



**Additive Manufacturing of Generative Design  
Based Novel Cooling Plates Structures for Electric  
Vehicle Battery Thermal Management Systems**

**3D-SBACOD (3D Smart Battery Cooling Design)**



smart

advanced manufacturing

## ORGANISATION PROFILE

Insert brief description of the leading organisation: Name, Personnel, Size, Products/Services/Technical areas and R&D project expertise.

Eskisehir Technical University 3DAM (Digital Design and Digital Advanced Research) Lab. is working on advanced additive manufacturing technology for industry. Main research areas; SLS, SLM, WAAM Additive Manufacturing design and simulation, topological and generative design, large scale composite additive manufacturing technology, CADX, advanced additive manufacturing process simulation. 3DAM recently established a new state-of-the-art Additive Manufacturing Laboratory (AML) under the overall umbrella of the university's existing Materials Research Facility (MRF) and **collaboration with ATAP AS - EDIC (Eskisehir Design and Innovation Center) with the dual purpose of research and innovation. 3DAM and ATAP AS - EDIC are a comprehensive facility, bringing together of additive manufacturing referred to as selective laser melting, plastic SLS, large scale composite extrusion system and several post processing systems and software.**

# PROPOSAL INTRODUCTION (I)

**Vision:** main project goal

In the past decade innovation in electric vehicle did not know its limit. Due to the increased interest in electric and hybrid mobility the need for high-performant batteries is becoming bigger and bigger. This Project ideas is about how battery cold plates can be designed with generative design and manufacturing for better performance.

**Motivation:** why the project is necessary

The performance of lithium-ion batteries used in electric vehicles (EVs) is greatly affected by temperature. Hence, an efficient battery thermal management system (BTMS) is needed to ensure the safety of batteries and prolong the cycle life.

**Content:** which are the developments to be made in the project

Heat exchanger plates used in Electrical Vehicls will be designed according to advanced manufacturing methods (3D Metal Printer – SLM method). Especially the geometry of the heat exchanger plate channels has critical importance in terms of heat transfer performance. With the project, it is aimed to provide maximum cooling performance by producing a heat exchanger to be produced with a 3D metal printer.

## PROPOSAL INTRODUCTION (II)

**Expected outcome:** descriptions of the results to be obtained in the project

Temperature rise is one of the main factors that affect the safe operation of electric vehicle. In order to improve the heat efficiency of the motor, the water-cooled motor of circular circumferential waterway for mini electric vehicle was studied as an object in this research, the structural parameters of the channel are optimized and analyzed from the following aspects: the width of the adjacent channel, the width and the height of the channel.

**Impacts:** what will be the expected market impact of the project

Electric vehicles are definitely more environmentally friendly than gasoline or diesel-powered cars, as they do not emit gases that harm the environment and your health. Battery cooling systems are critical parts of these vehicles. Producing those parts via 3D metal printers will allow to find best design for best performance.

**Schedule:** start and end dates for the project. Duration.

Start: July 2022

End: TBD

## PARTNERS

**Current Consortium:** list of partners already involved in the project

Coordinator: Prof. Dr. Oguz Çolak (ESTÜ)

Partner: ATAP AŞ- ETİM

Partner: Doç. Dr. Barış GÜREL (Süleyman Demirel University)

Potential Partner- Prof. Dr. Bengt SUNDEN (Lund University- Sweden)

Potential Partner- Diabatix (Belgium) (Generative Design, Analysis ) (<https://www.diabatix.com>)

**Partner search:** type of partner searched and countries of origin (if necessary).

SMEs or Test Centers are potential partners for this Project from eligible countries.

National International Electrical Automotive and/or Vehicle R&D Centers  
Electric Vehicle Battery Manufacturers

## CONTACT INFO

**Contact info:** of the person coordinating the project proposal

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