starkstrom
AUGSBURG
FSE Racing Team UAS-Augsburg

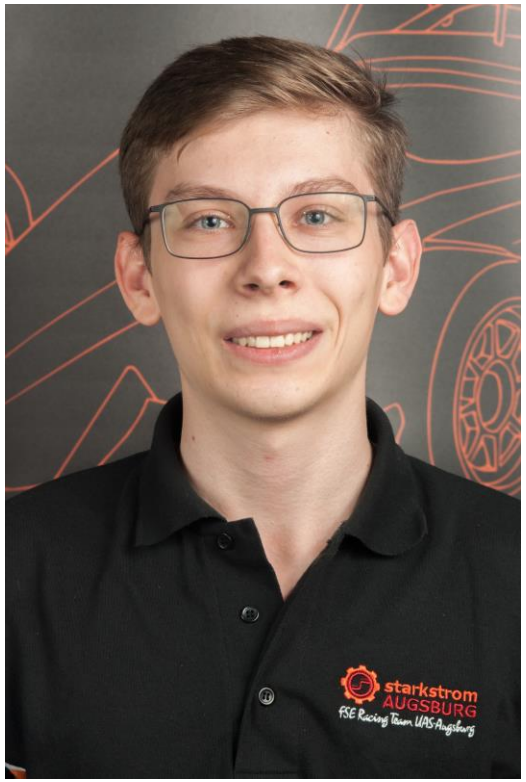
One Year of Life-Changing Experience

Building a Formula Student Electric Race Car from Scratch

Starkstrom Augsburg e.V.

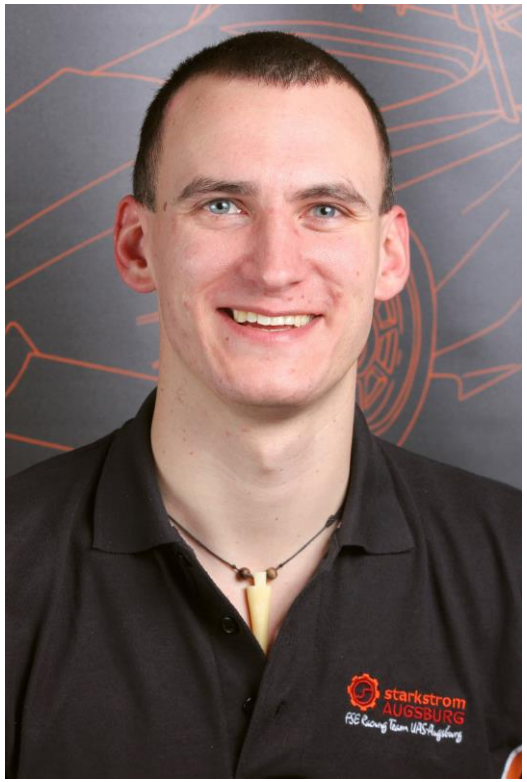
Maxim Kaufmann

2016 Manager Battery Systems



Michael Brandl

2016 Chief Technical Officer



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FSE Racing Team UAS-Augsburg

One Year of Life-Changing Experience

Formula Student Electric

1) Competition
2) Teamwork
3) Review
4) Detail

Audi Sport
Audi Sport
MAHLE
MAHLE

International Design Competitions

Worldwide

>15 competitions

all over the world

420 combustion

teams from 52 countries.

152 electric

teams from 37 countries.

Brasil
Canada
Japan
United Kingdom
Michigan
Lincoln

Australasia
Czech Republic
Hungary
Italy
Spain
Austria

Germany

~130 Teams

> 3500 students

IRTE
OTH Regensburg
CZECH REPUBLIC CTU CARTECH
LOCTITE RACEPRO

Formula Student Competition

Statics

Dynamics

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FSE Racing Team UAS-Augsburg

Teamwork

History & Evolution

History & Evolution

	UASA1302 „Scheuchtel“	UASA1403 – Elinor	UASA 1504 - Cedur
Power	68 kW (93 PS)	85 kW (115 PS)	80 kW (108 PS)
Torque	1000 Nm	1200 Nm	1200 Nm
Speed	130 km/h	150 km/h	130 km/h
Accel.	0-100 km/h – 3,5 sec	0-100 km/h – 3,2 sec	0-100 km/h – 3,2 sec
Weight	300 kg	259 kg	252 kg

starkstrom
AUGSBURG
E69
UAS AUGSBURG
voxeliet
LEW
Lechwerke
KUKA

MAHLE
Continental
BOSCH
DEKRA
VDI
Audi
ETAS
AUTODESK
www.HARTING.com
MOTION AND MOBILITY
starkstrom AUGSBURG
EDAG
dSPACE
KME
Intech
UAS AUG
Gustor
IPG
ANSYS
E69
KUKA
ETAS
SKF

Red Bull
Red Bull MOBILE
Red Bull MOBILE
>85kw

faurecia
ASSCON
Vapor Phase Technology
DEKRA
dSPACE
Müller
AHLHORN
UAS AUGSBURG
ANSYS
intech
Altium
E69

FORMULA
STUDENT
GERMANY
HOCKENHEIMRING
UAS AUGSBURG
BASF
Audi
BOSCH
Brunel
DAIMLER
DEKRA
ETAS
Henkel
MAHLE
PORSCHE

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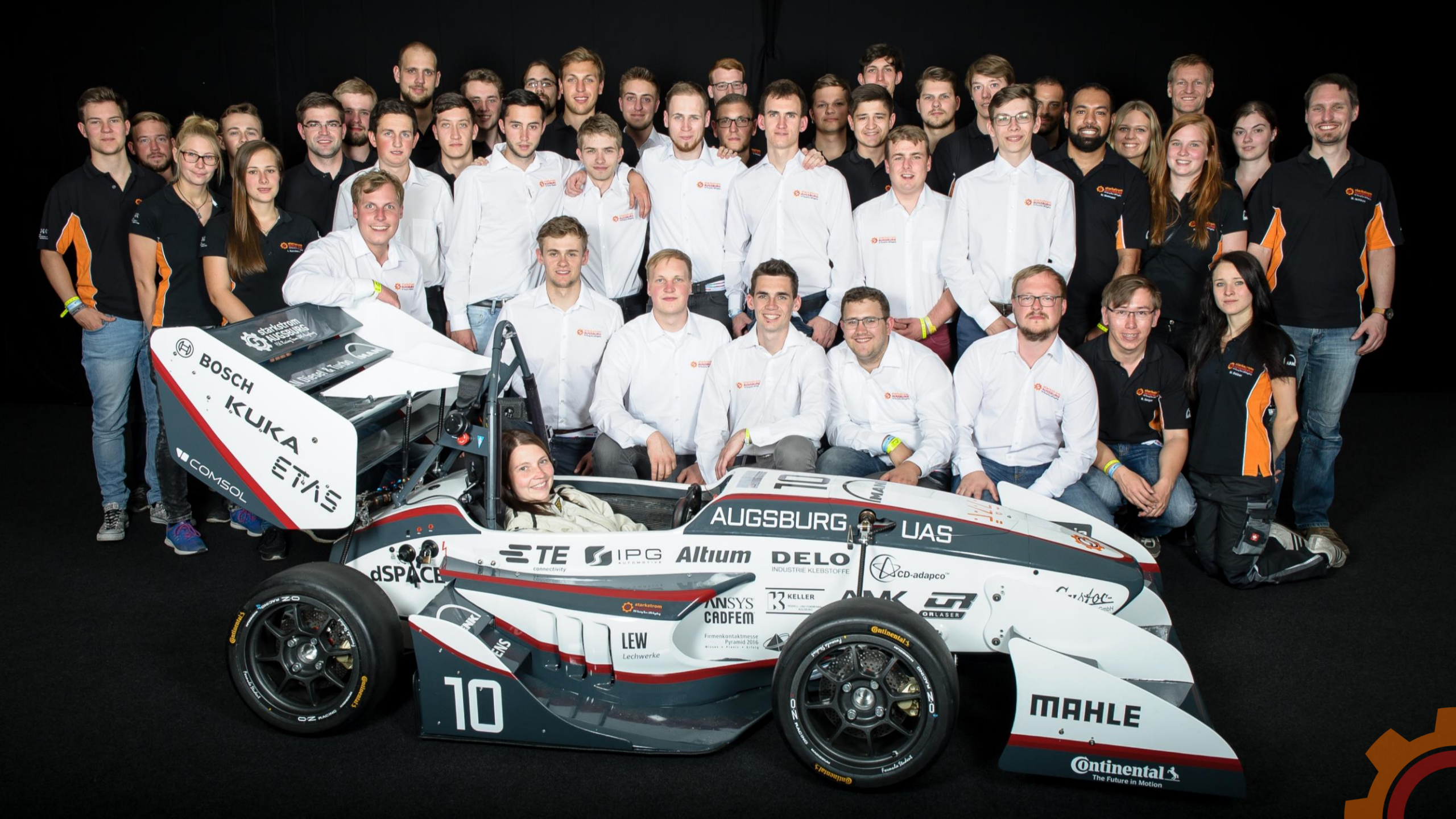
FSE Racing Team UAS-Augsburg

