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EPSiL

Steering System in the Loop

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Agenda

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Introducing EPSiL: Real-Time test bench for Steering Systems.

EPSiL enables real-time testing of complete steering systems in indoor settings. Designed to analyze the interaction between wheel forces, steering functions, and human interaction, EPSiL ensures comprehensive evaluations.

EPSiL applies steering link forces respecting vehicle kinematics, while allowing drivers to handle the steering wheel and interact with virtual simulations and drive virtual cars with real steering system.

- ✓ Steering Column
- ✓ Steering Rack
- ✓ DUT’s EPS system

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What can you do with EPSiL?

EPSiL Bench provides a suitable platform for the development, fine-tuning, and validation of steering functions within controlled environments.

FuSa
Fault injection

SOTIF
Management of predictable risks

Subjective Evaluations
Steering feel

Vehicle Dynamics
EPS, ADAS

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Key performances of EPSiL

EPSiL is designed for easy integration and precise performance. With real-time testing capabilities and accurate reproduction of steering system working conditions, EPSiL ensures reliable results.

Communication latency
< 3 ms

Max dynamic force on the steering link
20 kN

Communication protocol with the real-time machine
EtherCAT

Max linear travel of robotized pedal
150 mm

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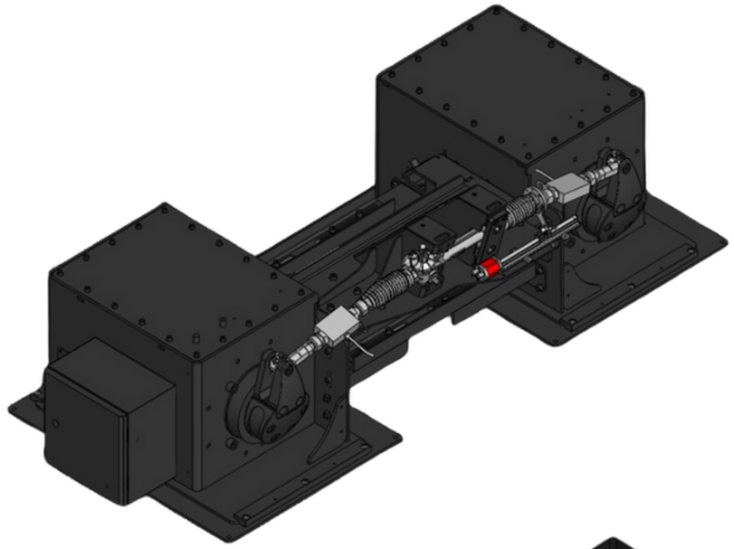
EPSiL versions

EPSiL fully integrates steering system components into simulation loop. With a rocker-link mechanism, EPSiL applies forces in three spatial directions, not just in line with the rack, just like it happens in a real car.

Choose between vertical- or horizontal-oriented motors to tailor EPSiL to your specific steering system testing needs.

1



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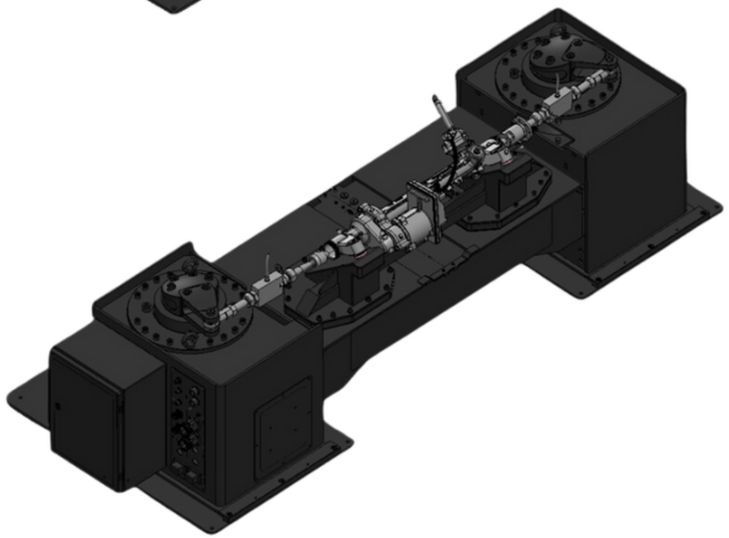

