

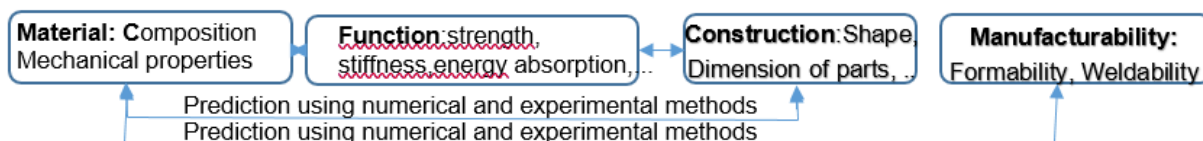
## Project proposal/idea

We are looking for consortium to join as a partner

The automotive industry, which is the dominant industry in Slovakia, will face significant changes in the near future related to electromobility: Fuel Cell Electric Vehicles - FCEV, Battery electric vehicles - BEV, plug-in hybrid electric vehicles - PHEV, Hybrid electric vehicles – HEV. It must respond to these changes by building the necessary infrastructure and preparing the workforce accordingly.

**The idea of the project** is to complete a Lean for Industry 4.0 research centre to support the component suppliers in the automotive industry. Lean manufacturing is based on the idea of reducing the time between the customer and the supplier by reducing the all kind of waste. Industry 4.0 is the accelerator for eliminating errors and increasing productivity. The development of IT technologies leads to digital transformation on a very broad scale.

The choice of material cannot be made only on the basis of construction, independently on technologies their processing. The functions of individual parts of the structure, used materials and technologies influence each other. They create an interconnected set of relationships between material, construction (body safety) and quality (formability). These relationships are decisive for the development of tailored materials – Fig. 1.



**Figure 1.** Schematické znázornenie postupu riešenia projektu

**The benefit of the project** within the framework of the completed research centre for the supplier sector will be in support of digital technologies (digital twins), statistical analysis of material, utility and technological properties of progressive materials, algorithms for predicting the utility properties of custom-made body parts and their production (formability characteristics) using numerical simulations and the Design of Experiment.

[\[https://doi.org/10.3390/met12010054\]](https://doi.org/10.3390/met12010054), [\[https://doi.org/10.3390/met9101058\]](https://doi.org/10.3390/met9101058),  
[\[https://doi.org/10.3390/ma13051223\]](https://doi.org/10.3390/ma13051223), [\[https://doi.org/10.3390/met8040242\]](https://doi.org/10.3390/met8040242),

**Identified suitable calls for proposals:** HORIZON-CL4-2023-DIGITAL-EMERGING-01-12: Adaptive multi-scale modelling and characterisation suites from lab to production (RIA)

**Recent projects related to the issue solved:**

**MS SR VEGA 2/0080/19** Prediction of weldability and formability for laser welded tailored blanks made of combined high strength steels with CAE support.

**APVV -00276-12** Supporting innovations of autobody components from the steel sheet blanks oriented to the safety, the ecology and the car weight reduction

**Infrastructure offered:** 3D scanning by FARO Platinum Arm 3D measuring arm with laser scanning head, PolyWorks Inspector software, Microscribe 3D touch scanner; CAE analysis of formability by PAM STAMP or Simufact.Forming software; testing of material properties, testing machine TiraTEST 2300 with online measurement and evaluation of data according to standards: ISO 6892-1: 2009; ISO 10113:2006; ISO 10275:2007; testing machine Erichsen 145-60: non-standard cup test, determination of drawing forces, cup height, thickness changes and strains along the cup wall; Nakajima test – determination of forming limit curves; photogrammetric contactless measuring system ARGUS to measure strains on sheet metal stampings and limit strains according to ISO12004-2 by section method, Etching system EU Classic.

**Partners in previous international research projects:** **1. TKFO/1302-1/2019-ITM\_SZERZ** "Industry 4.0 – Automotive industry Long-Term and Sustainable Success in Business at the Time of Digitalization. Corvinus University of Budapest, University of Pannonia, TU Kosice. **2. Project CEEPUS** "PL1 Metrology in Quality Assurance Systems", Politechnica Swiatokrzyszyska Kielce, University of Maribor (SI), VŠB Ostrava (CZ), University of Wiena, University of Kielce. **3. INCO-COPERNICUS – IC 15-CT98-0824** (DG12-MZCN) „Environmental friendly lubricants in deep drawing of steel sheet metal“. TECOS (SI), Miskolc University (HU), University of Ljubljana (SI), TU of Denmark (DK), Eindhoven UT (NL), Fraunhofer, IWU FhG. Chemnitz (D).

**Industrial partners:** **MATADOR Automotive Vráble**, a.s., Ing. Matej Golha (Quality Engineering Supervisor); **3Dees Industries s.r.o.**, Ing. Juraj Sulaček (sales engineer)

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