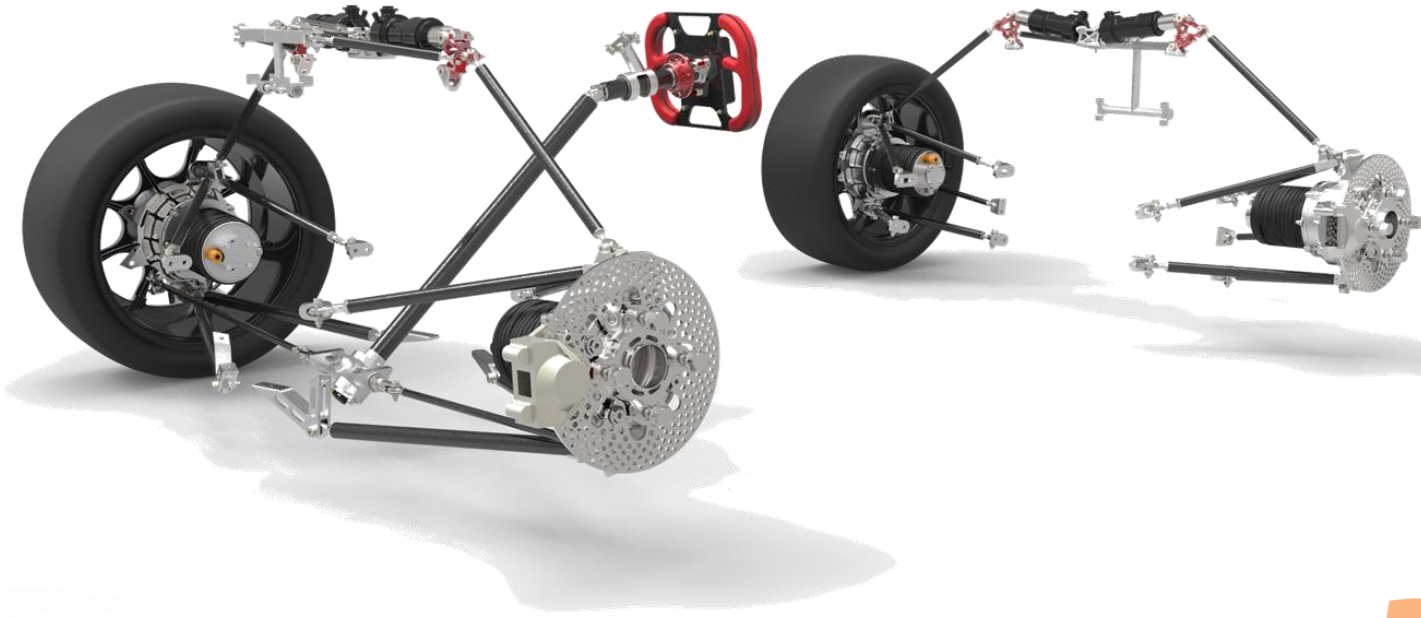
Review
Season 15/16

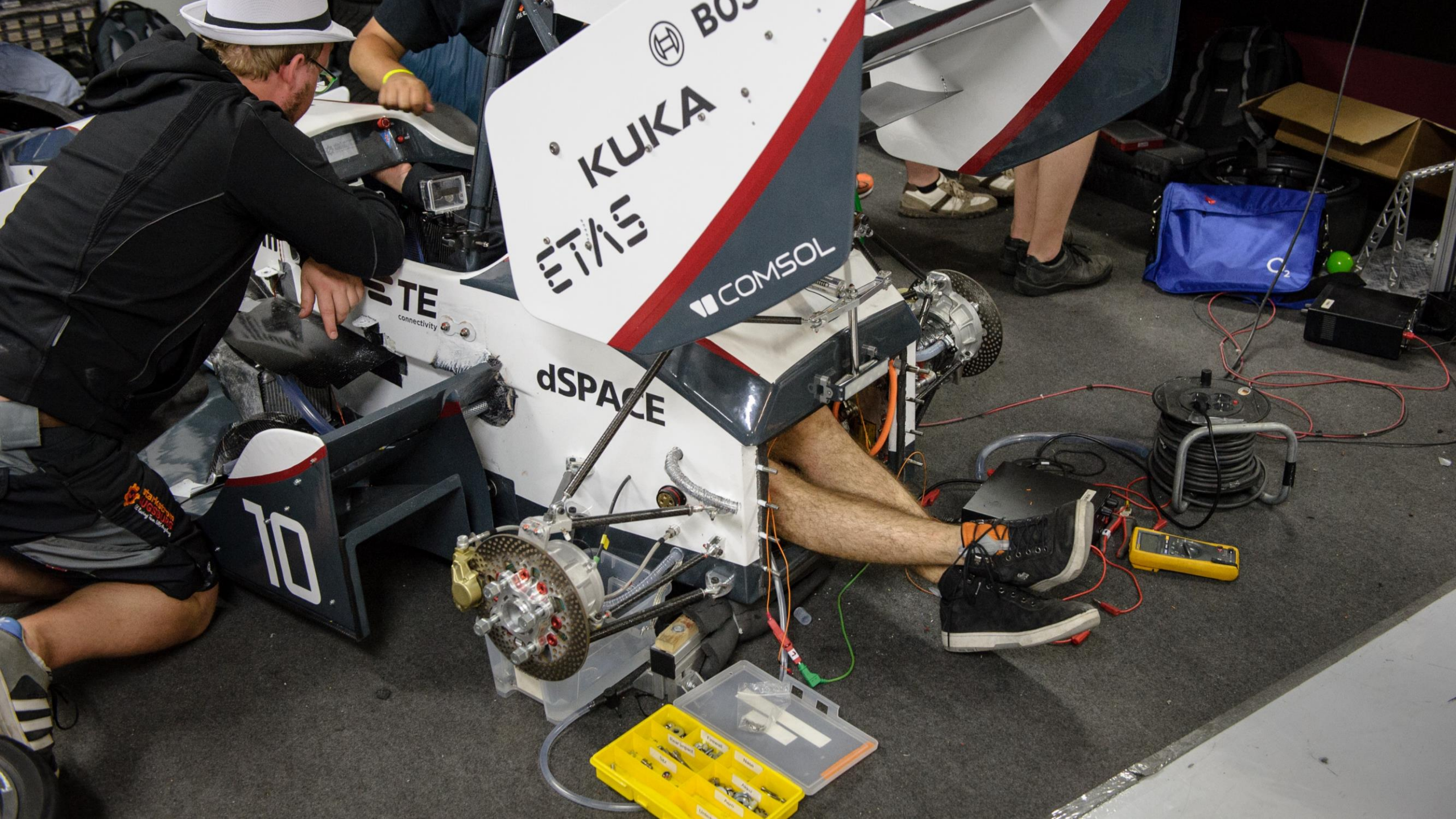

BOSCH
KUKA
ETAS
COMSOL
AUGSBURG UAS
TE connectivity
IPG AUTOMOTIVE
Altium
DELO
INDUSTRIE KLEBSTOFFE
dSPACE
CD-adapco
KELLER
ANSYS
CADFEM
AMK
LEW
Lechwerke
10
MAHLE
Continental
The Future in Motion

UASA1605 “Silencio”