1 Horizontal motors

2 Vertical motors

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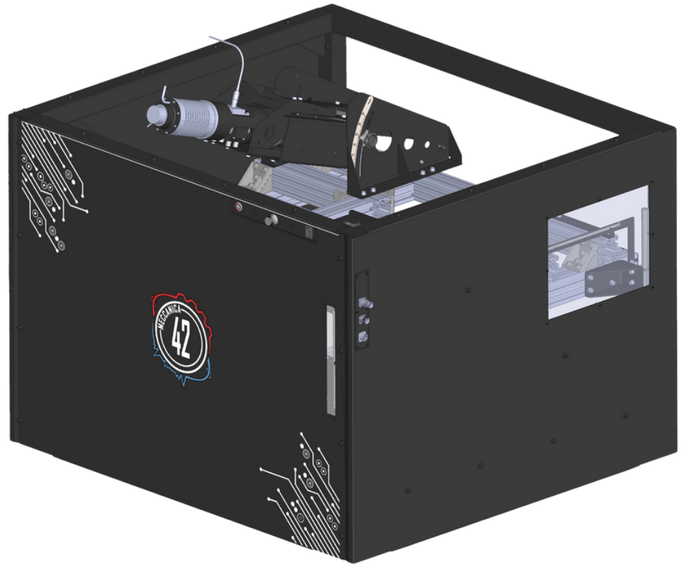
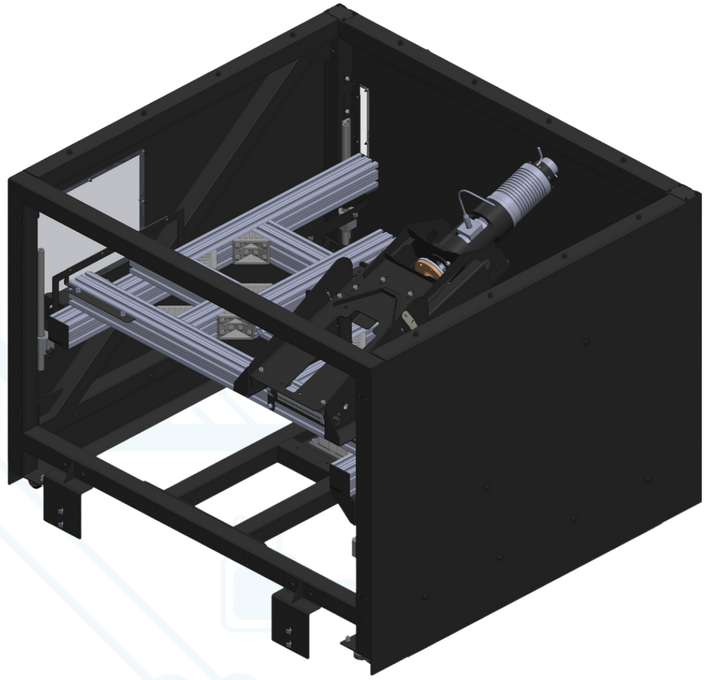
Steering Motor Cube - Not only a support for Steering Robot

Steering Motor Cube ensures precise positioning of the steering column in line with the real car, allowing the SR position to be adjusted in three directions and in pitch too.

With SMC, you can both control your EPSiL bench from a remotized cockpit and perform automated testing.

Furthermore, you can use SMC as a steering wheel actuator in a Steer-by-Wire system test bench, decoupling it's application from the only use on EPSiL bench.





