HOCHSCHULE LANDSHUT
HOCHSCHULE FÜR ANGEWANDTE WISSENSCHAFTEN

FAKULTÄT MASCHINENBAU Wintersemester 2021/22

Projektarbeit & Wahlpflichtmodul des Masters Automobil- und Nutzfahrzeugtechnik im Wintersemester 21/22

Infoveranstaltung zu den Wahlen und Planung der ersten Semesterwoche(Kooperation mit franz. Partnerhochschule) am 1.10.20. um 13:00
https://us02web.zoom.us/j/87637265894?pwd=UTdQd0xQUFVYVzZBbkw3TmdkTGMwZz09

Es ist **eine** der folgenden Gruppen zu wählen:

1. PA_Fischer

Project work “demoulding” 2021/2022

Objective: parts per minute is a major aspect for reducing costs within automotive production. When production fibre reinforced parts for automotive application a mould is used, in which the fibre mat is placed, then the matrix is injected under high pressure and the whole form is heated to accelerate the hardening process. For taking the new part out of the mould it has to be opened against the adhesive forces between matrix and mould.

To reduce these forces for this separation, which are an important aspect of production, special additives are added to the matrix. The matrix behavior concerning demoulding and the test bench for its investigation and quantification are the object of this project work.
Details:
Based on an existing test bench at the Landshut University for investigating this so called “Poker Chip Problem” theoretical investigations have to be made to optimize this test procedure, because due to the high forces test bench deformation sometimes leads to mismeasurements. Major jobs during the project work are:

- Calculation of stresses during demoulding on the test bench
- Calculation of deformations during demoulding on the test bench (FEM)
- Detailed analysis of actual measurement and test bench concept
- Identification optimization potentials based on the existing test bench and construction of these modifications
- Research / development of alternative test and measurement procedure to improve test procedure

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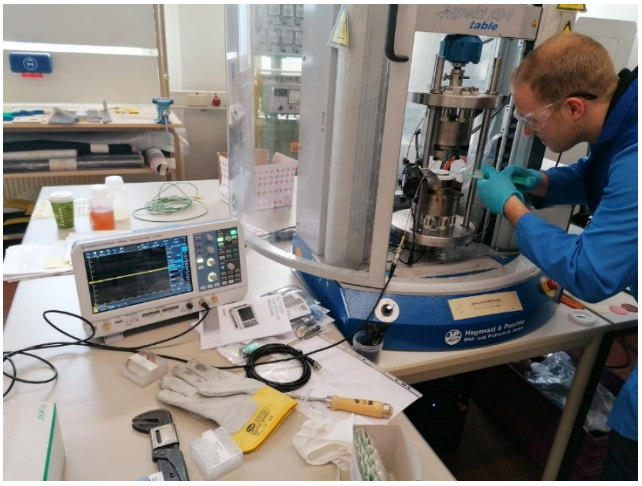
Picture of the esxisting test bench: 

- Video for more detailed information (only in German)

2. PA_Mock

Project work “regenerative fuel” 2021/2022

Objective: Evaluation of the use of bio methane and H2 as fuel for commercial and agricultural vehicals.

Details:

The use of bio methane and regenartively produced H2 reduces the CO2 emissions of vehicles with combustion engines almost to zero. Of course several changes to almost every conventionally propulsed vehicle are necessary to enable them to operate with these fuels.

This study should focus on utility vehicles within the agricultural and communal sector.

So there are 4 general questions that should be answered during this project work:

- For which kind of utility vehicles does it make sense to use bio methane or H2 as fuel – and in which aggregate state? Focus should be set on technical (power output, range) economical, ecological aspects.
- Are there already commercial vehicles existing, which can be operated with these fuels or will such vehicles launched soon?
- Which powertrain technologies have to be used for bio methane or H2 fuel technologies (existing and upcoming technologies)
- Which changes of a conventional powertrain are necessary to operate it with bio methane or H2?

The job is to elaborate a detailed study which will answer the questions listed above and upcoming additional questions so that the report will give a detailed evaluation of the actual situation and the chances of these fuels within the next years in the commercial vehicle sector .

