Universidad del País Vasco Euskal Herriko Unibertsitatea

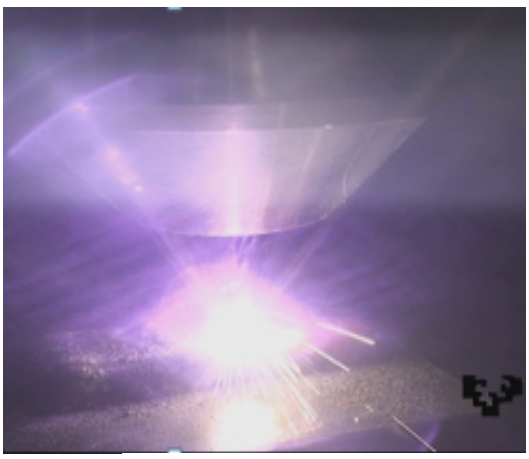
MASTER IN MECHANICAL ENGINEERING

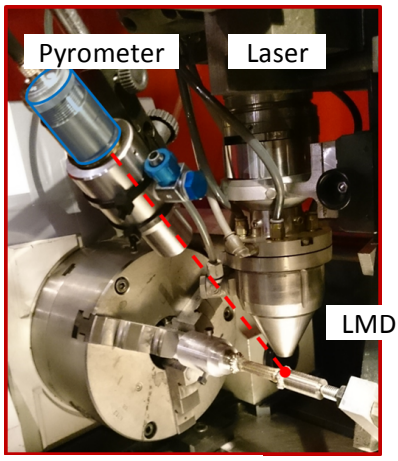
Master's Thesis Proposal
Academic Year: 2017-2018

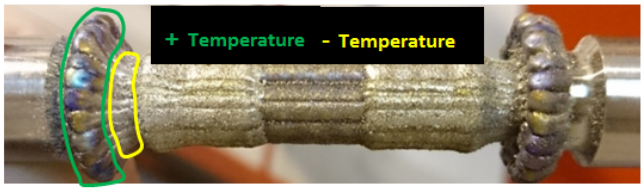
Title:
Temperature monitoring in Laser Material Deposition process

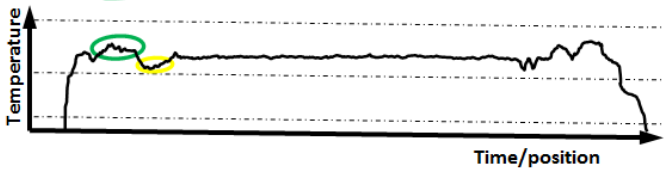
Laser Material Deposition (LMD) process is based on the melting of a substrate and a material injection (usually in powder form) into the melt pool. The process is used as an additive manufacturing process for complex structure manufacturing or high added value part repair. LMD process is usually carried out with a constant power and powder mass flow but, due to part geometry variation, the melt pool geometry can change becoming larger at corners or near the edges.

The proposed project is focused on measuring the temperature of the melt-pool with a pyrometer and control the laser power in order to process the part at a determined temperature, instead a fixed power.









Universidad del País Vasco Euskal Herriko Unibertsitatea

MASTER IN MECHANICAL ENGINEERING

Master's Thesis Proposal
Academic Year: 2017-2018

Title:

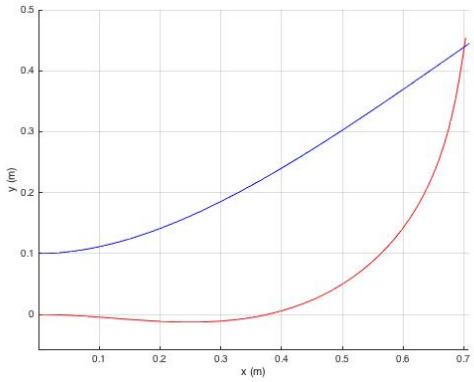
Parallel Continuum Mechanisms: Dynamic Simulations in Real-Time

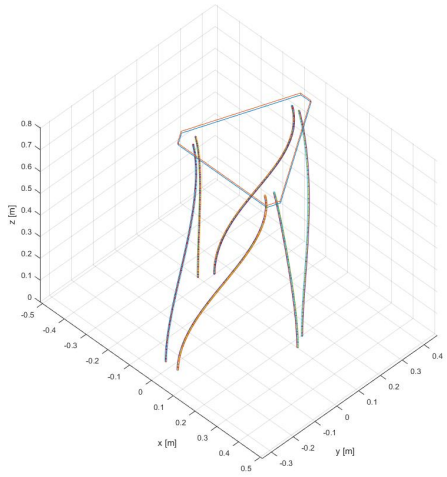
Parallel manipulators based on rigid links have had a continuous evolution towards industrial applications over the last decades. There are several successful examples of parallel kinematic machines being used extensively in industry, mainly in manipulation tasks, high precision motion generators, simulators, and so on. Regarding flexibility, typical concern is about the small deflections due to loads and their effect on accuracy or dynamic behaviour.

Parallel continuum mechanisms are those closed-loop mechanisms that exhibit large nonlinear link deflections by design. In some sense is an extension of compliant mechanisms to macroscopic dimensions. Such mechanisms have the potential for being devices with a safe interaction with humans in manipulation tasks in industry.

Unfortunately, the solution of position, kinematic and dynamic problems involves computational inefficient procedures that still have to be researched further to become applicable to real time use.

This research will seek the answer to the questions: which is the method we should use to solve those problems to be implemented to control spatial parallel mechanisms? Which is the cycle time we can use? How well simulations match experimental results? How can we handle vibrational effects?





Universidad del País Vasco Euskal Herriko Unibertsitatea

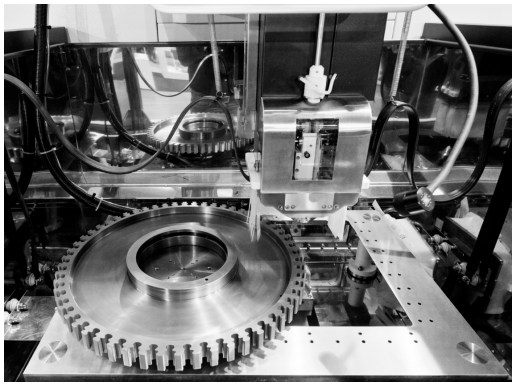
MASTER IN MECHANICAL ENGINEERING

Master's Thesis Proposal
Academic Year: 2017-2018

Title:

Part signature and continuous process monitoring in advanced manufacturing of aero-engine parts

Quality of aero-engine components is subject to strict controls. A large number of tests are carried out after machining, when the part has been completely manufactured. If some defect is observed at that stage the part is rejected, and therefore the process is uneconomical. In order to reduce costs, continuous monitoring of the machining process is proposed so that problems can be detected during manufacturing, and corrective actions could therefore be applied on real time.

In this project a new software tool will be developed and calibrated so that instantaneous events that may occur during machining can be detected. This new technology will be applied to an advanced machining technique, namely Wire Electrical Discharge Machining (WEDM). WEDM is used for machining aerospace alloys with very strict tolerances and surface finish, such as the disc fir-tree shown in the photograph.

The Master Thesis involves becoming an expert in WEDM technology, Matlab programming, and decision-taking in setting up thresholds for process monitoring. The Master Thesis will be carried out in the new *Center for Advanced Aeronautic Manufacturing - CFAA*, located in Zamudio (about 15km from Bilbao).