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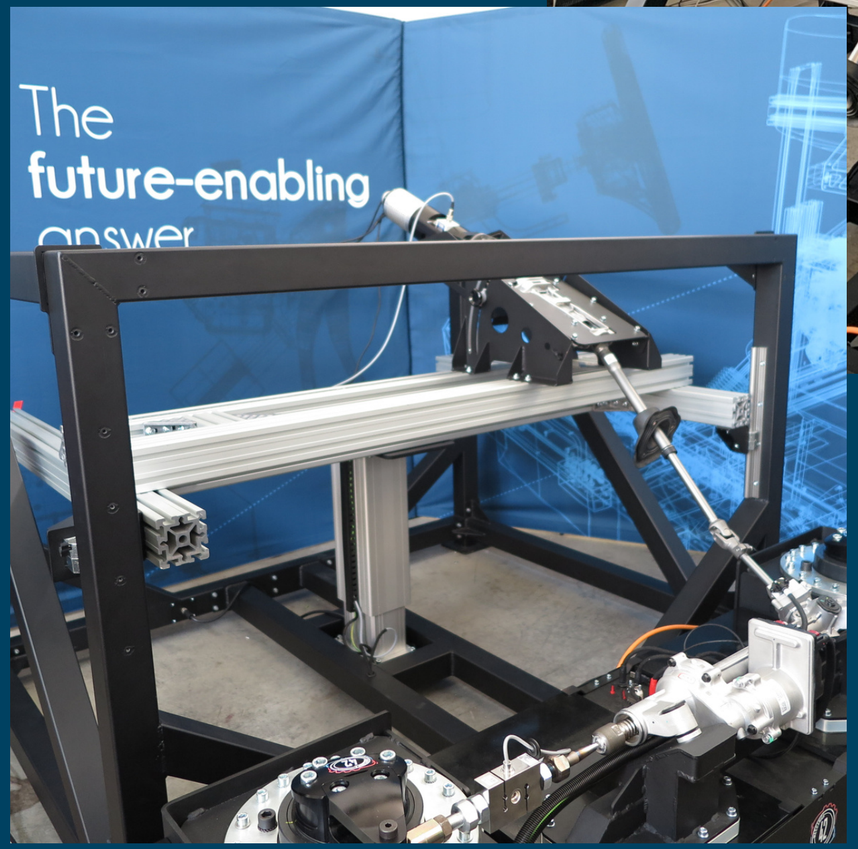
Virtual Column - Steering wheel and steering column united, even remotely

Virtual Column provide the possibility to drive your EPSiL bench also from a remoted cockpit with the use of the FS (Feedback System) and SR (Steering Robot) actuators.

The FS actuator provides an incredibly realistic steering feedback based on the actual dynamics of the DUT in EPSiL, that is controlled by SR.



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EPSiL can be a built-on-you product

Imagine a product that feels like it was made just for you - because it was.

What can you custom on your EPSiL?

- Rocker links geometry and dimensions
- DUT central frame and motor island links
- Connectors/wiring
- Tuning controls and interfaces