Planetary gearboxes inside the wheel assembly

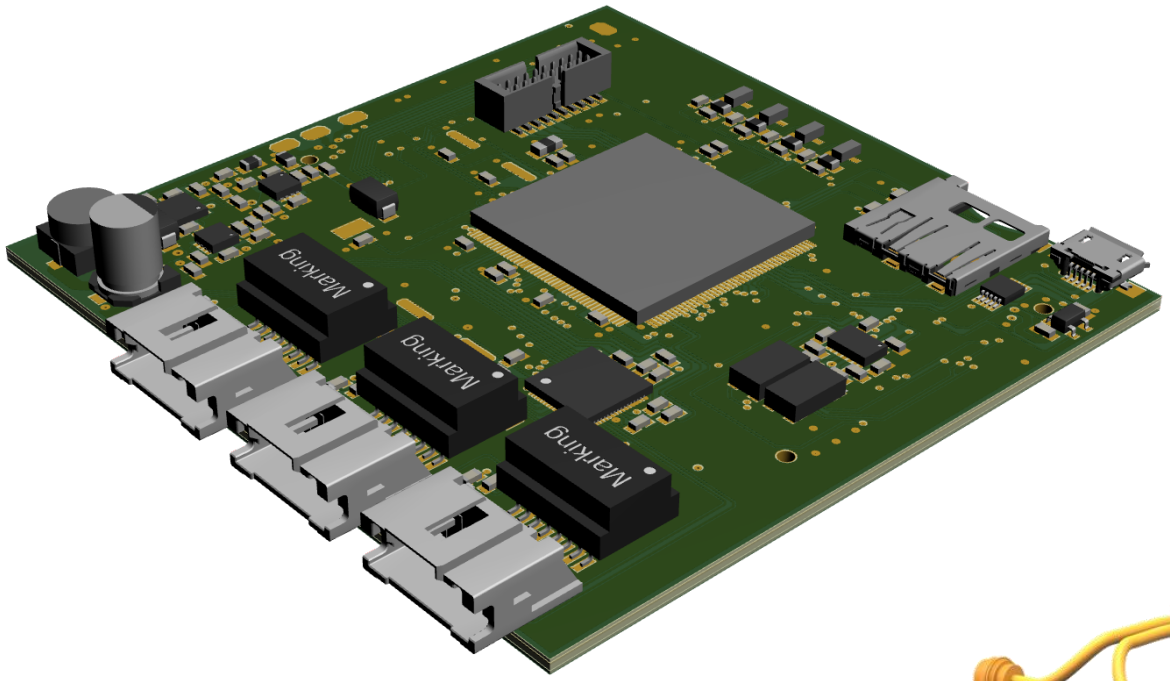
Suspension with carbon tubes and third-damper element



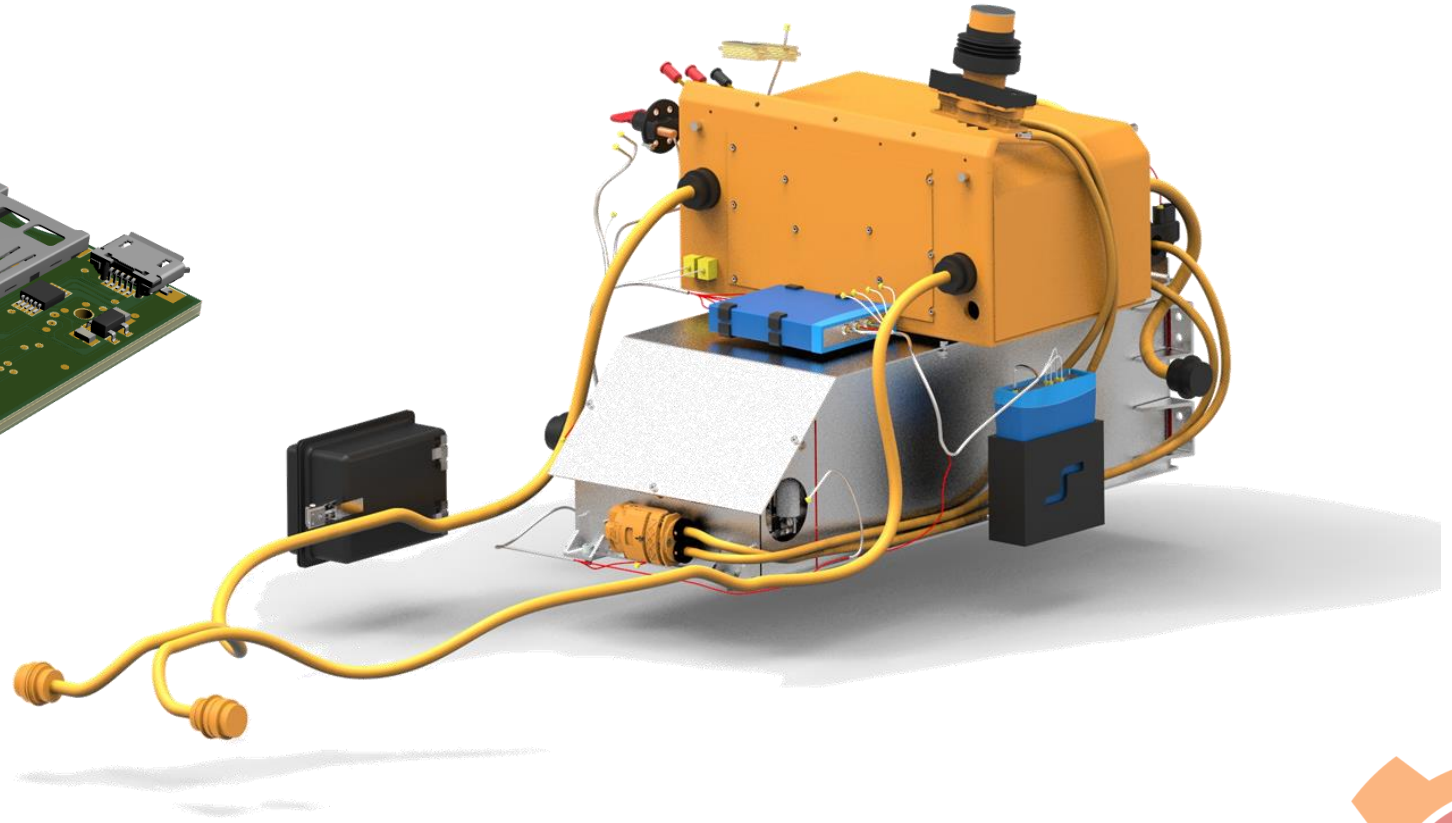

KUKA
COMSOL
TE
connectivity
dSPACE
10

UASA1605 “Silencio”

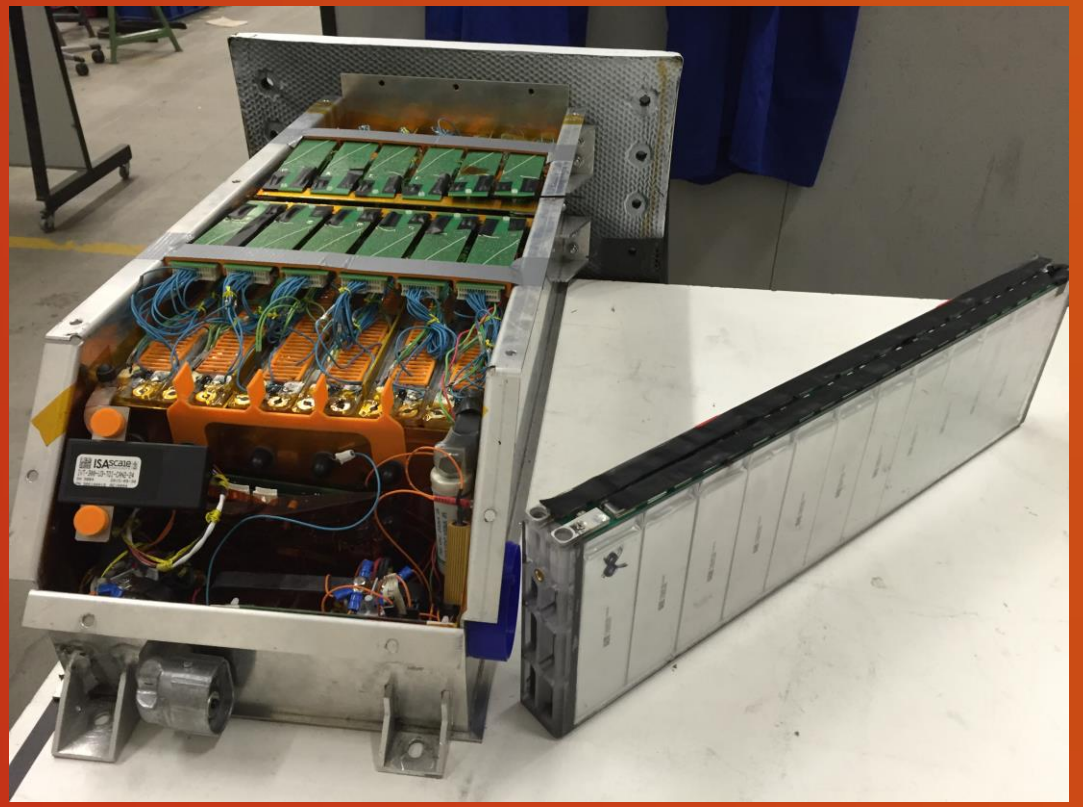
System-on-Module for Electronic Control Units (ECUs)



