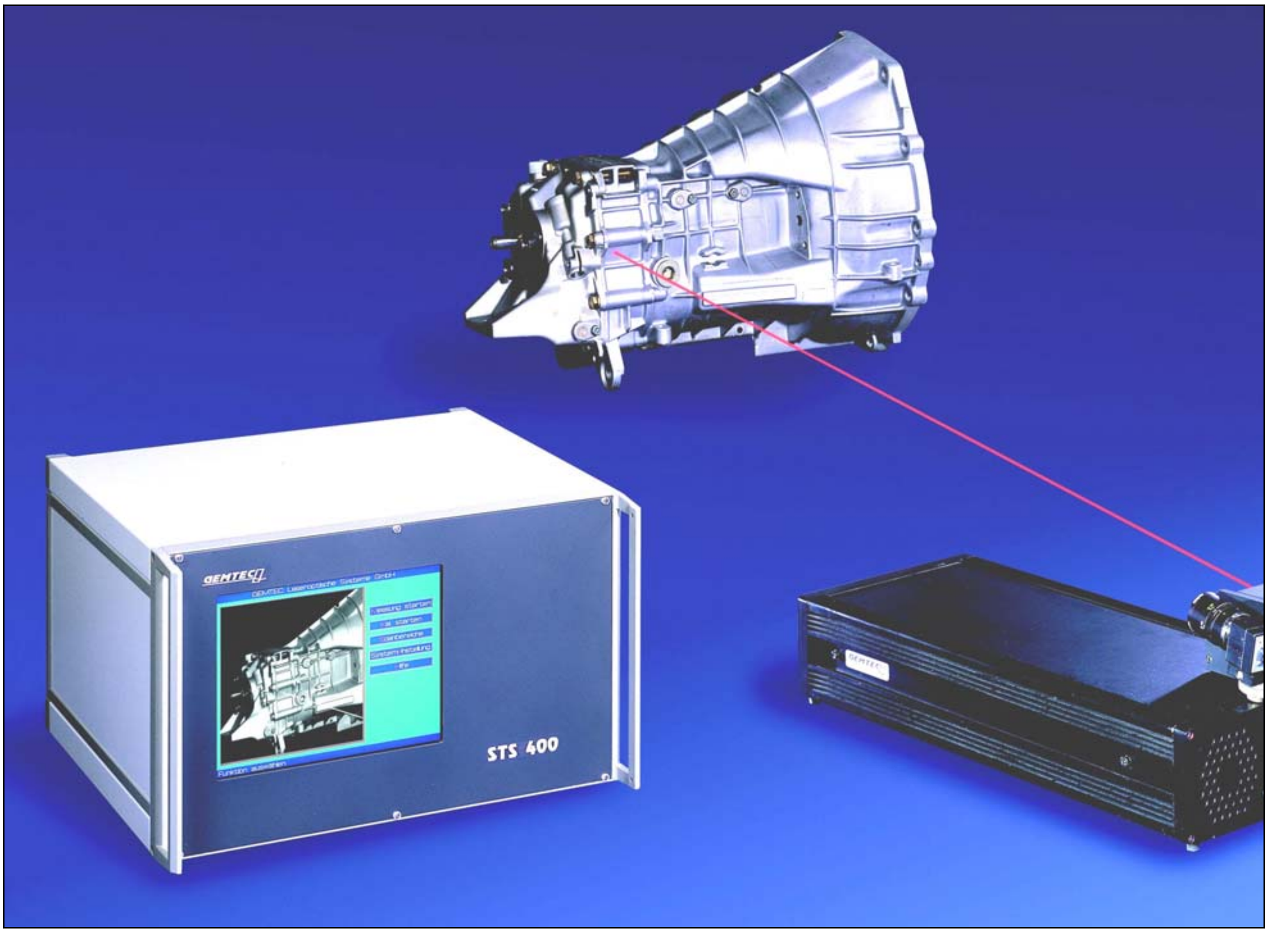
Laser Leak Localisation System STS 400



STS 400

- very sensitive (10^{-4} cm^3/min)
- fully automatic mode
- replacement for underwater-bubble-test
- test object scanning via laser