Main jobs:

Coordination, Documentation, Communication

Research (internet, OEMs, users , …)

basic CAD (conceptional studies)

estimations / calculations for technical, ecological, economical aspects

3. PA_Köll

Project work “forklifter” 2021/2022

Objective: development of a new forklifter layout with focus of an improved acoustical behavior

Details:
Actual forklifters usually have a poor noise and vibration behavior. As consequences the subjective noise rating always is very bad and sometimes the driver are eve obliged to wear ear protectors during operation which is an important marketing disadvantage.

During the last years a constant contact to Jungheinrich, one of the major manufactorer of logistical equipment located close to Landshut has been established with the focus on improving forklifter nvh behavior.

Based on last years results some major noise generating aspects have been identified of qwhich most of them are a direct consequence of todays forklifter layout. There are strong hopes that a new general layout will help to achieve major nvh- improvements. Of course the primary functions and logistical performance of a forklifter should not be altered.

The main jobs within this project are:

- review the actual state of knowledge
- internet research for alternative forklifter concepts
- derive major rules for general nvh-optimised forklifter layout and concept
- develop an alternative layout and make conceptional drawings (CAD) and package studies
- Basic simulations (FEM) to give an estimation of the nvh-potentials

- "nice to have": experiments for evaluating the general potentials of a new concept. (experimental)

The project work is in close cooperation and with constant participation of Jungheinrich and you will get access to internal information (CAD, FEM, specifications…) so the whole project has to be handled as confidential.

4.PA_Roidner1

1. Numerical simulation of the passenger compartment of the AMI Citroën vehicle

The technological innovation for green mobility is currently a priority issue particularly, the thermal management of electrical vehicles, the study of an air conditioning/heating system, battery cooling, or passenger compartment comfort.

For example, battery life is considerably reduced if the operating temperature is more than 40°C and the efficiency or the power decreases if temperature is less than -10°C. According to the vehicle use, it is easy to reach 40°C in summer, so it is necessary to find technological solutions to limit these temperature peaks.

The AMI Citroën vehicle is an interesting example of a future urban vehicle for green mobility as it is a small electrical car (figure 1). This car can be used without driving license, with a range of 75km (with an electrical motor of 6kW). The maximal speed is 45km/h, so it is intended for urban use and short journeys. It takes three hours to get fully recharged with a standard electrical 220V plug. Its reduced size (2.41m long, 1.36m wide, and 1.52m high) allows to transport two passengers. The numerical simulation of the passenger compartment of this vehicle, submitted to different external conditions of temperature, could permit to measure the technological efforts to provide as to improve the vehicle comfort, which is now not equipped with an air conditioning system nor a heating system. For safety improvement in urban traffic, the AMI vehicle has large glass surfaces (figure 1). Unfortunately, these surfaces are an important disability in summer. The inside temperature can then reach 70°C if the AMI is parked in direct sunlight, with an outdoor temperature of 45°C.

CFD (Computational Fluid Dynamics) simulations will allow to predict temperature inside the vehicle submitted to different external conditions.

The proposed work is a preliminary study to prepare AMI Citroën vehicle tests in thermal wind tunnel (in Soufflerie S6, in Institut Aérotechnique de Saint Cyr-L'Ecole, Le Cnam as shown in figure 2). These tests in S6 would be conducted at full scale in 2022-2023.

In this preliminary study, the aim is to develop a model of AMI vehicle at a 1/5 scale, with additive manufacturing, and a digital twin to test, and compare, both models (experimental and numerical models) under different external temperature conditions.

