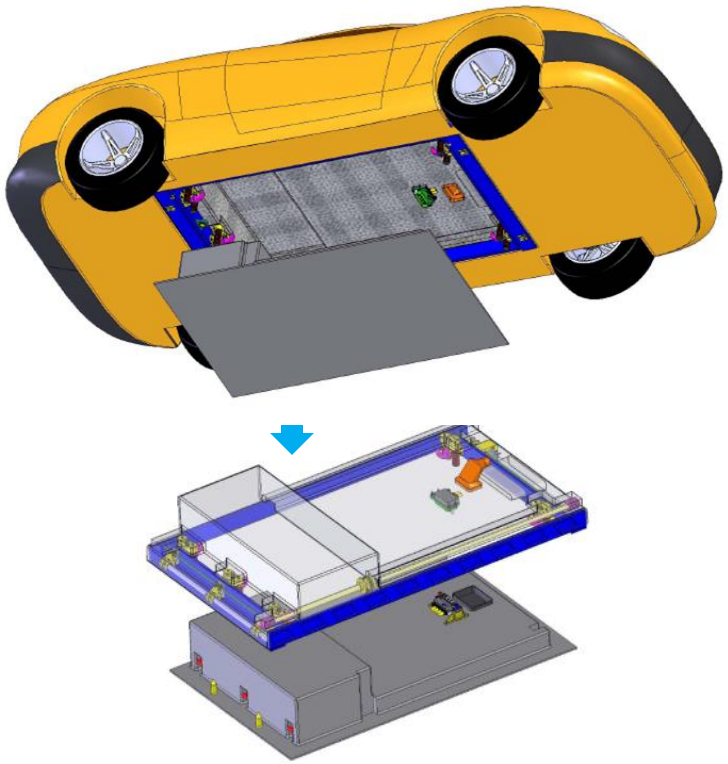
EASYBAT
EASY AND SAFE BATTERY SWITCH IN AN EV

Removal Battery Interfaces

for Electric Vehicles



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EASYBAT

EU Call: Transport (including Aeronautics)

Call: FP7-SST-2010-RTD-1, GC.SST.2010.7-4. Smart storage integration

Project full title:

- Models and generic interfaces **for easy and safe Battery insertion and removal in electric vehicles.**

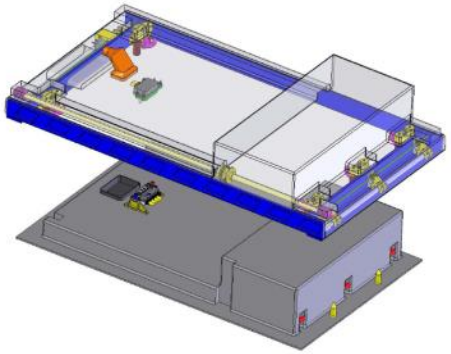
Project Coordinator: Dr. Chanan Gabay

Duration: 30 Months (2011 - 2013)

EC Contribution: 2,240,000 Euro

The Solution: Standard Interface !

- Mechanical interfaces
- High voltage power interfaces
- Thermal interfaces
- Low voltage and data interfaces



Battery Switching Station

EASYBAT Main Objectives

- Develop **Generic Interface Concepts** to enable interoperability and interchangeability between the battery and the vehicle on-board systems.

- Suggest new **standards** to build a consistent regulation framework for the battery pack generic interfaces.

- Assessment of EASYBAT's solution in terms of:
  - **Cost, Logistics and Environmental impact**

1st Step: Analysis Existing Solutions:

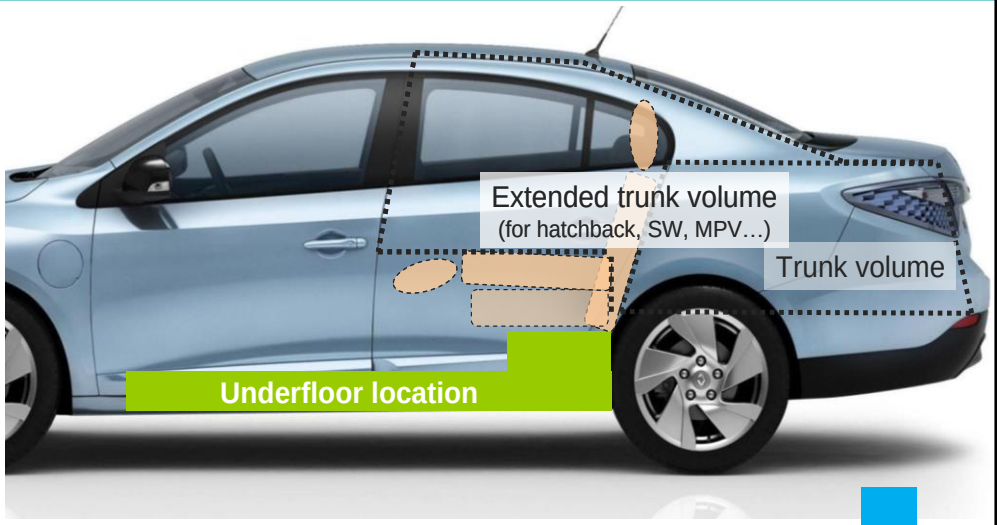
- Electric vehicles suffer from short driving range performance, by switching the battery of the electric vehicle, its range can be extended.
- A switchable battery pack that can be easily installed and removed into and out of the electric vehicle.
- Two alternatives solutions today:

Active Solution	Passive Solution
The **vehicle** plays an **active** role in **releasing/locking** the **mechanical** locks of the battery, while the BSS is not involved in this mechanical locking .	The **BSS** plays an **active** role in **releasing/locking** the **mechanical** locks of the battery, while the vehicle is not involved.

1st Step: Analysis Existing Solutions

Ex.: Cabin Functionality

- trunk volume
- RR seats functionality

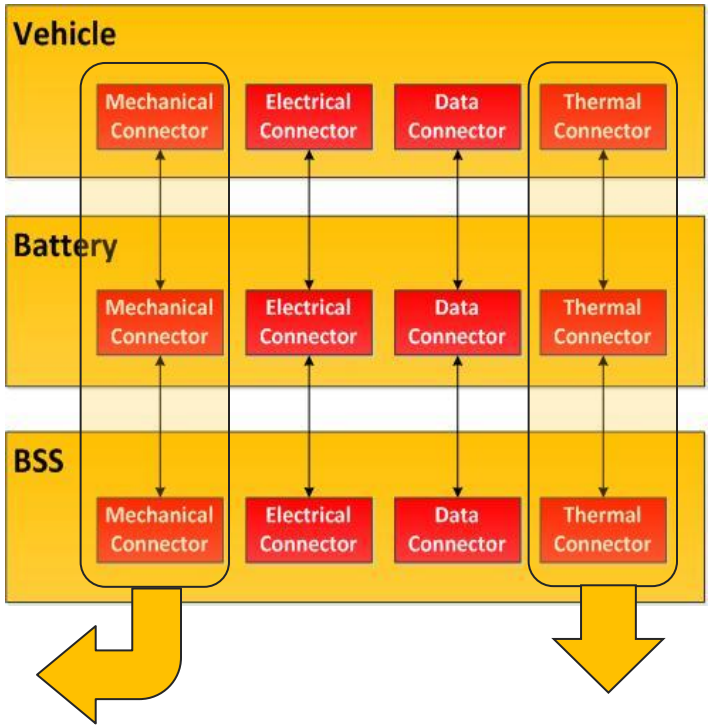


Req. #	Requirement	Originating constraint	From	To
R1	Battery location won't impact the trunk volume in coherence with market values of the vehicle segments	Cabin functionality – trunk volume	Customer	Battery
R2	Battery location won't impact the RR seats functionality compatible with hatchback, SW, MPV... concepts	Cabin functionality – RR seats functionality	Customer	Battery

2nd Step: Interface Requirements

Mechanical Interface Requirements:

- **Secure** the **battery pack to vehicle body.**
- **Aligning** and **preloading** against the vehicle body.
- **Generic:** the solution can be used for all EVs and all battery packs, and between the Battery Switch Station and any type of EV.
- **Simple** and cost effective.
- Not sensitive to underbody **contaminations**.
- Allows a **fast** switch process.