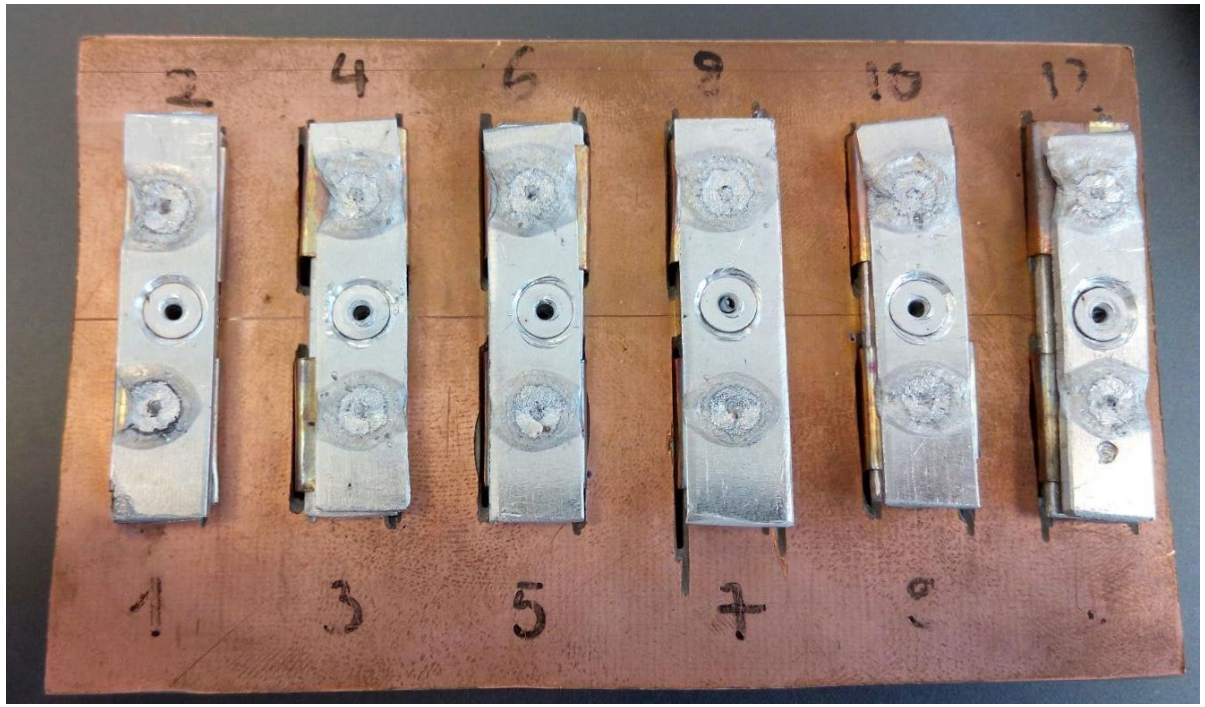
600V Accumulator with laser-welded cell connections

