



# Continental Engineering Services Develops Brake Systems with Hardware-in-the-loop Simulation - a First in the Motorcycle Sector

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In automotive development, virtual development methods are state-of-the-art and there are no existing alternatives in standard development and release processes. Advantages such as reproducible test environments, the possibility of automation and faster feedback on result communication between tester and developer can seamlessly be transferred to the two-wheeler sector. The tests accompanying the development pose specific challenges for the test drive regarding safety and space requirements for measurement technology. Errors in vehicle dynamics control functions are a significant risk for test drivers in the two-wheeler sector.

When developing brake control unit for two-wheelers, Continental Engineering Services GmbH (CES) now makes use of the hardware-in-the-loop experience from the automotive sector. The modular body of the test bench enables extensions to develop and test motorcycle brake systems.

Using the open integration and test platform MotorcycleMaker, risky maneuvers and error injections

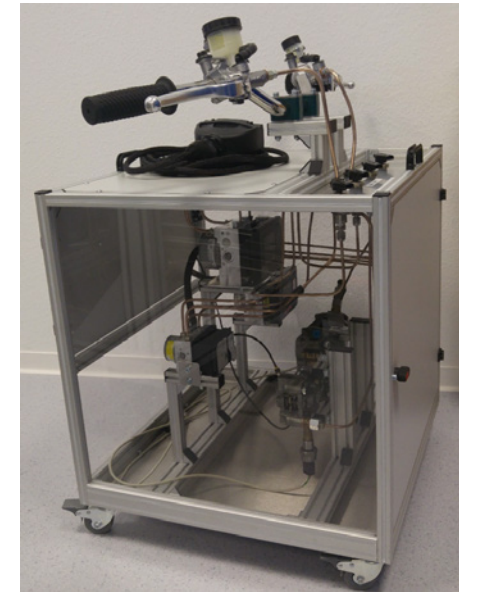
with high measurement technology requirements can be performed on the test bench. Here, the hydraulic part of the brake system, consisting of the brake control unit, the brake caliper and the operating unit, is physically present. MotorcycleMaker facilitates the simulation of the remaining parts of the virtual vehicle and allows for the addition of errors in conjunction with the Fail Safe Tester. The interface from the virtual world to the real world is implemented by the real-time capable Xpack4 hardware. The real-time system enables restbus simulation and electronic interfaces to peripherals of the test bench.

Extensions of motorcycle ABS are being developed in current projects, resulting in the increased implementation of cornering ABS and traction control.

With this hardware-in-the-loop test bench, Continental Engineering Services GmbH extends the test landscape to enable the development of vehicle dynamics control functions as well as advanced driver assistance system in the two-wheeler sector.



Visualization of the test in IPGMovie



The modular design of the test bench

## Overview

<p><b>Customer</b></p>  <p>Continental Engineering Services GmbH</p>	<p><b>Country</b></p>  <p>Germany</p>	<p><b>Products</b></p>  <ul style="list-style-type: none"> <li>• MotorcycleMaker/HIL</li> <li>• Xpack4 real-time computer</li> <li>• Fail Safe Tester</li> </ul>
<p><b>Challenge</b></p> <p>Eliminating errors in vehicle dynamics control functions for two-wheelers</p>	<p><b>Solution</b></p> <p>Testing the brake system on the test bench</p>	