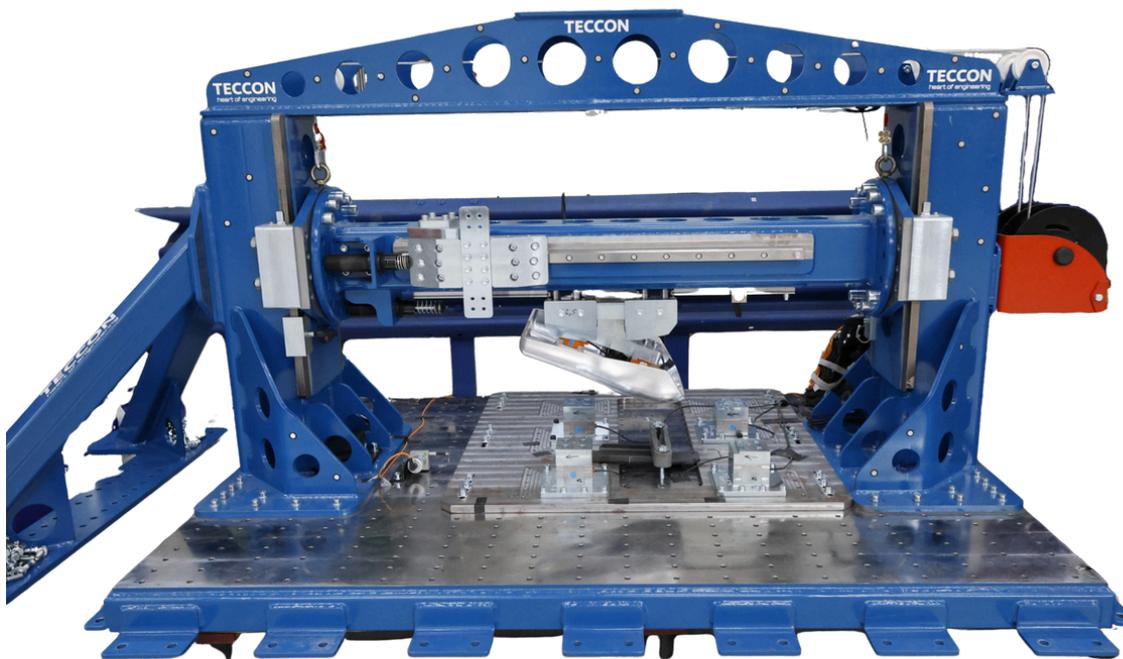# TECCON
heart of engineering

SAM: SEAT ASSESSMENT MACHINE
Virtual Restraint System Development

- **Dynamic testing:** SAM enables both frontal and lateral seat test setups, replicating real-world crash conditions
- **Correlation of hardware and simulation:** It ensures strong alignment between physical seat components and CAE seat models, making simulations more reliable.
- **Detailed analysis of seat structure:** SAM provides crucial insights into the seat restraint behavior under crash loads.
- **Integration of hardware testing and digital twin:** Combining physical tests with virtual simulation improves seat model validation, supporting efficient, safety-focused vehicle development.
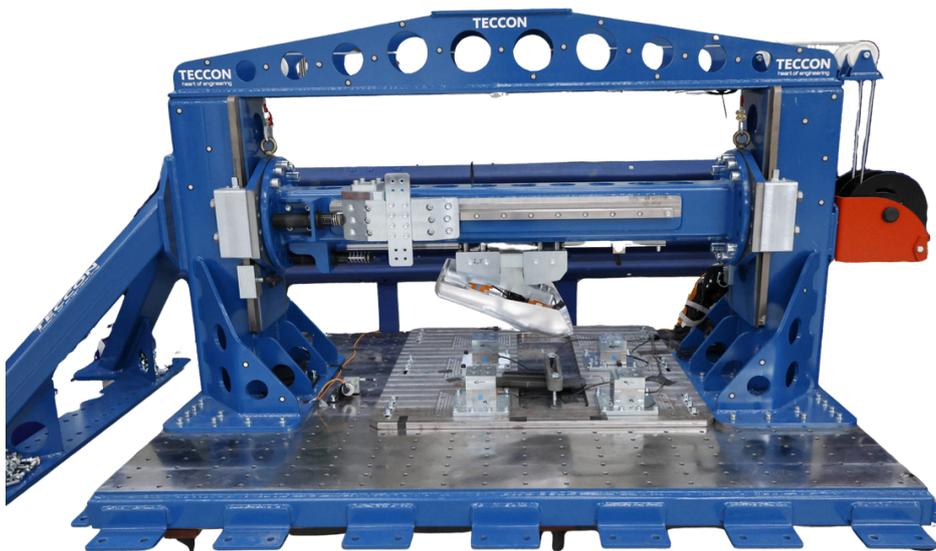
SAM: SEAT ASSESSMENT MACHINE