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BrakeiL

Brake System in the Loop

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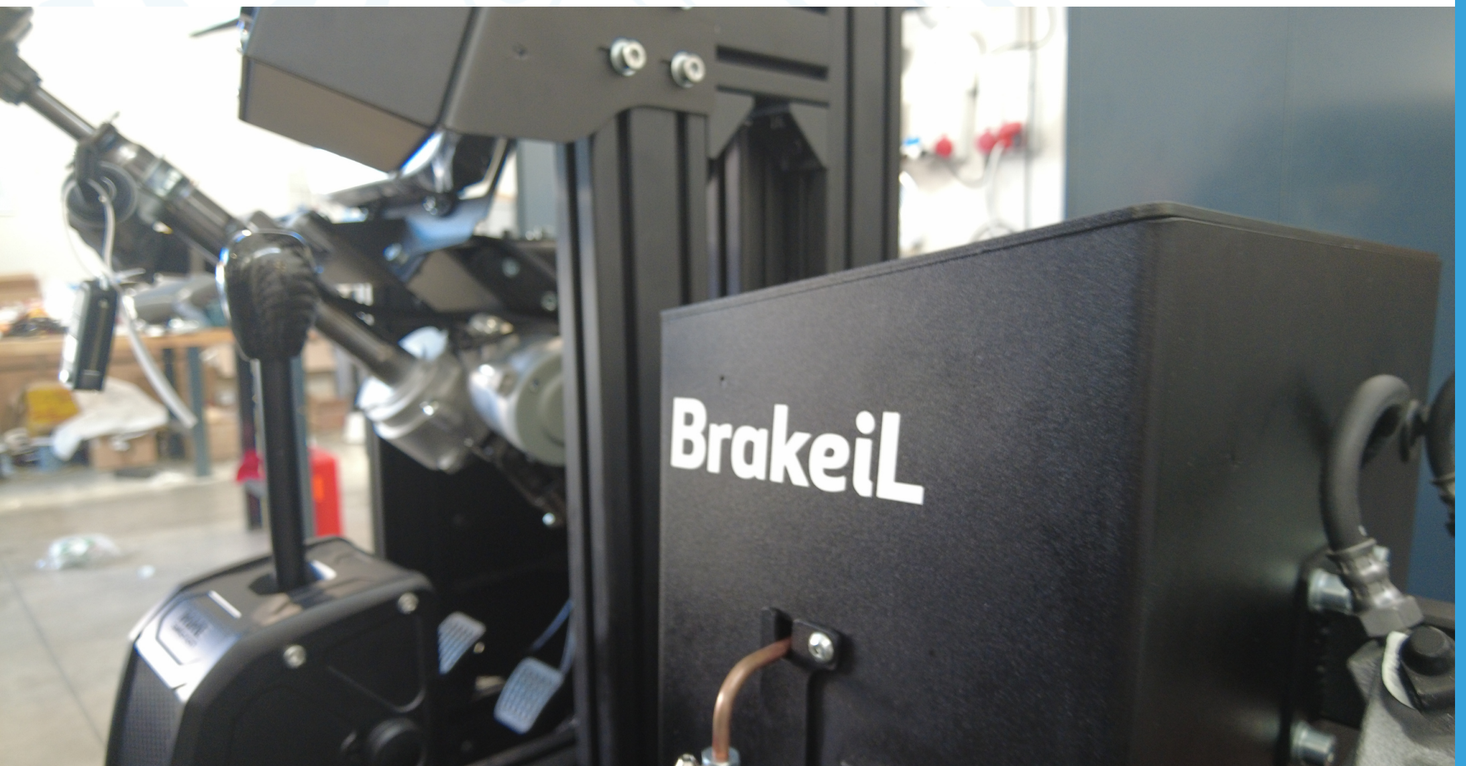
Agenda



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Introducing BrakeiL: real-time rig for testing complete brake systems.

The brake pressure is directly built up by the master cylinder and all the braking functions (ABS, ESC, etc.) are physically performed by the devices under test.

With BrakeiL you can test complete brake system including (depending on the vehicle under test):

- ✓ Brake pedal
- ✓ Master cylinder
- ✓ Brake-By-Wire
- ✓ Brake booster (pneumatic, electric, electromechanical, etc.)
- ✓ One-box brake system
- ✓ ESC module
- ✓ Hoses, callipers, pads, and discs

