Hukseflux
Thermal Sensors

Engineering services

Challenging heat transfer or thermal measurement problem? Contact Hukseflux

Hukseflux offers measurement solutions for the most challenging applications. Our expertise in determining heat transfer and thermal quantities is at your disposal via our engineering services. Let us help you to improve product concepts and get better results.

Introduction

Hukseflux' main area of expertise is measurement of heat transfer and thermal quantities. We are known as a leading manufacturer of heat flux sensors, pyranometers and a range of thermal measuring systems. Did you know that Hukseflux offers engineering services as well?
We apply our expertise to related fields such as measurement of temperature differences, thermal contact resistance and to flow sensors, fouling sensors and many more.
Highlighted in this brochure are some examples of the challenging applications we encountered and the solutions we provided to our customers.

Services: what we do

- design customer-specific experiments, for example to characterise materials or determine thermal properties such as thermal contact resistances
- design and supply complete measuring and control systems, for example for use in the customer's production or quality assurance processes
- design customer-specific sensors, sometimes, not always, later manufactured by ourselves for the same customer

Why work with us

Having Hukseflux experts on board, you will get better results faster.

- our people, many with degrees in engineering and physics, have many years of accumulated experience performing measurements, designing experiments and building practical equipment. This helps, for example, to save time, make equipment serviceable, more accurate or at a lower cost
- in many cases we "recycle" our existing thermal measurement and control expertise in our customer's application
- we have many custom-made sensors (for heat flux and differential temperature) as well as measuring systems that make it possible to quickly and efficiently perform our first prototyping

Figure 1 *User at work with a typical measuring system supplied by Hukseflux.*

The next pages show you some example projects carried out by Hukseflux via its engineering services and some references.

Please contact us to discuss if our engineering services can offer a solution for your needs.

Example projects

Figure 2 *Example of a typical test facility designed by Hukseflux: SRC02. 19-inch rack, height 2.4 m. (see also figure 3).*

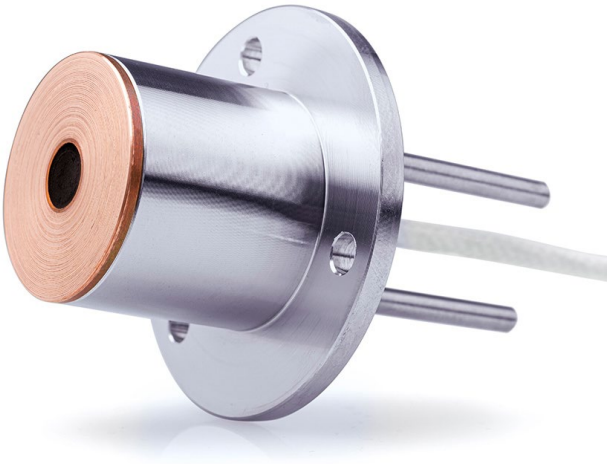

Figure 3 *Water-cooled Gardon Gauge developed in cooperation with Sandia National Laboratories.*

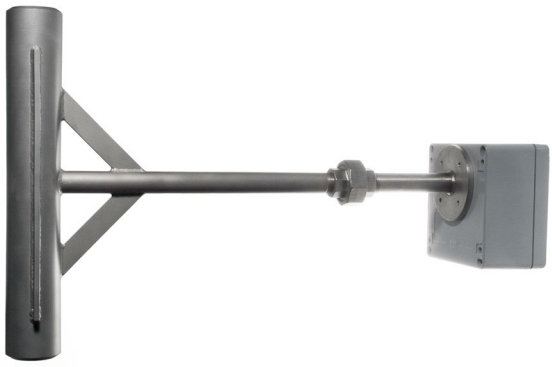

Figure 4 *Example of a typical sensor designed by Hukseflux engineering services for one single user; Clyde Bergeman Power Group. CBW01 heat flux sensor on a steam pipe. The sensor is located in the weld material at the crown of the tube. Typical use is in coal-fired boilers and solar concentrators. Wiring is led away in the vertical tube to a connection box through the boiler insulation material. CBW01 is ASME certified.*

Figure 5 *Example of a typical OEM sensor designed by Hukseflux: pyranometer for inclusion in the integrated MaxiMet compact weather station of Gill Instruments.*

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Project overview

Table 1 *Hukseflux thermal engineering and consultancy, list of some of the projects we carried out.*