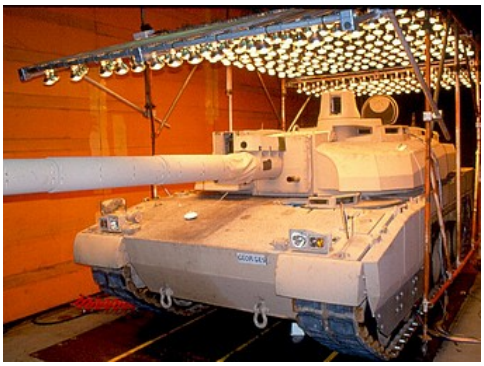


Figure 2: Measurements in thermal wind tunnel S6 in Institut Aérotechnique de Saint-Cyr l'Ecole, Le Cnam

roposal of tasks repartition:

France	**Allemagne**
- Preparation of the test bench for experimental model of AMI (external condition control of temperature and velocity of flow…): test bench design, material order, test bench assembly - Specifications of the test campaign: chosen parameters for experimental and numerical tests	- Design of the digital twin of AMI with CAD - Preparation of the additive manufacturing of the numerical model
Manufacturing of 2 experimental model prototypes using additive manufacturing (one for France partners and one for German partners)	
- Test of the experimental model in thermal wind tunnel	- Numerical simulation by CFD (Computational Fluid Dynamics) of the AMI digital twin (with SimFlow software for example)
Comparison of experimental and numerical results	

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PA_Roidner2

Augmented reality of automotive air conditioning system

In order to understand the role of each component of an automotive air conditioning system (figure 1), it is interesting to use a test bench to make measurements (global and local measurements). But it is difficult to understand phenomena encountered in the components if the system is working. Using a digital twin of the air conditioning system allows to study flows and heat exchanges during the thermodynamics cycle. In that case, measurements in realistic operations are not possible. Augmented reality is a way to take advantage of both tools: experimental model and numerical model.

Valeo, French automotive supplier, is a privileged partner of LIFSE (Laboratory of Fluid Engineering and Energy Systems). In the context of a project funded by ADEME (French ecological transition agency), Valeo and LIFSE work on the optimization of automotive air conditioning systems used in small urban electrical vehicles.

In order to promote this research work for green mobility, this learning innovation project will allow to facilitate the understanding of an automotive air conditioning system operation.

- Test bench design and assembly to study the air conditioning system outside the vehicle
- Integration of the numerical model on the experimental test bench using augmented reality.

For these different steps, le LIFSE (Laboratory of Fluid Engineering and Energy Systems) could provide devices for the assembly of the test bench. It is also possible to use a software to produce augmented reality, for example with the Oreka society which is a partner of Le Cnam for other learning projects.

France	Allemagne
- Development of an experimental device (automotive air conditioning system provided by Valeo) - Instrumentation of the experimental device (temperature and pressure measurements…)	- CAD (Computer-Automated Design) design of air conditioning system components - Simulations of flows and/or heat exchange inside these components by CFD simulation (Computational Fluid Dynamics) or OpenModelica (an open-

	source Modelica-based modeling and simulation environment)

Integration of animations and numerical simulations in the experimental device with Augmented Reality (figure 2)

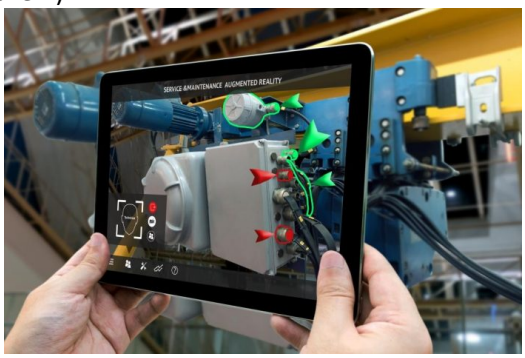

Figure 2: Example of Augmented Reality on a test bench

Außerdem ist **ein** Wahlpflichtmodul aus den folgenden zu wählen:

- Methoden der FEM in der Fahrzeugentwicklung
- Mehrkörpersimulation
- Applikationsentwicklung

Die Wahl erfolgt über das SB-Portal im Zeitraum

1.10. -3.10. 23:59

Bei Mehrfachbelegungen werden betroffene Studierende von der Verwaltung manuell zugewiesen!!

Bitte beachten Sie, dass die Gruppen zunächst auf ein Mindestmaß befüllt werden und bei Bedarf zusätzliche Plätze geschaffen werden.

Bei Unklarheiten oder Problem bei der Wahl wenden Sie sich bitte an Simon Münster(simon.muenster@haw-landshut.de)