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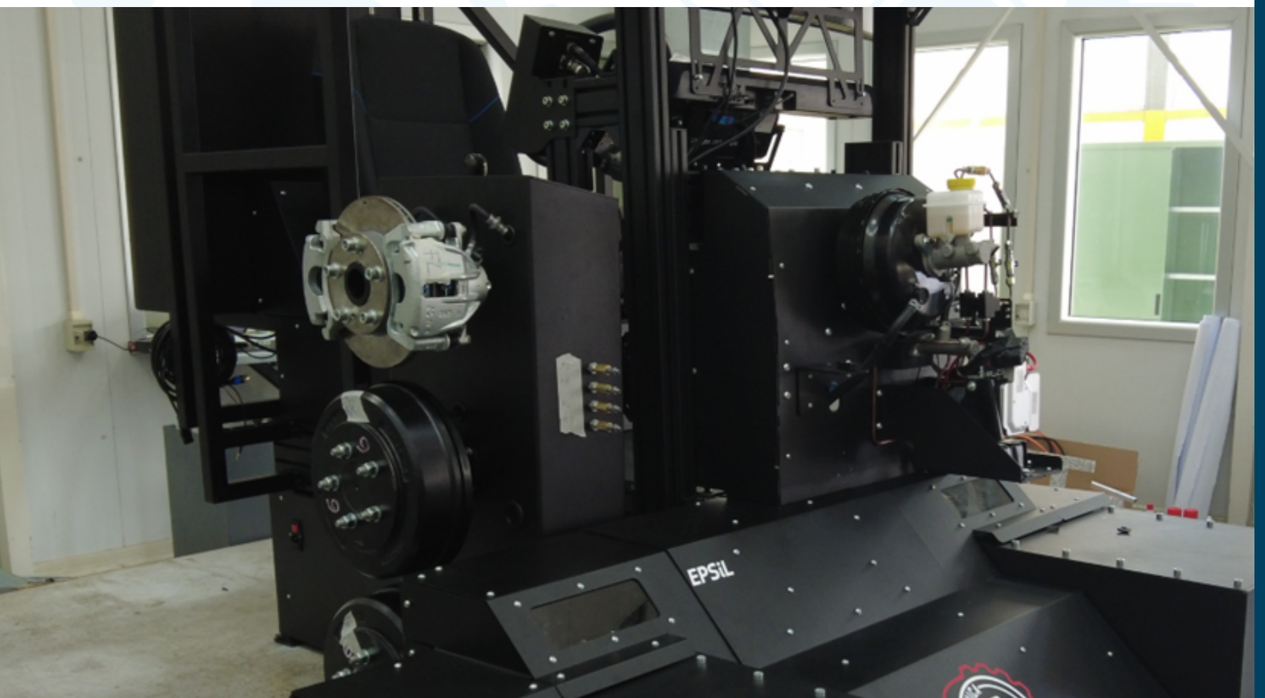
What can you do with BrakeiL?

BrakeiL enables human-driven and automated tests into driving simulators and it is suitable to develop, tune and validate braking functions in:



FuSa
Fault injection

SOTIF
Management of predictable risks

Subjective Evaluations
Brake pedal feel

Vehicle Dynamics
ABS/ESC

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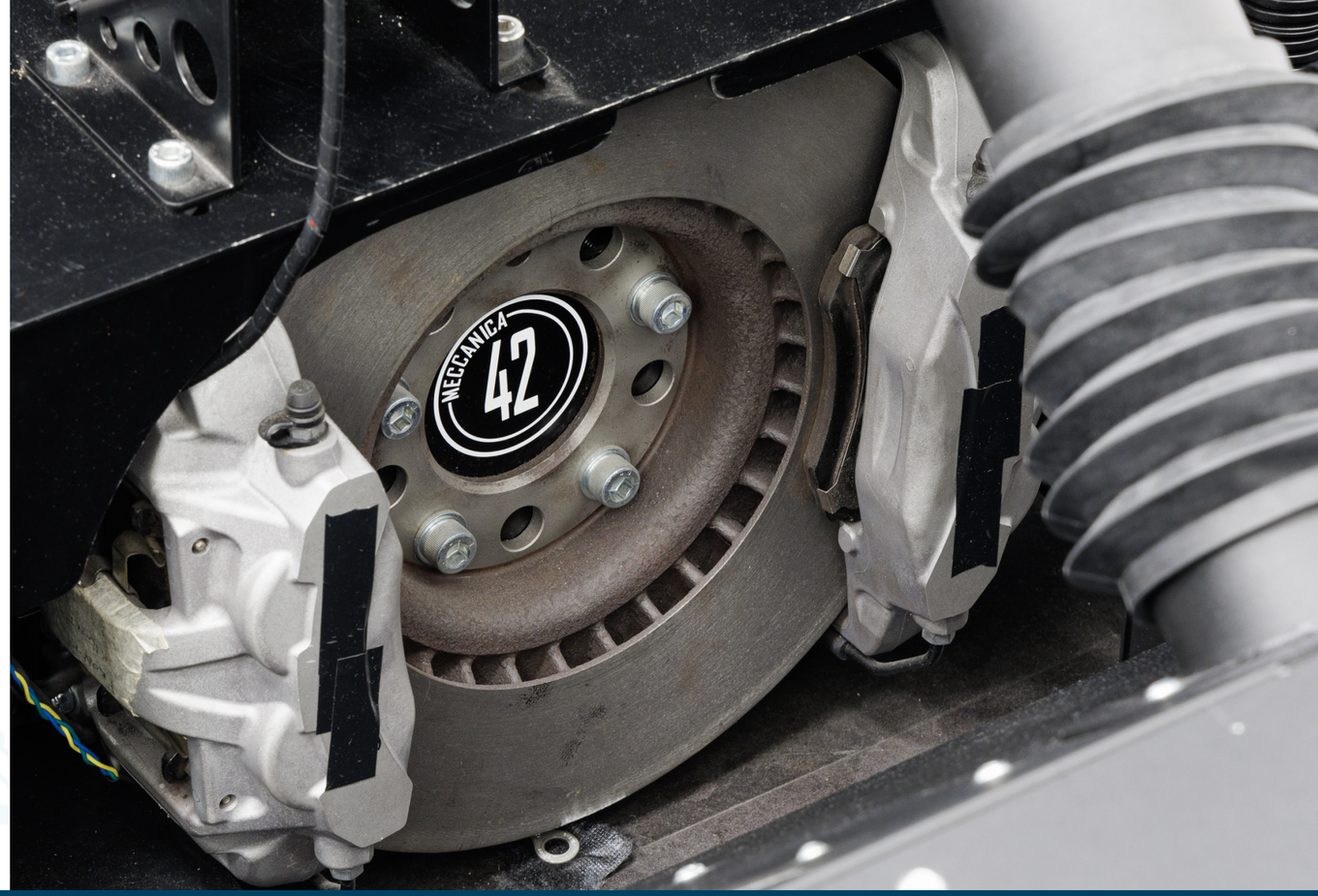
Key performances of BrakeiL

BrakeiL is designed for easy integration and precise performance. With real-time testing capabilities and accurate reproduction of wheel speed signals, BrakeiL ensures reliable results.



Communication latency
< 3 ms

Max force of robotized pedal
2000 N

Communication protocol with the real time machine
EtherCAT

Max linear velocity of robotized pedal
1.1 m/s

Max linear travel of robotized pedal
150 mm

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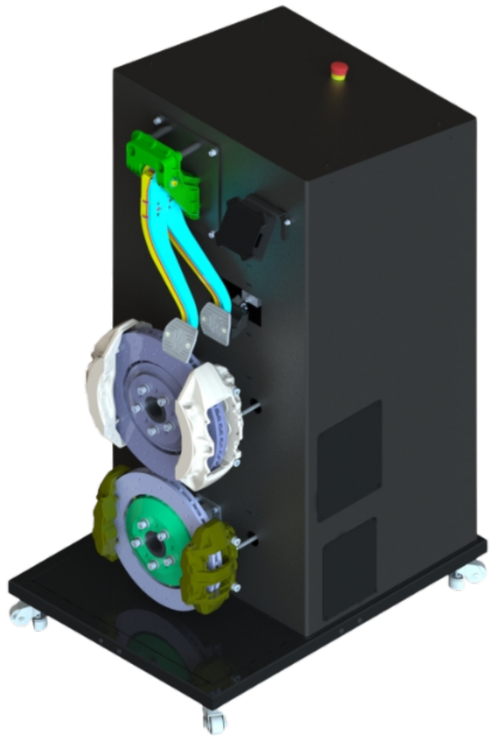
BrakeiL versions

BrakeiL integrates brake system components into simulation loops. In its standard version, the driver has the option of acting on the brake system from the cockpit. In its remoted version, on the other hand, BrakeiL also allows the bench to be mounted in a location other than the cockpit, enabling the braking system to be controlled remotely.

