

## *SimulationX is used by the BMW Group for the simulation of Bowden cables in virtual vehicles.*

The Bavarian OEM and ITI enjoy a longstanding business relationship in the field of system simulation developing versatile solutions in all kinds of physical domains for now more than a decade.

Both ITI's software and its engineering services have helped BMW optimize powertrains and hydraulic applications. ITI's fundamentally new simulation models make system simulation not only more accessible, but also expand into completely new fields of application across departments.

SIMULATION X



*The simulation results achieved with SimulationX are in line with the data BMW measures. Consequently, the company applies this simulation method to more and more areas of the development process.*

### Challenge

#### **Simulation of Bowden Cables**

The development engineers of ITI's key customer were looking for a simulation tool that could calculate changes in position and shape of Bowden cables already fitted to the virtual vehicle – taking into account kinematic and kinetic conditions as well as forces required to operate various mechanisms.

### Solution

#### **SimulationX Professional Edition**

Based on the design data, various scenarios, such as opening lids and operating door handles, are scrutinized through simulations of the virtual vehicle. Characteristics like changes in length by bending, changes in shape by drag force and pressure from the cable housing as well as friction between cable and housing are modeled three-dimensionally to feed the results back into the design program.

### Benefits

#### **Optimization from the start**

Simulating Bowden cables with SimulationX permits evaluating concepts at an early stage without any hardware setup, which in return means shorter change cycles and increased ease of use.