Virtual Restraint System Development

The Seat Assessment Machine (SAM) is an **advanced testing** and validation system developed for the **virtual development of automotive restraint systems**.

With both **frontal and lateral test setups**, SAM enables load-case-specific dynamic testing to accurately reproduce real crash scenarios. These tests are used to correlate physical seat hardware with CAE seat models, ensuring a **high level of consistency** between **simulation and experimental results**.

Through **detailed analysis of the seat's restraint performance**, SAM provides essential insights into **occupant safety**, seat structure behavior, and energy absorption characteristics.

By combining hardware testing and **virtual simulation**, TECCON Austria achieves a higher validation quality of seat models, supporting efficient and safety-focused vehicle development for future mobility solutions.

SAM: SEAT ASSESSMENT MACHINE

Virtual Restraint System Development
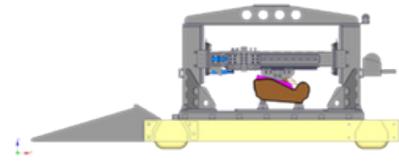
FRONT SETUP

The front test setup of the Seat Assessment Machine (SAM) is designed for precise, load-case-oriented evaluation of vehicle seats under frontal impact conditions.
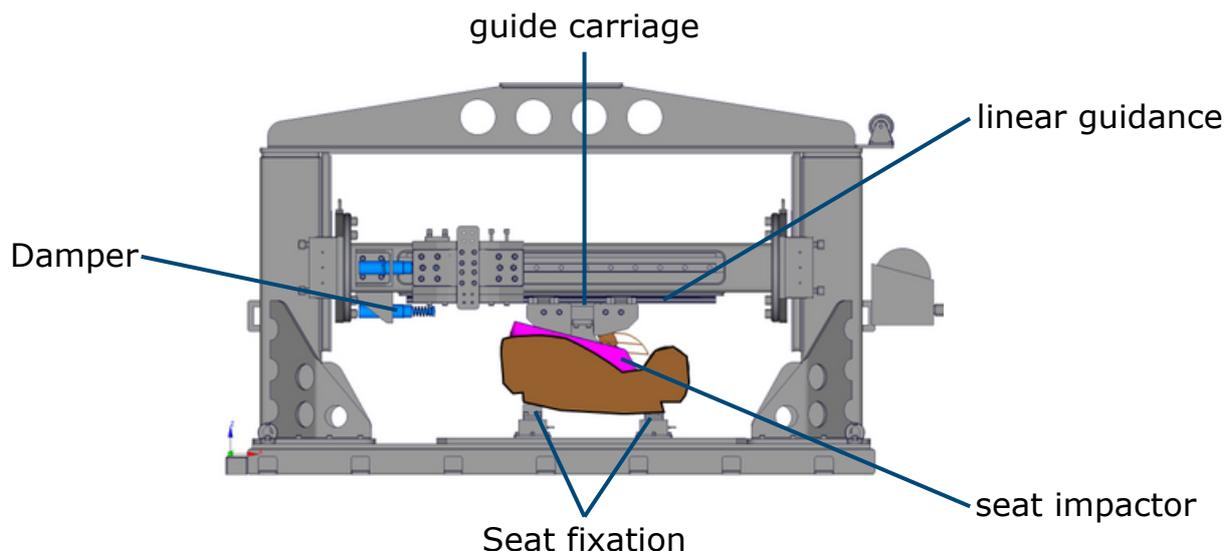
Test variations:

- Guide sled mass
- Sled acceleration
- Impactor insertion depth
- Seat position settings
- Tests conducted with or without HUT (Hybrid III Test Dummy)
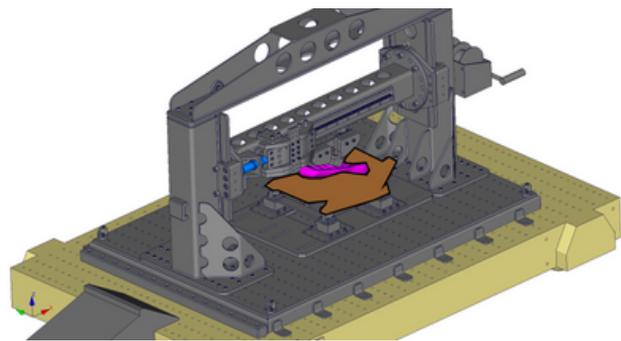
Measurements include:

- 1× displacement measurement of the guide sled
- 2× force measurements at the seat impactor
- 4× force measurements at the seat mounting points
- 1× acceleration measurement of the sled
- 1x z Seat displacement (Potentiometer)

Optional: Plexiglass wall with grid for visualization and optical tracking.

guide carriage
linear guidance
Damper
seat impactor
Seat fixation

This configuration allows highly accurate correlation between physical testing and CAE seat models, supporting robust validation of seat restraint performance in frontal crash scenarios.
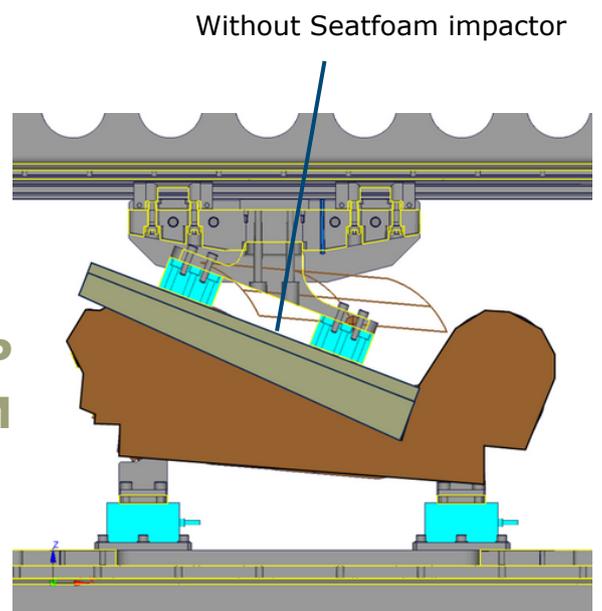
SAM: SEAT ASSESSMENT MACHINE