HUKSEFLUX THERMAL ENGINEERING AND CONSULTANCY		
FIELD OF APPLICATION	PURPOSE	SOLUTION
Production of plastics with nanoparticles	Measurement of the thermal properties of plastic melts with nanoparticles, consistency monitoring	Thermal conductivity sensor working at high pressures and temperatures in extrusion environment. Funded by E.U., FP7 NanoOnSpect project
Meteorological calibration laboratory	Calibration of solar radiation sensors	SRC02 solar radiation calibration facility (see figure 2)
Semiconductor manufacturing	Measurement of contact resistance of interface layers in the 10 to 50 x 10^{-6} m thickness range, design verification	Specially developed measurement principle for thermal resistance eliminating the effect of contact resistance
Oil and gas; LNG pipeline insulation	Measurement of tube thermal insulation for Liquefied Natural Gas (LNG) transport, design verification	Thermal resistance test rig at partner institute, TNO, working at -160 °C
Composite testing	Estimating the through-fibre and along-fibre thermal conductivity of aramide fibres	Preparation of dedicated specimens, and test method , using fibres cast into epoxy
Graphene	Measurement of aging of graphene in space applications, stability verification	Test facility for comparative thermal resistance testing of sheet material
LED's	Measurement of the thermal power generated by LED engines, approval testing	LED thermal power tester with integrated absolute calibration. Sponsored by the ZHAGA consortium
Building physics	Testing thermal properties of building components in a real operating environment	Equipping a container-size PASLINK test cell with specially designed heat flux sensors (cells are also known as PASSYS cells).
Coal fired boilers	Measurement of fouling and control of soot blowers for Clyde Bergemann Power Group	Heat flux sensor mounted in the weld material of a boiler pipe
Solar concentrators	Measurement of high heat fluxes up to 2500 x 10^3 W/m^2	Water cooled gardon gauge. Project in collaboration with Sandia National Laboratories

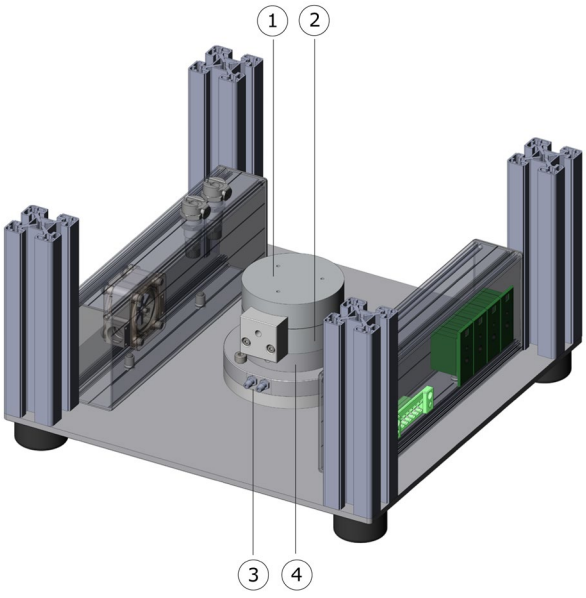

Figure 6 *Cross-section of a test facility designed by Hukseflux engineering services. LED thermal power tested designed for the ZHAGA consortium. The LED engine is mounted on the LED attachment block (1). Generated heat passes through a heat flux sensor (2) to the cooling water inlet and outlet (3). An internal heater (4) is used to calibrate the system.*

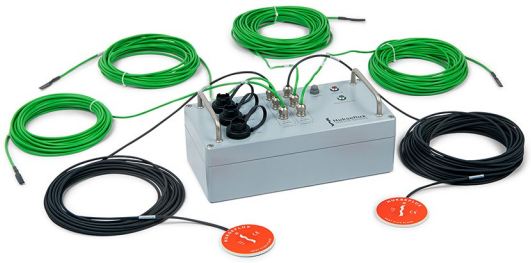

Figure 7 *Example of a measuring system designed by Hukseflux engineering. Measuring system for analysis of the thermal resistance and the thermal transmittance of building elements by in-situ measurement. TRSYS02 is used for measurements according to ISO 9869 and ASTM C1155 / C1046 standards.*

Figure 8 *TRSYS02 in use: on-site measurement of the building envelope thermal resistance.*

References

AkzoNobel, DAMEN, NanoOnSpect, KEMA, Clyde Bergemann, Airbus Defence & Space, Abengoa Solar, bluewater

About Hukseflux

Hukseflux Thermal Sensors offers measurement solutions for the most challenging applications. We design and supply sensors as well as test and measuring systems, and offer related services such as engineering. Our main area of expertise is measurement of heat transfer and thermal quantities such as solar radiation and heat flux. Hukseflux is ISO 9001 and ISO 14001 certified. Hukseflux sensors, systems and services are offered worldwide via our headquarters in the Netherlands, and locally owned representative sales offices in the USA, Brazil, India, China, Southeast Asia and Japan.

Contact Hukseflux

We offer creative solutions as well as the highest quality products at an acceptable price level. If we cannot offer you an acceptable solution ourselves, we will tell you who can. Please contact us to discuss if our engineering services can offer a solution for your needs.

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E-mail us at: info@hukseflux.com