FUSION TECHNOLOGY DESCRIPTION

EUROfusion
TECHNOLOGY TRANSFER PROGRAMME

Ultra Sniffer New leak detection method

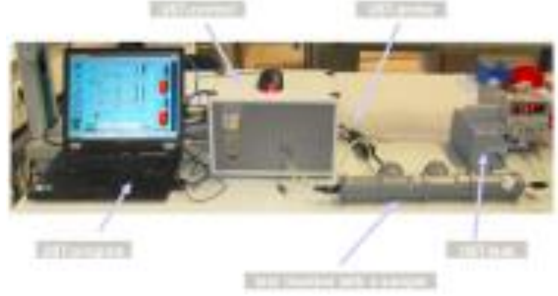
The test sensitivity of classic sniffer test method is limited by the helium concentration in the air, but by reducing the atmospheric helium concentration the test sensitivity can be significantly improved. The Ultra Sniffer Test gas (UST) method is simple – there is no evacuation of the test chamber, only a filling with helium free gas. The method has successfully been used for testing super conducting coils for Wendelstein 7-X at the Max Planck Institute for Plasma Physics (IPP) in Greifswald. The technology is ready for use in the non--fusion domain and is currently being commercialized by the inventor, Mr. Robert Brockmann.

Description of the technology

The inventor Robert Brockmann developed an Ultra Sniffer Test gas (UST) method that uses the partial vacuum effect (PV effect) for the detection of gas tightness of components. A characteristic of the UST method is the extremely high system sensitivity of 5x10--10 Pam3/sec at atmospheric pressure (1013 mbar). In contrast to conventional vacuum leak test methods, the UST--Method reduces the helium partial pressure in a chamber with a helium free gas. This brings the helium partial pressure down to 1x10--8 mbar, so the gas tightness of components can easily and reliably be determined with a sensitive 10–10 Pam3/sec. This was demonstrated by tests conducted during the construction of the Wendelstein 7--X fusion experiment at the Max Planck Institute for Plasma Physics (IPP) in Greifswald. It was shown that leaks at normal pressure (1013 mbar and 20°C) up to 10–8 Pa*m3/sec. are easily detectable. This means that, with the UST-Method, leaks with a theoretical loss of gas of 5 cm3 in 30 years are well within the detectable range.

Innovation and advantages of the offer

The UST-Method is ideal for leak detection and leak--tightness of complex components and allows the detection of leaks with extreme sensitivity appreciably faster, more reliably and simpler than hitherto. Even tiny leaks, until now difficult or impossible to detect, can now be identified and even localized. The UST method can easily be adapted to diverse test objects – allowing tests even during the production process. Detecting leaks with the UST method drastically simplifies the testing of objects that are considered to be difficult to test or even non-testable by other means. Therefore UST is the only over--pressure leak testing method that reaches the leakage measurement reliability of the vacuum test gas method and additionally offers the ability to localize leaks.



Components of the UST method

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Non-fusion Applications

The technology has successfully been applied in the Nuclear Fusion domain. In particular it was used for tests during the construction of the Wendelstein 7--X fusion experiment at the Max Planck Institute for Plasma Physics (IPP) in Greifswald. Further domains of application outside fusion are targeted. In particular the application to testing of fuel cells seems promising. The typical criteria for the selection of a test method are sensitivity, the possibility to also localize the leaks, the reliability of the tests, the complexity of the components that can be tested as well as preparation and actual test time. Against all these criteria, the UST method is superior compared to conventional methods. In particular it shows the same sensitivity as vacuum test methods combined with the ability to also localize the leaks. New application areas are for example in the area of material sciences. However, the application in all industry domains requiring leak detection and localization in pre--production seems promising, in particular for ad hoc testing. Foundries could be a potential area of application, and also the area of magnetic resonance imaging (MRT). Use in the Space Domain has already been explored by the inventor and was identified as promising.

Fusion Heritage

The method was developed for use in the Fusion domain. It was successfully tested at the Max Planck Institute for Plasma Physics (IPP) in Greifswald and certified in 2013. It shows superior performance over conventional methods and is also applicable to the testing of complex components.

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