

# Temporal pulse shaping, dominant parameter in reducing welding defects during high power fiber laser welding

**Mohammed Naeem**

*Prima Power Laserdyne, 8600 109<sup>th</sup> Avenue, #400, Champlin, MN 55316 USA*

[mohammed.naeem@primapower.com](mailto:mohammed.naeem@primapower.com)

High power laser welding requires the optimization of many parameters depending on the thermo physical properties of the material, the environment, laser and its process parameters i.e. average power, peak power, pulse duration, pulse energy, pulse repetition rate, power density and **temporal pulse shaping**. Depending on the material composition and weld joint requirements (i.e. mechanical and metallurgical properties) various pulse shapes can be used to improve the weld quality in terms weld porosity, solidification cracking etc. Pulse shaping is very beneficial, when welding:

- High carbon steels
- Crack sensitive alloys
- Dissimilar melting points materials
- Coated materials
- Painted materials
- Contaminated materials
- Powder metallurgy parts
- Highly reflectivity materials

Work has been carried at Prima Power Laserdyne to develop various pulse shapes to produce crack and porosity free welds in materials used in aerospace, automotive etc. Some of the results from this study will be discussed.