Thermal Interface:

While cooling by **air** solutions already **exist**, a study regarding **water cooling** is conducted within the EASYBAT project.

The results are expected to include a technical and economical comparison to current air cooling solutions.

3rd Step: Architecture

The 4 independent duplicated compliant mechanical interface modules:

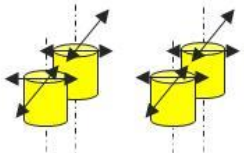
On board passive mechanism

1 specific active tool per battery type or vehicle platform

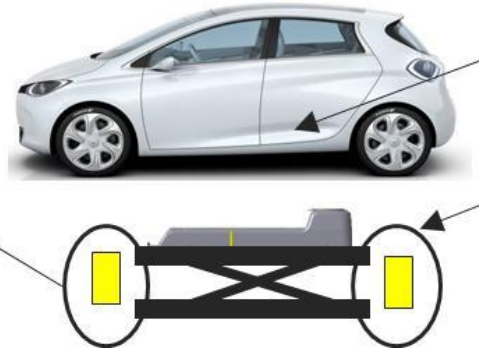
On board active mechanism

1 standard passive tool for all battery types and vehicle platforms

Standard BSS + standard mechanical interface



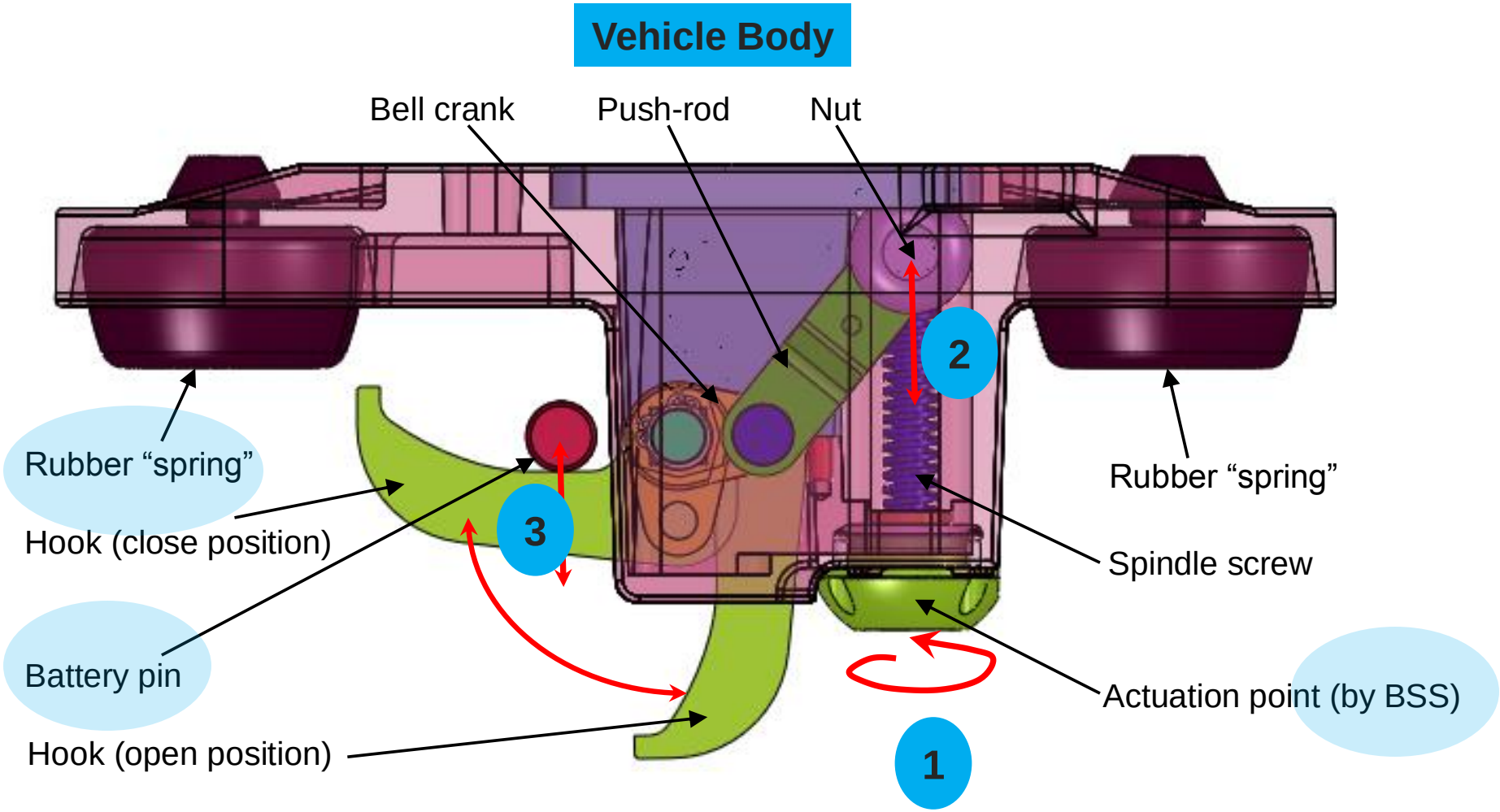
4 standard duplicated tools for all battery types and vehicle platforms