Laser Leak Localisation System STS 400

Range of Application

STS 400 permits the simple incorporation of a leak localisation test into industrial production processes. The leak test system allows the detection of very small leaks, so far only possible by manual under-water tests or by special sniff tests. Besides, STS 400 is well suited for automation. As neither the quality of the surface nor the temperature of the test-object has an influence on the test process, the leak test system STS 400 provides reproducible constant test results. The system can reliably detect leaks in large and complex parts after the final assembly process, as well as in simple small parts produced in large quantities. The fully-automated application of the system assures constantly low rates of rejection, because, in contrast to the under-water method for example, no operator-related influences are involved. With a typical test time of 50 ms/cm^2 (320ms/sq.inch), the test in many cases can be completed within a few seconds. The part-to-part cycle time often is essentially determined by the choice of the peripheral components of the test stand (for example the time needed to fill the test object with test gas and part-feeding- and transfer-times). A self-diagnosis module, implemented in the STS 400, supervises and registers every important system parameter. The system is especially suited to control quality and survey production.

Principle of Operation

STS 400 uses a newly-developed optical feedback principle for the detection of leaks (patent pending). During the leak detection process a laser beam, which for visibility is superposed by a red, eye-safe laser, scans the test object. Analogous to the electron beam of a TV-tube, the laser is moved across the test object or parts of it. Whenever test gas escaping from a leak is illuminated by the laser beam, the gas shows a characteristic reaction. This reaction can be detected by the test system and causes the properties of the laser beam to change which again has an influence on the illuminated test gas, so that a closed loop, as in a control system, is formed. After the completion of the test a "leak map" has been created, which is superposed on the picture of a conventional CCD-camera in order to visualize the detected leaks. Thus the user is able to actually "see" the (color-marked) leak positions on the screen. However there is no need for an operator, since the system allows the use of different "scan-windows" for each of which certain limits can be set so that fully automatic decisions can be made.

As a test gas the inert gas sulfurhexafluoride (SF_6) may be used, for instance. The individually necessary sensor sensitivity (which can affect the test time) is preset by an internal microcontroller during the calibration of the test object. In many cases, STS 400 is able to adjust the necessary test time to the varying test conditions and thus to optimize the overall test time. Even under rough conditions the system can reliably detect the test gas. Thus wet or soiled test parts may also be tested.

System Interfaces

STS 400 features two ways of system control:

- manual control by keyboard and monitor
- control by a serial interface (RS 232) in connection with a PC, for instance

Each of these two interfaces allows the user to trigger a measuring or calibration process or to choose one of many parameter sets. All activities of the system and their results are output through the serial interface and therefore may be printed by a printer or monitored by a computer. Furthermore, a RGB signal of the image displayed on the screen is made available to the user via an additional monitor socket in order to enable the external storage or printout of the displayed "leak map". All in all it is very simple to make statistical use of the test data for quality control purposes during the production process and to recall possible disturbances of the production process even after years.

Periphery and Application

For locating leaks with the STS 400 system the inside of the test object is pressurized with the test gas. Depending on the size of the object and the amount of leakage, often only a mixture of air or nitrogen and the test gas is used. In order for the leaks to be detected it is necessary that the test gas can get to the outer surface, where it can be illuminated by the laser beam. This can easily be assured by setting the test object under pressure during a sufficient amount of time.

Technical Specification

Leak rate *)	ca. 10^{-6} to 1 mbar l / s
Test gas	Ethene (C_2H_4), Sulfurhexafluoride (SF_6) and others
Measuring time	ca. 50 ms / cm^2
Working distance	0.5 - 2 m
Scanning angle	+ - 16°
Laser class	4; safety measures necessary
Self-diagnosis	continuous and automatic
Measuring head:	
Size	600 x 240 x 210 mm
Weight	16 kg
Control electronics:	
Size	19-inch case or insert; 6HE
Weight	24 kg
Power	230 V; 50 Hz; ca. 500 W
Interfaces	RS 232, Profibus DP

*) Depending on distance, scanning speed, test gas, and peripheral conditions

12/2004 Subject to alterations!

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