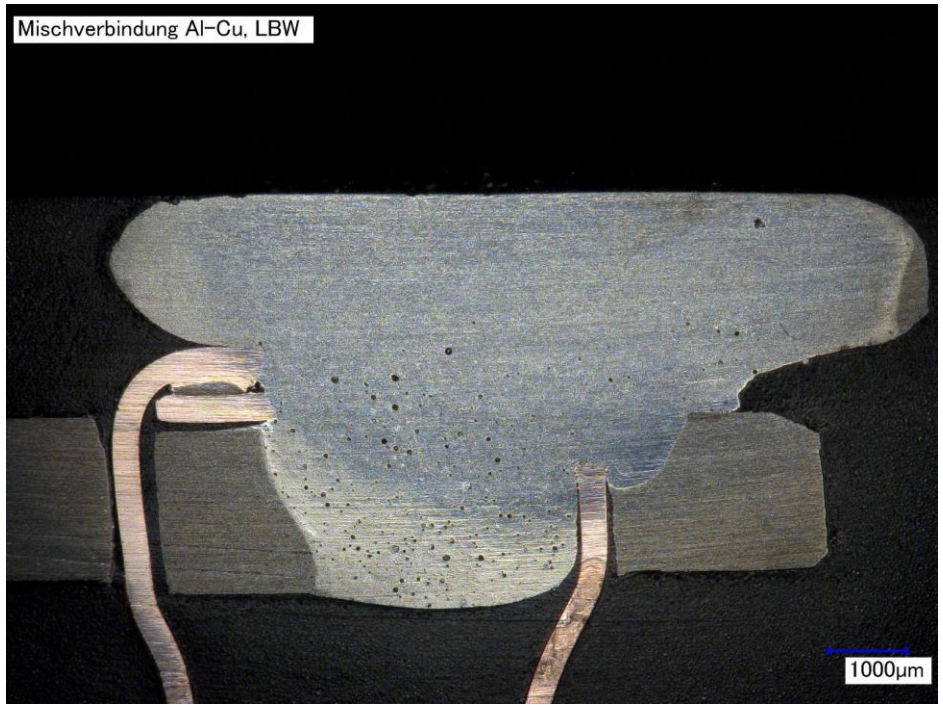


Detail
HV-Accumulator
Thermal Simulation

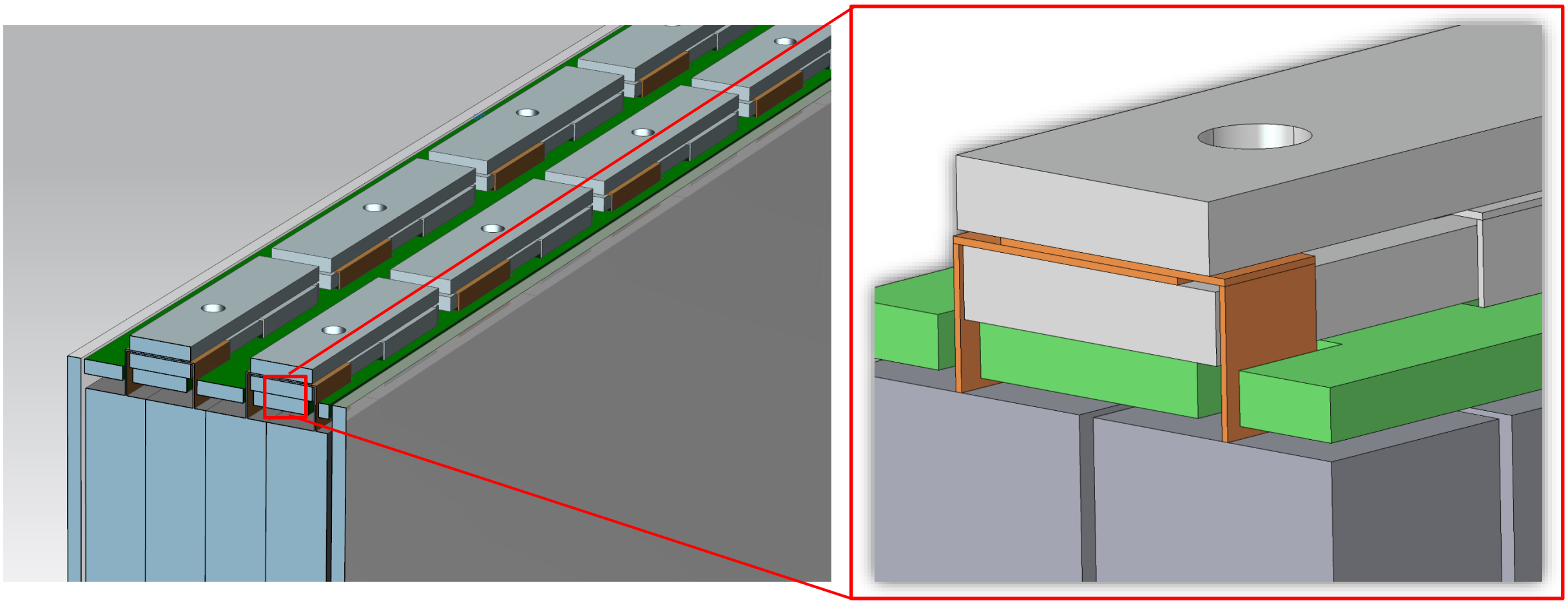


Tests

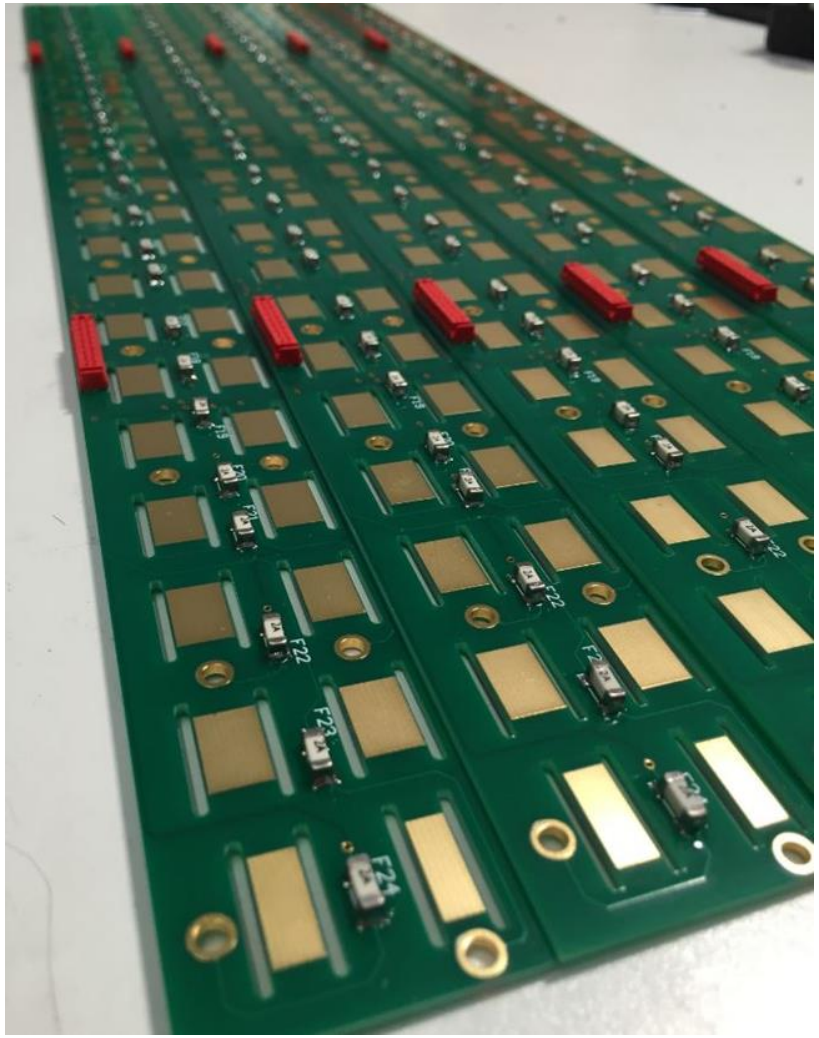


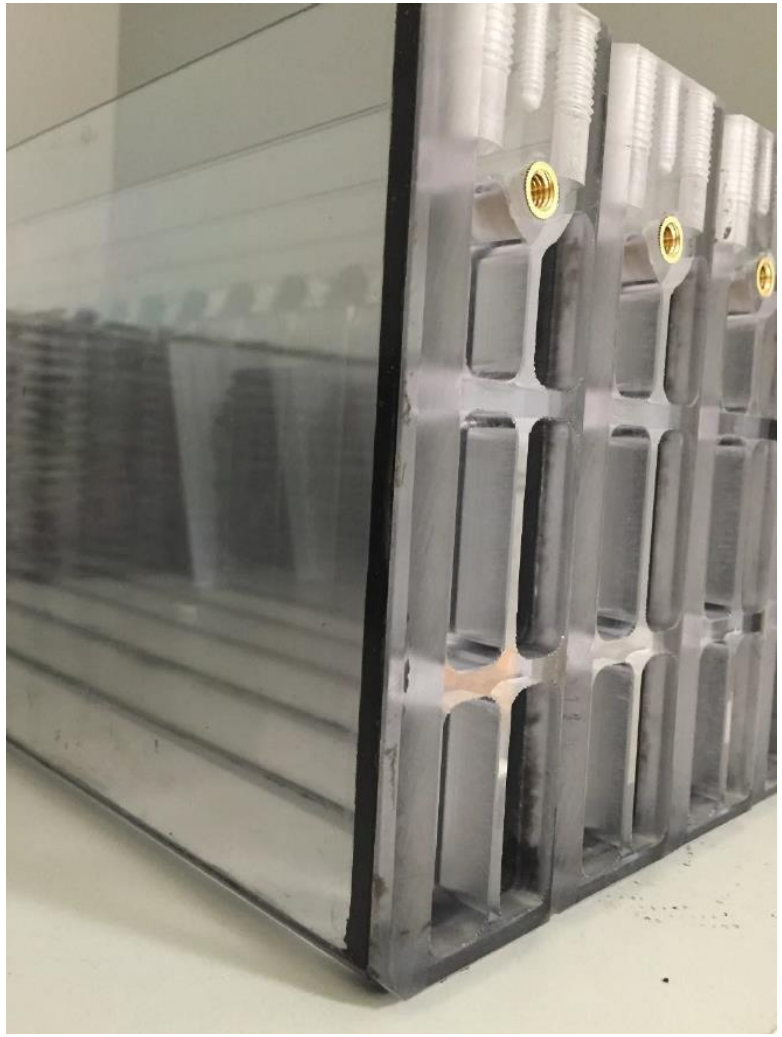


Design