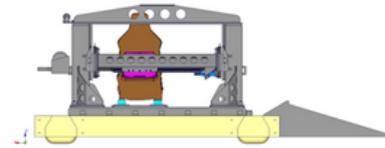## Virtual Restraint System Development

FRONT SETUP

distance measurement

force measurement

acceleration measurement

Optional plexiglass wall with grid

Without Seatfoam impactor
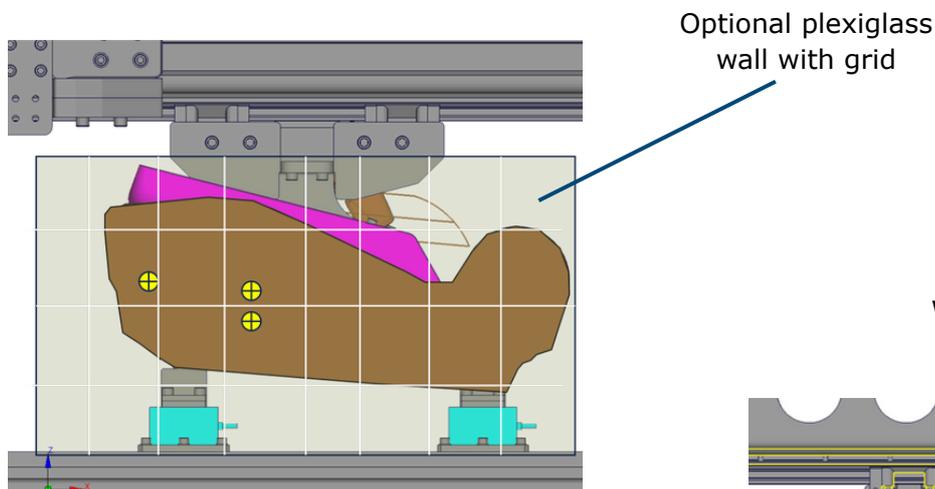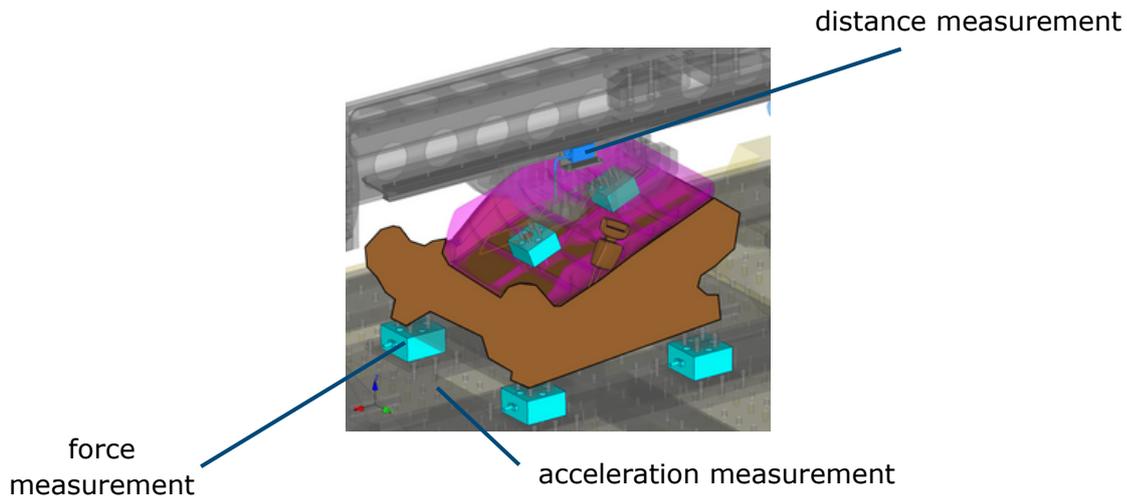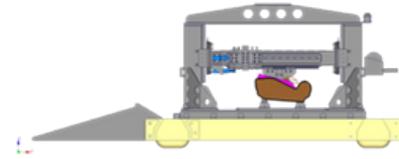
FRONT SETUP
WITHOUT SEATFOAM

SAM: SEAT ASSESSMENT MACHINE
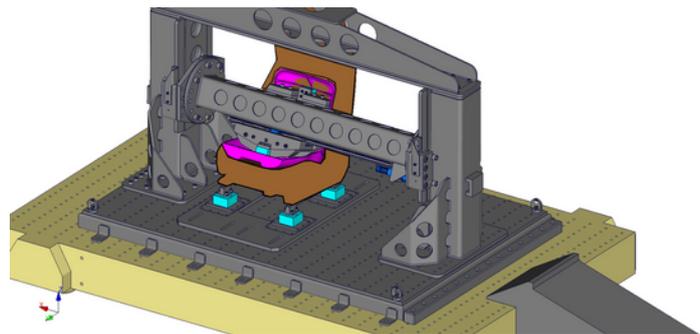
Virtual Restraint System Development

LATERAL SETUP

The side test setup of the Seat Assessment Machine (SAM) enables detailed evaluation of seat performance under lateral impact conditions.


