



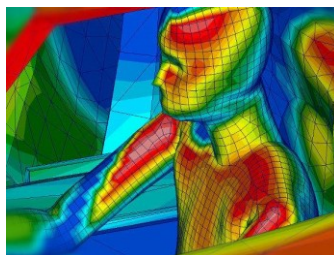
Flexible HVAC Dummy

The HVAC manikin was developed by ARRK Engineering to help OEM manufacturers evaluate and measure the passenger thermal comfort and environmental conditions in the automotive industry.

The type of vehicle for which the HVAC design is created can vary from commercial to passenger vehicles, for which the limbs of the manikin can be adjusted to suit given seat and body positions.

In order to be able to evaluate the thermal comfort of the passengers, the Theseus software is used, which is also offered by ARRK Engineering. More info about Theseus-FE <http://www.theseus-fe.com/>.

Measurements with the system are meant to be done in stationary vehicle and not while driving.



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System characteristics and utility

The HVAC manikin represents the shape of a human body and is printed from glass filled nylon.

The main body parts are fixed together with ball joints and angle joints that are lockable in various positions, making it possible simulating the movements of passengers inside of any vehicle.

The setup possibility of the body limbs presents one of the market differentiation criteria, hence additional movements of the Head have been added.

Degree of Freedom (DOF) limits of Body panels has been significantly increased compared to current existing products.

On the surface of the body panels, sensors are placed which measure the air temperature (T), air velocity (V), radiation (Rad) and relative humidity (RH).

Based on the measured data, the thermal comfort within the cabin can be evaluated by software THESEUS FE, and therefore it is possible to compare different vehicles (benchmarking).

Degree of Freedom (DOF)



Distribution of Sensors & Processing of Measured Data

The system includes 31 measuring points where all the required environmental properties mentioned above can be measured simultaneously.

Collecting the data is possible via an SD card reader unit based in an accessible area and also via live data connector.

Using both data collection possibilities the system offers a back-up solution if one of them would fail.

Assures a reliable transfer method compared to wireless transmission, also avoiding Faraday Cage impact and distortions in the climate chamber.

Live data values can be even provided in International Unit System (SI) and are able to be post processed in different evaluation software, including THESEUS FE provided by ARRK Engineering.

System offers live visual feedback to users about sensor status and any possible errors via LEDs.

Technical Parameters

Air temperature	Number of sensors	31
	Measuring range	-20°C to +70°C
	Calibration accuracy	± 1°C (Typical), ±3°C (Max)
	Display accuracy	± 0.1°C
Wind speed	Number of sensors	31
	Measuring range	0.1-5.0 m/s, Bidirectional
	Temperature compensation range	-20°C to +70°C
	Manufacture accuracy	<3% of the measured value
	Calibration accuracy	± 0.2 m/sec (0.1 – 2.0 m/s) ± 0.15 m/sec (2.0 – 5.0 m/s) (measured by ARRK Engineering)
Radiation	Display accuracy	± 0.1 m/sec
	Number of sensors	31
	Measuring range	close to 0 – up to 2000 W/m ²
	Temperature compensation range	-20°C to +70°C
	Wave length	0.2-20µm total response, plus 0.2-3µm solar response
	Calibration accuracy	± 100 W/m ²
Relative humidity	Display accuracy	± 0.1 W/m ²
	Number of sensors	31
	Measuring range	0 to 95% RH, non-condensing
	Calibration accuracy	Approx. ± 4% (0%RH - 80%RH, @25°C) ± 6% (80%RH - 100%RH)
Relative humidity	Display accuracy	± 0.1% RH

Why to choose us?

- ✓ Easy manipulation & quick installation time.
- ✓ Various data transfer methods (SD card and/or cable).
- ✓ Product, Software & Service from one hand (Theseus –FE, Training).
- ✓ Modular built and fast exchangeability of parts

<https://www.arrkeurope.com/company/references/case-studies/details/news/automotive/>

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