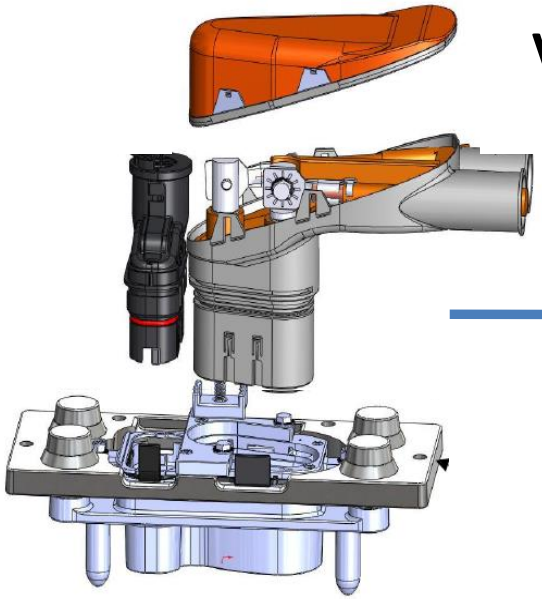
1 mechanism (standard interface)

1 standard tool for all battery types and vehicle platforms

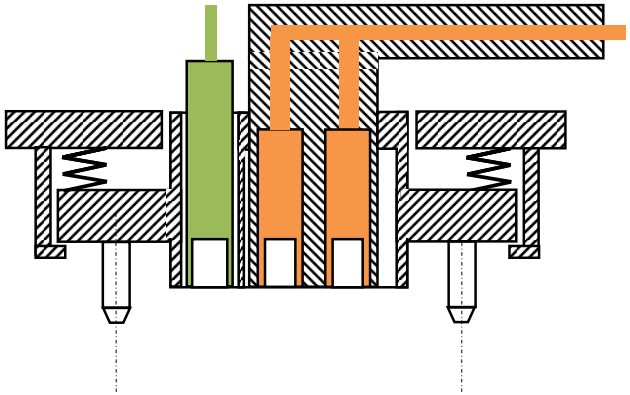
4th Step: Development – Mechanical interfaces Mechanism