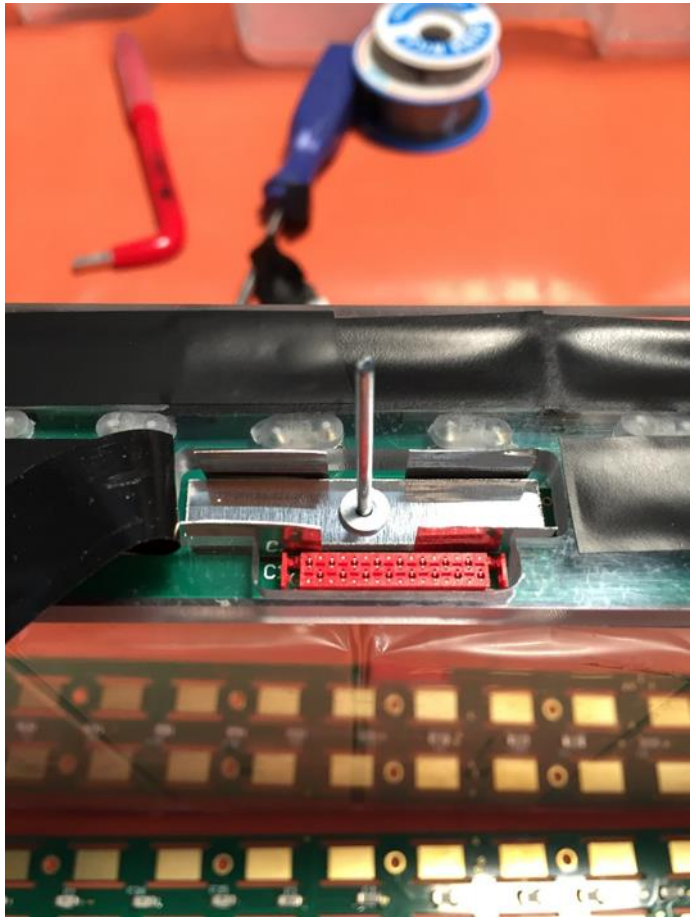


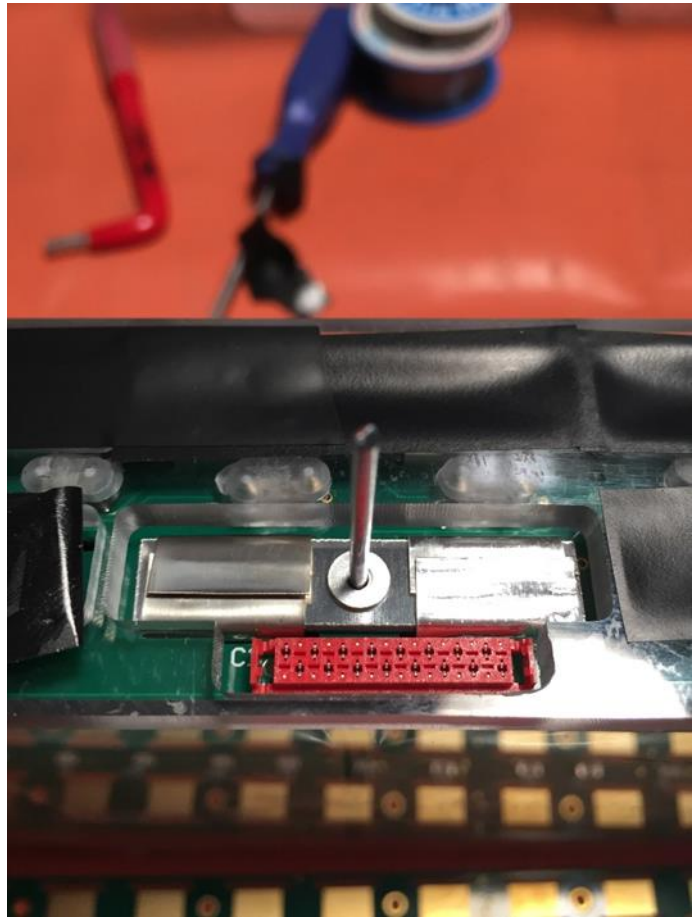
Design



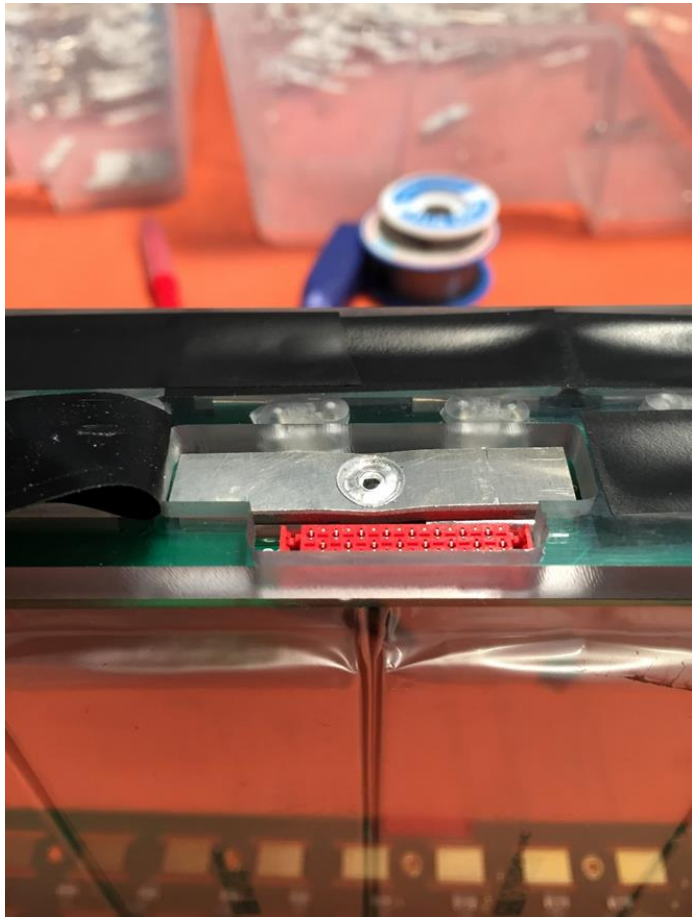


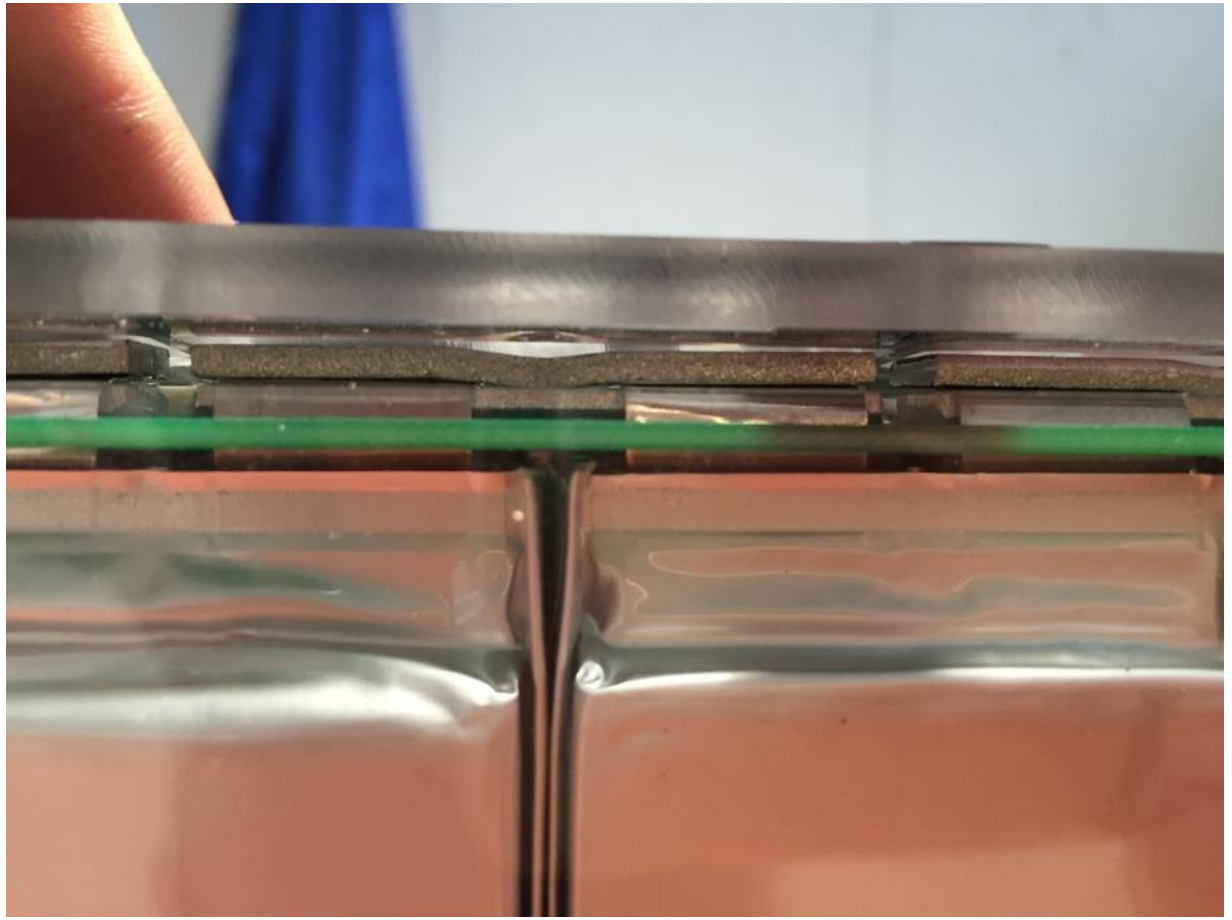
Design



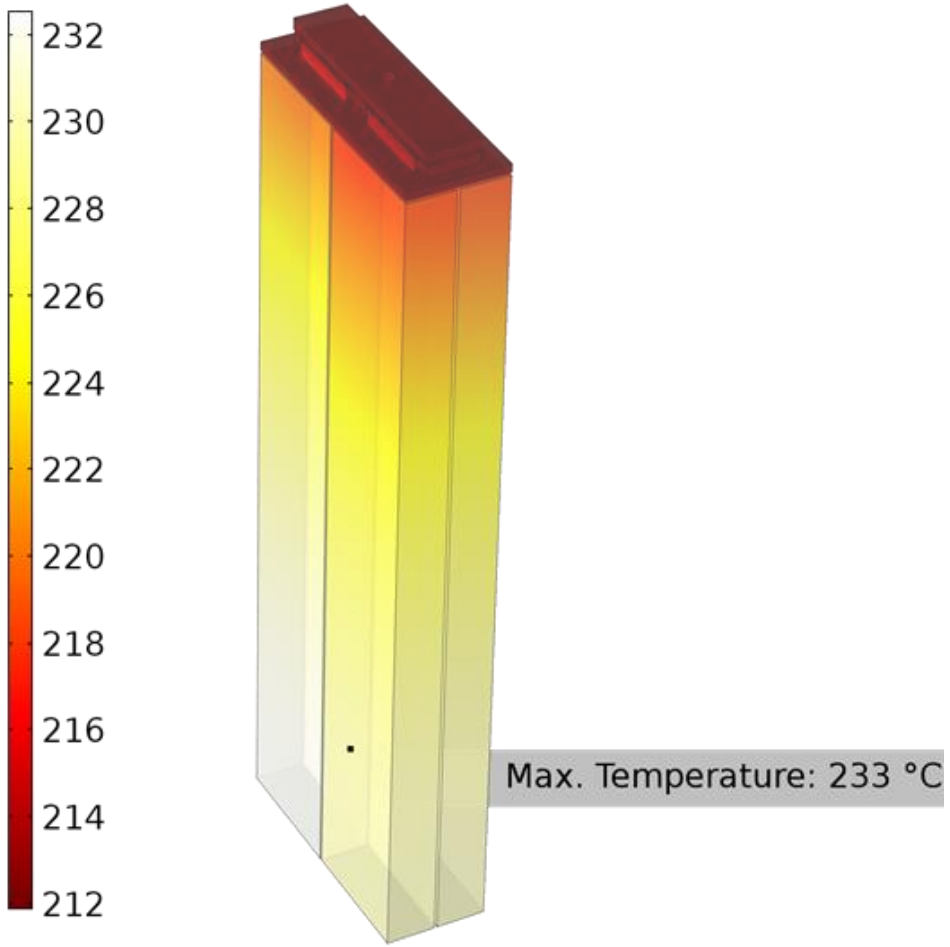


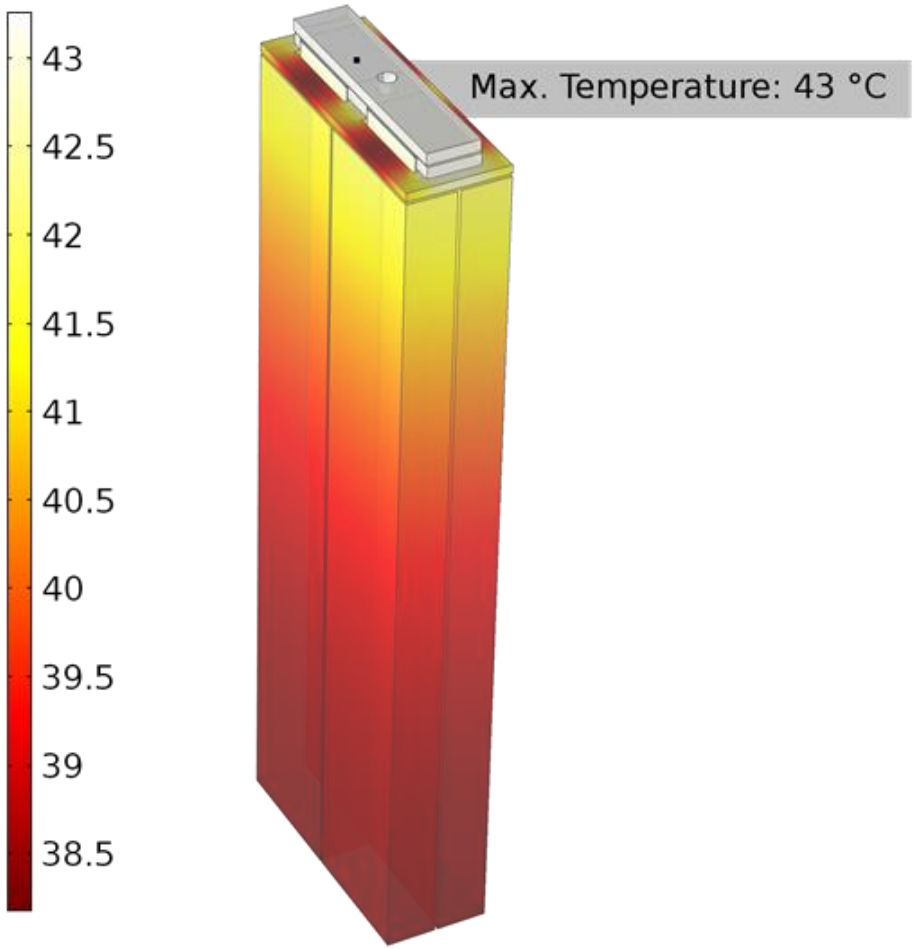