1

2



1 **BrakeiL - STD**

2 **BrakeiL - REM**

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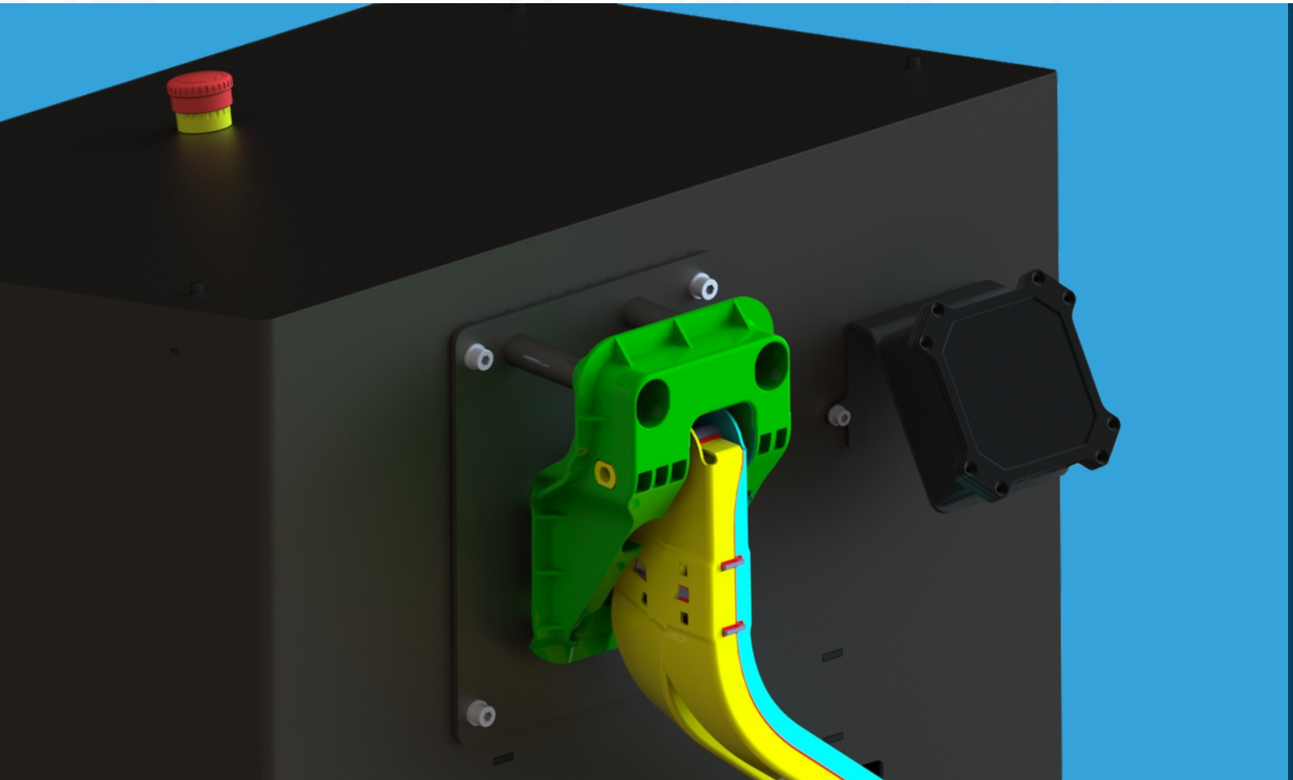
BrakeiL optionals

Complete your BrakeiL bench with our products: you can use the bench with all its functions.

