Quality
- ISO9001, ISO140001,
- EcoVadis 2% scoring since 2018

AimValley understands the full complexities as well as the subtle nuances of designing great edge solutions. We excel in building complex systems that are part of your product in the fields of Industry 4.0, Big Data, HealthTech and Transportation markets. Our combined skills represent all the important aspects required for the development of end-to-end systems