Σ smart
advanced manufacturing

LOFSMol

Low and Flexible Sheet Metal Forming for Low Volumes

ORGANISATION PROFILE

TECNALIA is the largest center of applied research and technological development in Spain, a benchmark in Europe and a member of the Basque Research and Technology Alliance. We collaborate with companies and institutions to improve their competitiveness, people's quality of life and achieve sustainable growth. Our mission is to transform technological research into prosperity.

Some figures

1.464 employees	+9000 client companies	€120M income
287 PhDs	73% SME clients	47% private income
827 patents in portfolio	14 invested NTBCs	

Committed to smart, flexible and sustainable manufacturing through digitalization, automation and eco- efficiency as drivers of the change that transforms materials and manufacturing processes.

· Industry 4.0
· Advanced machines, automation and robotics
· Decarbonisation of industry and the circular economy
· New materials and manufacturing processes
· Additive manufacturing

PROPOSAL INTRODUCTION (I)

Vision:
Low cost and flexible production of single/few units of sheet metal parts through **a modular and accurate dieless ISF (Incremental Sheet Forming)** concept.

Motivation:
Delivering **single units or small batches of sheet metal parts** is a problem that remains yet poorly solved. For prototyping purposes often approximate versions of the design are made by cutting, bending and welding. When the exact geometry is desired, options are either a tooling-based process (ex. drawing) or 3D printing (e.g. SLS) which both lead to **high price** parts and, in general, **slow response** as well.

ISF is a non-conventional forming technique particularly suitable for low volumes requests. Basically, it consists in the localized and progressive deformation of the sheet using a punch-type forming tool which follows an NC programmed toolpath. It offers high flexibility and low cost because of the equipment involved (3 to 5 axis machining system) and tooling skipping.

Despite the potential of the technology, ISF parts still lack the geometric accuracy requested by more demanding applications and there is no organized specific process knowledge which makes difficult a technology transfer to the industry.

Content:
- Identification of geometric features
- Testing campaign and data generation
- Geometric error modelling, testing and evaluation
- Toolpath optimization for geometric accuracy
- Modular forming strategies and their integration
- Automation of toolpath modules generation and their connections

PROPOSAL INTRODUCTION (II)

Expected outcome:
1. AI-based predictive model of parts geometric deviation
2. Geometric deviations solver for tool path correction
3. Geometric features catalogue with automatic programming modules

Impacts:
- Production costs reduced for low volumes/single parts
- Agile delivery of low volumes/single parts
- Shorter ramp-up for serial production
- Parts accurate to the final design
- Ease of technology adoption
- New technology/products portfolio

Schedule: 2-years project starting by early 2024

PARTNERS

Current Consortium:

Tecnalia (Es)   Project lead, ISF technology, automatic NC programming

The University of Liverpool (UK)   Geometry representation, AI

Partner search:

End-users   Sheet metal parts manufacturers (automotive, appliances, aerospace, creative architecture…), machinists or any other potential user of the technology

Technology providers   Machine-tool builders, robot manufacturers
                                           CAM automation

Countries:
UK, ES, FR

If the proposal is of interest for you do not hesitate to contact us. We are open to suggestions!

CONTACT INFO

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