



DELIVERABLE 2.1

REAL-TIME FULLY OPERATIVE REDUCED ORDER MODELS

Grant Agreement number: 723082

Project acronym: STREAM-0D

Project title: Simulation in Real Time for Manufacturing with Zero Defects

Project coordinator: INSTITUTO TECNOLÓGICO DE ARAGÓN

Call: H2020-FOF-2016

Topic FOF-03-2016: Zero-defect Strategies at System Level for Multi-stage Manufacturing in Production Lines

Project start date: 01/10/2016

Duration: 42 months

Reporting period: From 01/10/2017 to 01/4/2019

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723082

Disclaimer

This document contains material, which is the copyright of the STREAM-0D consortium, and may not be reproduced or copied without permission. All consortium partners have agreed to the full publication of this document. The commercial use of any information contained in this document may require a license from the proprietor of that information. The reproduction of this document or of parts of it requires an agreement with the proprietor of that information. The document must be referenced if used in a publication.

© 2016 - 2020 STREAM-0D Consortium

Partners

No.	Name	Short name	Country
1	INSTITUTO TECNOLÓGICO DE ARAGÓN	ITAINNOVA	Spain
2	FERSA BEARINGS	FERSA	Spain
3	ZF TRW – LUCAS VARITY GmbH	TRW	Germany
4	STANDARD PROFIL	SP	Spain
5	LABORATORY FOR MANUFACTURING SYSTEMS AND AUTOMATION	LMS	Greece
6	ECOLE CENTRAL NANTES	ECN	France
7	INTEGRATED ENVIRONMENTAL SOLUTIONS LIMITED	IES	UK
8	STAMTECH SRL	STAM	Italy
9	DAY ONE SRL	DAY-ONME	Italy
10	CENTER FOR TECHNOLOGY RESEARCH AND INNOVATION LTD	CETRI	Cyprus

Document Information

Project	STREAM-OD
Work Package	2
Deliverable n.	2.1
Title	Real-time fully operative ROMs
Responsible beneficiary	ITAINNOVA, ECN
Involved beneficiaries	
Type¹	R
Dissemination level²	CO
Due delivery date	31-12-2017
Actual submission date	10-4-2018

¹ **Types. R:** Document, report (excluding the periodic and final reports); **DEM:** Demonstrator, pilot, prototype, plan designs; **DEC:** Websites, patents filing, press & media actions, videos, etc.; **OTHER:** Software, technical diagram, etc.

² **Dissemination levels. PU:** Public, fully open, e.g. web; **CO:** Confidential, restricted under conditions set out in Model Grant Agreement; **CI:** Classified, information as referred to in Commission Decision 2001/844/EC.

Executive Summary

This deliverable describes the Reduced Order Models that have been developed for each end user application and that will be integrated in the production lines in order to predict in real time the main KPIs. A Reduced Order Model has been developed for each application. In the bearings case, a ROM has been developed that is able to predict the dimensions of the cone and cup as a function of the temperature. For the extruded seals, the ROM is able to predict the die profile shape, temperature, vulcanization and foaming degrees as a function of the extrusion velocity, infrared oven power, microwave oven power and gas oven temperature. For the brake booster reaction disc, the ROM is able to predict the 3DK characteristic curve (output force vs input force) as a function of the ratio disc shape, rubber material properties and reaction disc geometry. The three ROMs have been fully validated (by verifying their accuracy with respect to the base FEM models and by validating the initial FEM models with experimental tests) and their capability to run in real time in very simple platforms (PC, laptop or tablet) has been checked. The initial FE models which are the base for the development of the ROMs are also described in detail, as well as the mathematical algorithm that has been used for the construction of the ROMs.