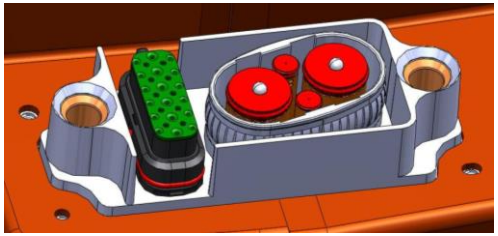
Electrical Interface

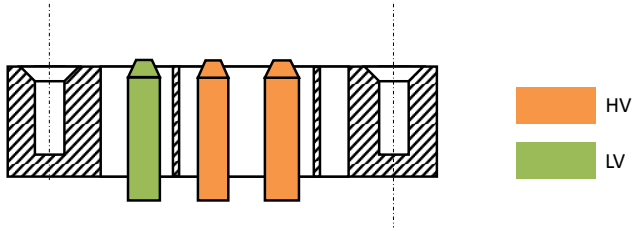


Vehicle/BSS connector



Battery connector

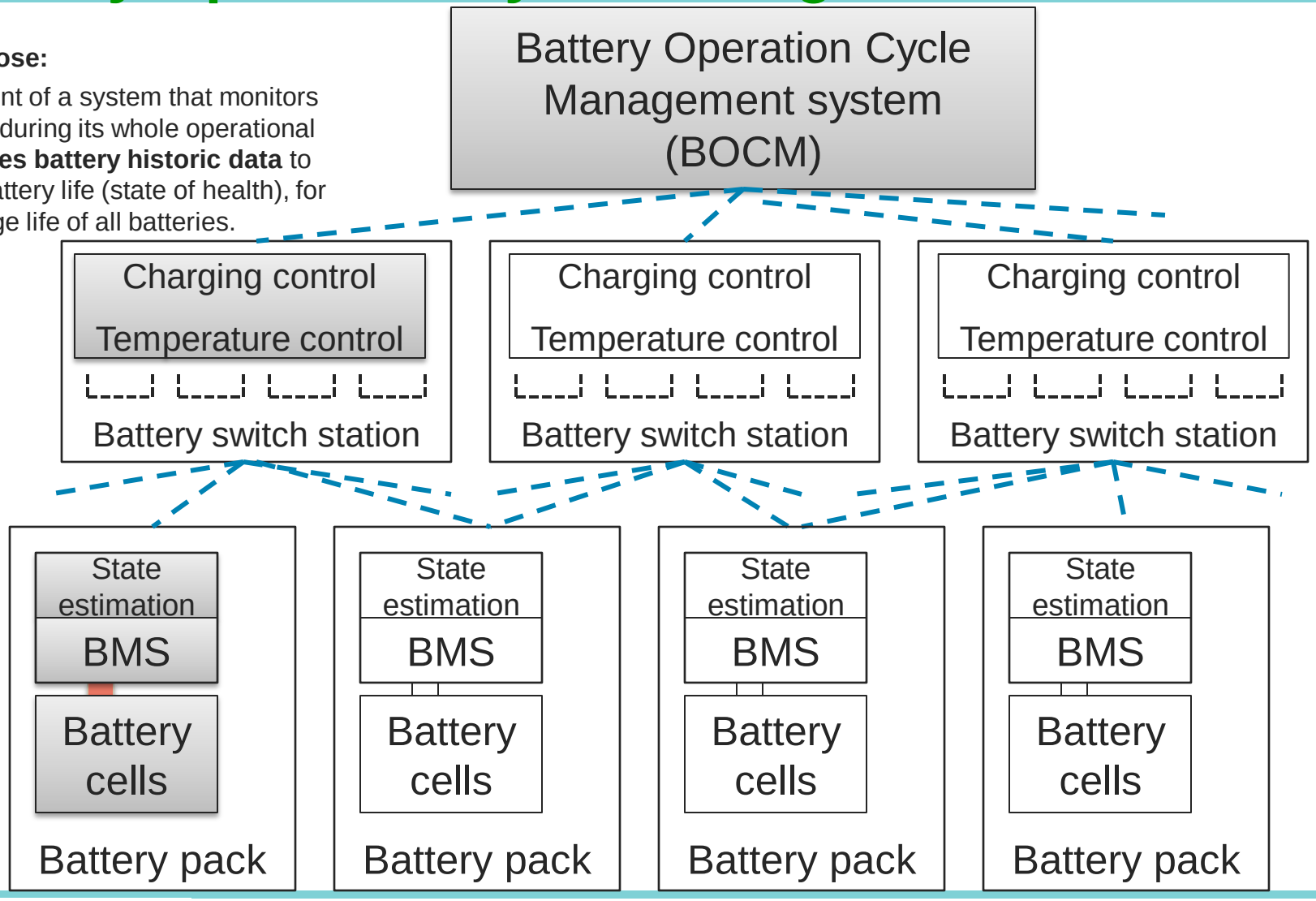




Data Interface:
Battery Operation Cycle Management

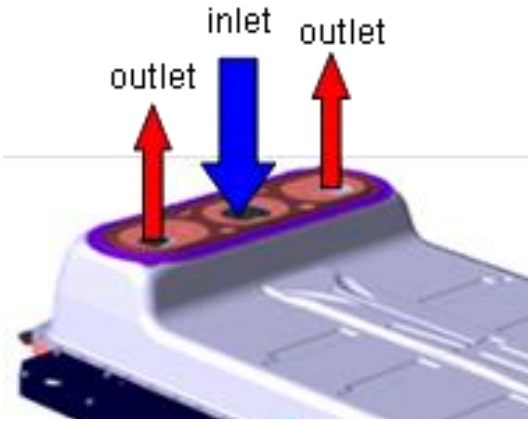
Main Purpose:

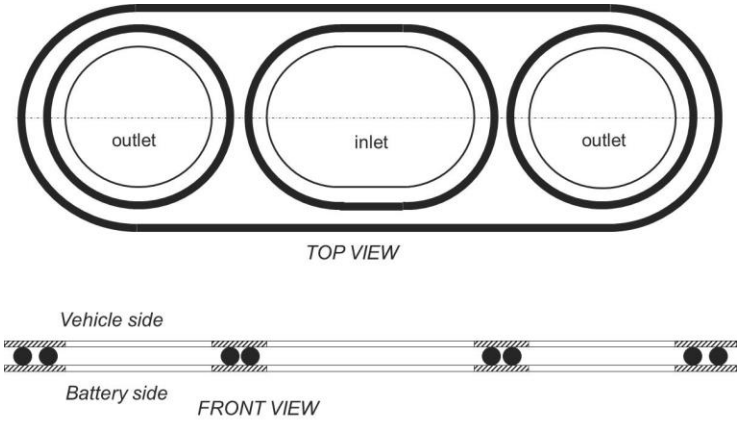
Development of a system that monitors the battery during its whole operational **life and uses battery historic data** to estimate battery life (state of health), for best average life of all batteries.



