



**FPGA**

**CASE STUDY  
FPGA**

**DELIVERED TO  
Tata Power Company Limited**



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Aurelius



## **FPGA training delivered to client tata power company limited**

**Client: Tata Power Company Limited**

**Industry: Defence**

The Tata Power Company limited is an Indian national electric utility company which is based out of Mumbai Maharashtra and is a wholly owned subsidiary of the Tata Group. The company's core operations lie in the generation transmission and distribution of electricity and has a electrical generation capacity of about 10,577 MW and is thus India's largest integrated power company. Tata Power has its operations in, India, Singapore, Indonesia, South Africa and Bhutan. The company has its thermal power stations in Mumbai, Mundra, Jojobera, Maithon, kalinagar, Halida and Belgaum. They also have hydro stations and wind farms spread across at various locations in the nation. The company has also executed several overseas projects in the Middle East, Africa and South East which includes Jebel Ali G station in Dubai.

The organization also has a strategic engineering division which is engaged in the defence system and engineering for over four decades now. The organization has been working with MoD and laboratories which provides and solutions for the various defense requirements of the country.



## Technology: FPGA

### Domain: Embedded design and programming

**FPGA** or Field programmable gate array are essentially designs for integrated circuits which can be configured by the user even after the designing is completed. The FPGA configuration is mostly specified in the hardware description language and is more or less similar to using application specific integrated circuit.

FPGA circuits consists of programmable logic blocks which have a hierarchy of reconfigurable interconnects which allow the block to be essentially wired together while performing the tasks. The various logic blocks are configured as per the complex combinational functions to be performed such as simple AND and XOR gates.

The current FPGAs being used are large resources of logic gates and RAM blocks which can implement complex digital computations. FPGA comes with the integrated advantage of employing very fast input output rates and bi-directional data buses to verify the correct timings of the valid data within the setup time and hold time. FPGAs can have both analog and digital functions such as slew rate.

Recently, FPGA has been working entering the domain of coarse grained architectural approach by combining the logic blocks and the inter connects of traditional FPGAs using embedded microprocessors and various related peripherals in order to create a complete “system on a programmable chip.” Organizations such as Microsoft use FPGA in order to accelerate high performance computationally intensive systems as the FPGA delivers a very high performance per watt of energy usage. A good example is the data center of Bing Search Engine which uses this concept.



## **Challenges Faced By the client:**

Tata Power working in the domain of power generation and development was experiencing increased electronic and data computation requirements as their power houses and operations centers were increasing in size and number. With a steep increase in the computational needs of speed, accuracy and robustness coupled with the growing size of the organization led to the requirement of FPGA to be integrated into their embedded systems to provide better speed accuracy and robustness in the computation capabilities of the organization's operations in the domain.

Before Aurelius came into picture, the organization's workforce had very basic knowledge and understanding of FPGA design and Hardware and in order to implement FPGA, required not just in-depth and comprehensive knowledge in the domain but also, hands on practical knowledge of the domain so that they can take care of the finer details and issues of the design and development process and consequently deliver a complete product which is robust and works effectively. FPGA requires a lot of experience to be implemented and executed without any hassles and troubleshoot when and if required. This is not possible from the get-go for organizations who begin with FPGA from scratch. Hence, the client organization needed a guide who can provide the valuable experience and finer details to the client organization which in turn will deliver the organization to achieve greater heights in the domain of FPGA development operations, integration and execution. Considering the industrial requirements and domains the client worked, it was also needed that the guidance provided was as per their specific requirements and the subject matter expert delivering the guidance was also adept and had knowledge in the very domain that the client operates and provides services in. The major challenge was integrating power electronics and with the principles and concepts of FPGA so that a robust and highly effective applications can be developed.



## Why Aurelius

Aurelius Corporate Solutions in the capacity of being the problem solvers of the industry took up the task of understanding the exact requirements and needs of the client by conducting an extensive and comprehensive of the client's industry and their operational procedures. Based on the data obtained and analysis performed, the first step taken was to search for the correct subject matter expert who can understand the operational procedures of the client's work and the end requirements leading to those operations. Aurelius owing to its deep rooted global industrial ties was able to perform a global search for the correct subject matter expert of the same industrial expertise as the domain of work of the client.

The next step was to develop a consultative insourcing solution which can inculcate the correct mix of theoretical understanding and practical hands-on knowledge in the client's workforce.

The insourcing solution was constructed for a two-day duration and was to cover both the software and hardware part of the FPGA embedded programming and design with conceptual clarity and hands-on experience as delivered by the subject matter expert. The solution included extensive comparison with ASIC and CPLD along with integration of external components such as micro controllers, processors, PCIE switches, etc. Application oriented selection for FPGA/CPLD was also explained to the participants for their benefit.

On the support front, Aurelius was responsible for providing complete onshore and offshore support to the client since the beginning of the solution till the end and also, post solution support for updates and upgrades. With Aurelius, Tata Powers gained the advantage of legacy integration where the knowledge resources and information was guaranteed to be of the global level and applicable on the global industrial scale. The solution was delivered in an extremely smooth manner with least hassles and the knowledge transfer took place in a manner that



the participants were able to inculcate and build their own fundamentals in the tool.

## **Solution and Post Solutions Benefits**

Completing the solution, the workforce/participants were able to inculcate industry level expertise in FPGA and were able to directly begin working and architecture FPGA systems which can be used in their organization. Owing to the minimum possible buffer/self learning time, the organization was able to break even on the investment on the solution within a few weeks of the solution completion and now had a workforce well adept in the knowledge and information of FPGA with hands on and practical knowledge too. With a workforce trained in the technology and tools, the organization is now experiencing increased revenue generation and profit percentages with the increased ability of the workforce to perform the operations in a faster and more accurate manner using FPGA. The data suggests that they are experiencing over 30 percent increase in their revenue generation and moving towards improved production and operation capabilities.