WSE – Wheel Speed Emulator



Valve systems for adjusting system compliance

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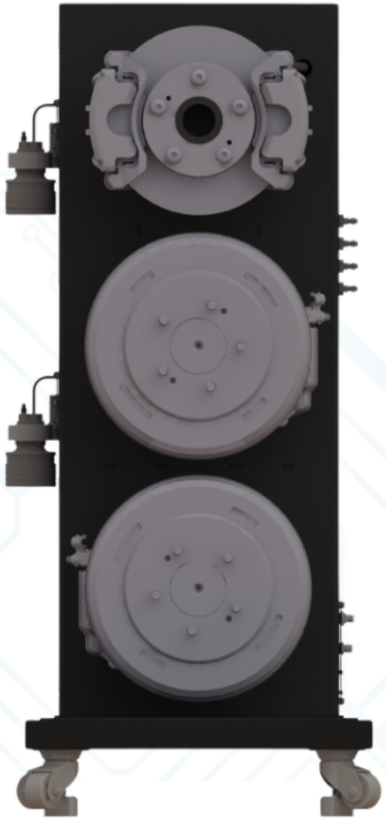
BrakeiL options



Compatible with disc and drum systems

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BrakeiL can be a built-on-you product

Imagine a product that feels like it was made just for you - because it was.

BrakeiL can be a built-on-you product

- ✓ Braking element links
- ✓ Connectors/wiring
- ✓ Pipe routing
- ✓ Cable management
- ✓ Tuning controls and interfaces

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CamiL

Camera in the Loop

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Agenda

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Introducing CamiL: Bridging the Gap Between Real-World and Simulation Environments!

Unlock the power of camera-based vehicle functions in your driving simulator lab with CamiL. Integrating virtual scenarios into your setup, CamiL immerses your camera in lifelike simulations through an advanced system of lenses and monitors.

But that's not all – CamiL goes beyond visuals. With virtual sensors complementing your suite of sensing devices, experience the full spectrum of ADAS functionalities in action.

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What can you do with CamiL?

CamiL enables to test all the functionalities of the vehicle's vision devices in a controlled environment.

FuSa
Fault injection

SOTIF
Management of predictable risks

Vehicle Dynamics
ADAS/AD

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Key features of CamiL

CamiL allows the introduction of the camera-based vehicle functions into a driving simulator laboratory.

Optional camera blinding system
Simulate emergency situations

Fully adjustable camera position
x, y, z and pitch angle

Communication protocol with the real time machine
CAN, Flexray, others

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CamiL options

Bench offers the option to integrate our advanced blinding system. This enhancement allows CamiL to realistically replicate various scenarios, accurately simulating the effects of sudden flashes of light on camera performance.

Blinding system

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CamiL can be a built-on-you product

Imagine a product that feels like it was made just for you - because it was.

What can you custom on your CamiL?

- Camera adjustable linkages to CamiL
- Camera field adaptation lens
- Connectors/Tuning controls and interfaces

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WSE
Wheel Speed Emulator

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Introducing WSE:

this device estabilished the raw signals of up to four wheel speed sensor into HIL simulations.

Supply Voltage
12 V

Output current levels
7-14-28 mA

Communication rate
Up to 100 Mbps (EtherCAT) / 1 Mbps (CAN)

Communication
EtherCAT or CAN

What can you customize?

- Tunable wheel Parameters (Radius, pole number)
- User defined data protocol bits
- Switching protocol
- AK protocol

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FB
Passive Feedback Unit

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Introducing FB: Customizable Pedal Feel for Brake-by-Wire Vehicles.

FB is a compact and lightweight device designed to tailor pedal feel to individual preferences in brake-by-wire vehicles. Its friction-minimizing technology ensures precise responsiveness, adapting smoothly to user needs.

Plus, FB seamlessly integrates with our simulators, enhancing the cockpit experience with adjustable pedal feel.

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Key performances of FB

Discover the most brilliant features of FB.

Max allowable pressure
200 bar

Light and compact
Under 500g

Easy mounting
M10x1 hydraulic coupling

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The **future-enabling** answer

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