Test variations:

- Guide sled mass
- Sled acceleration
- Impactor insertion depth
- Seat position settings

Measurements include:

- 1× displacement measurement of the seat impactor at the seat cushion
- 1× displacement measurement of the seat impactor at the seat backrest
- 2× force measurements at the seat impactor (seat cushion)
- 2× force measurements at the seat impactor (seat backrest)
- 4× force measurements at the seat mounting points
- 1× acceleration measurement of the sled
- 1x z Seat displacement (Potentiometer)

Optional: Plexiglass wall with grid for visualization and optical tracking.
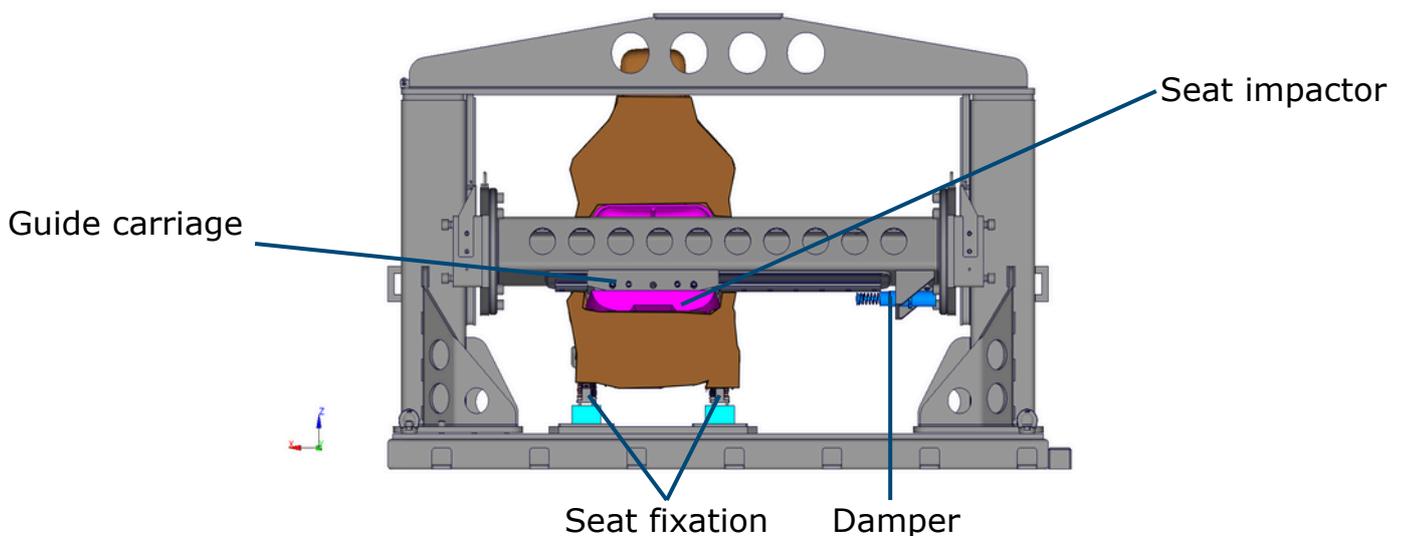
This setup provides precise, repeatable data for correlating physical seat tests with CAE seat models, ensuring reliable validation of lateral restraint performance and seat structure behavior.

SAM: SEAT ASSESSMENT MACHINE

Virtual Restraint System Development

LATERAL SETUP

distance measurement

Seat impactors separated

force measurement

acceleration measurement

Optional plexiglass wall with grid