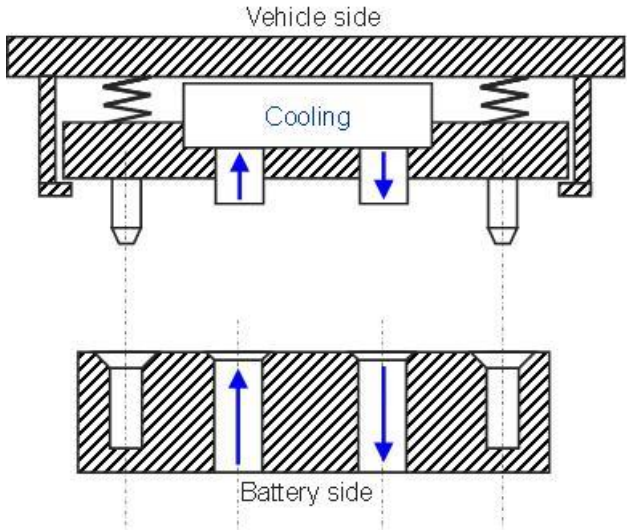
Cooling Interface

By air





By liquid



Final Step: Demo & Workshop Agreements

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Demonstration

CENELEC

EASYBAT Workshop Agreements on
"Switchable batteries for electric cars"

23 & 24 April 2013

Renault technical center, 1 avenue du Golf 78288 Guyancourt

http://www.cenelec.eu/pls/apex/f?p=WEB:NEWSBODY:3417247645110363::NO::P300_NEWS_ID:125

Thank You