Design



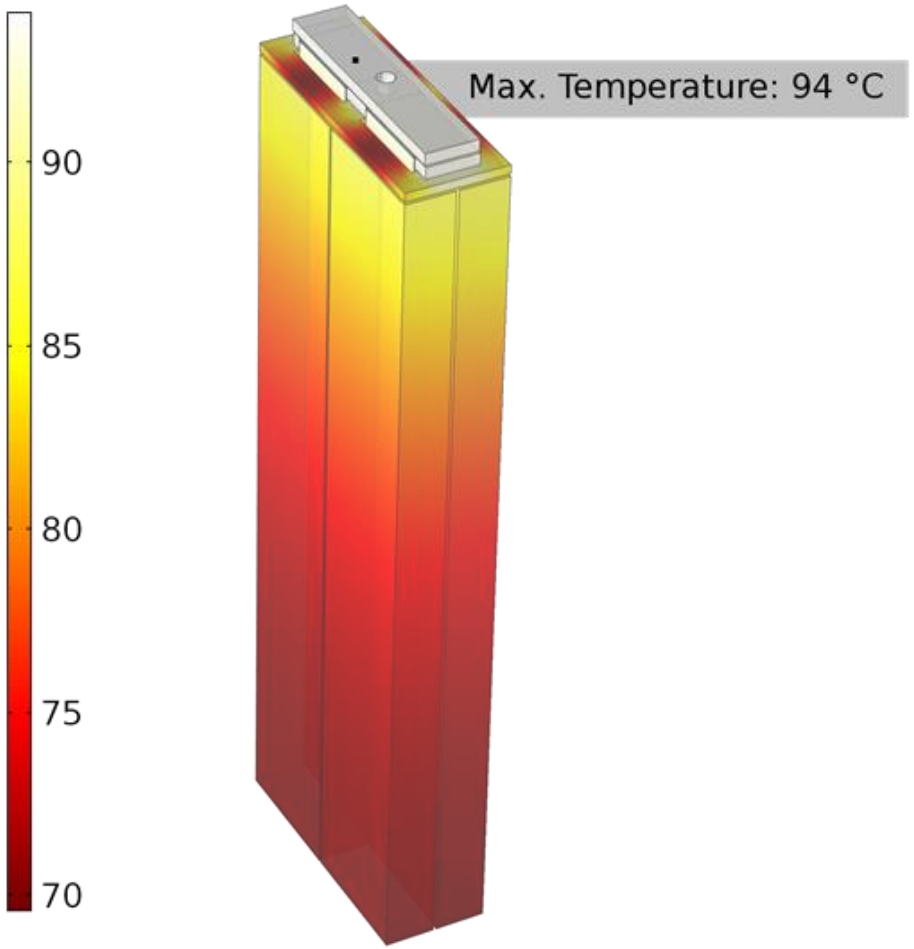


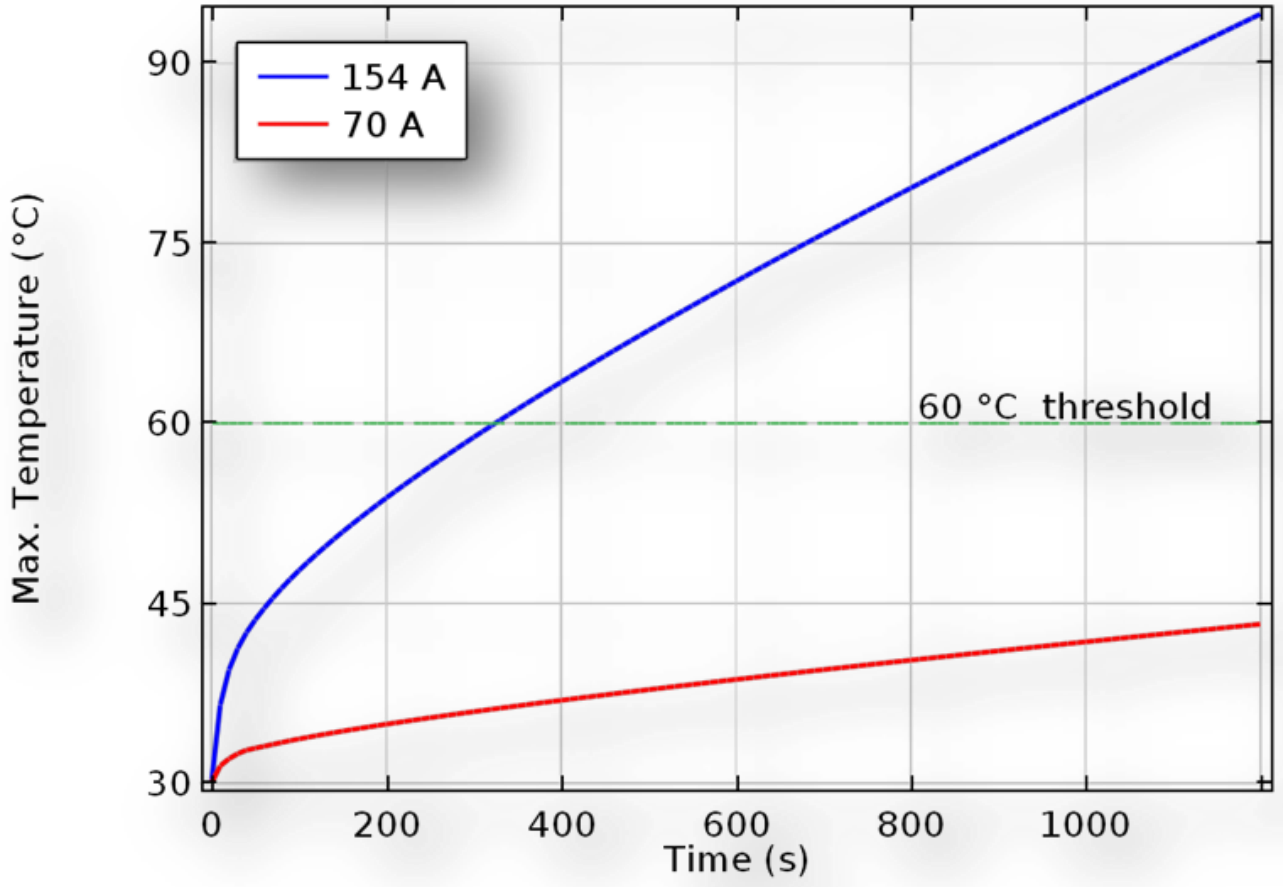
Simulation


232
230
228
226
224
222
220
218
216
214
212
Max. Temperature: 233 °C

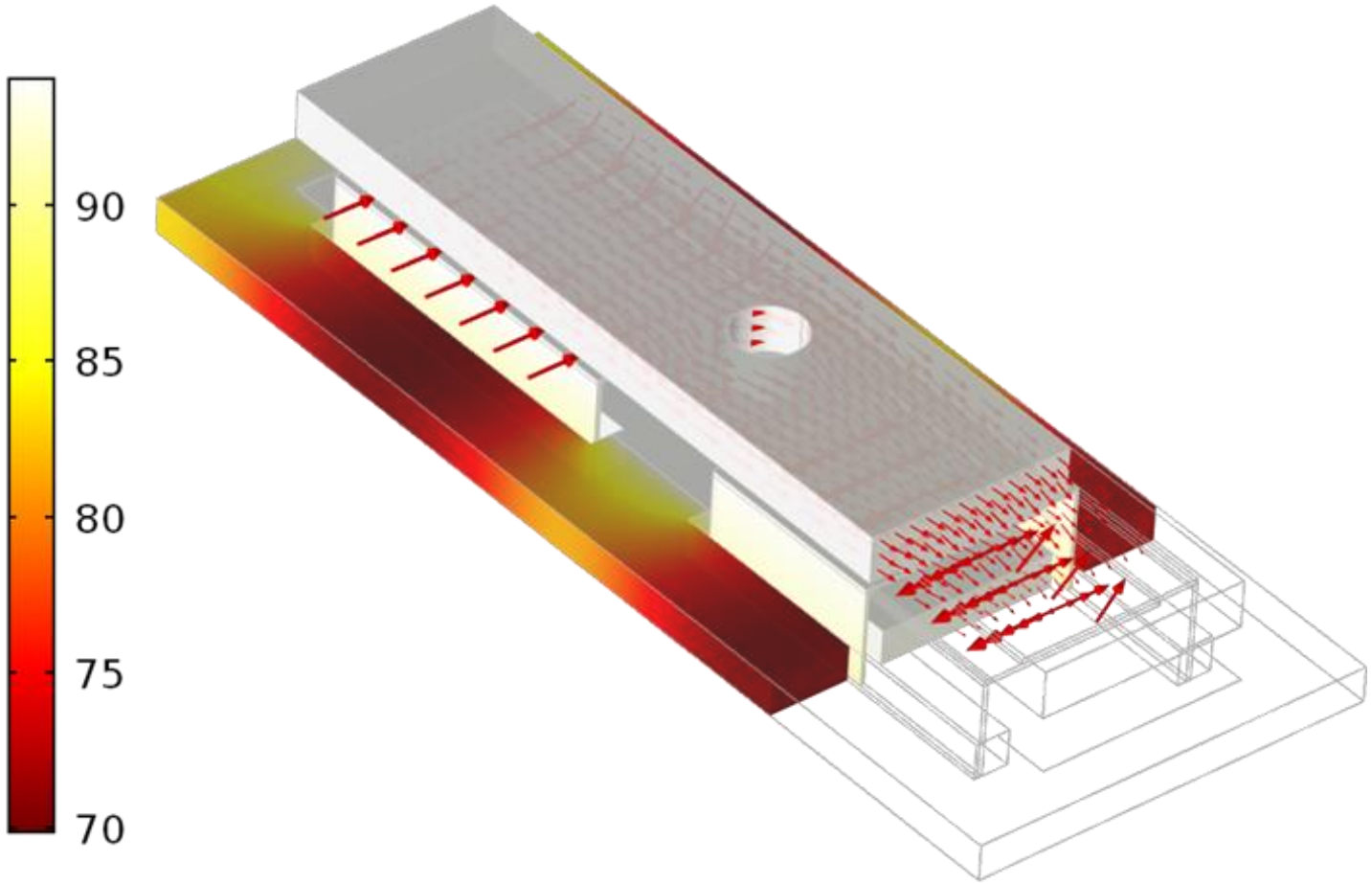

43
42.5
42
41.5
41
40.5
40
39.5
39
38.5
Max. Temperature: 43 °C

Simulation


Max. Temperature: 94 °C
90
85
80
75
70


154 A
70 A
60 °C threshold
Max. Temperature (°C)
90
75
60
45
30
0
200
400
600
800
1000
Time (s)

Simulation



Thanks for your attention!

Questions?