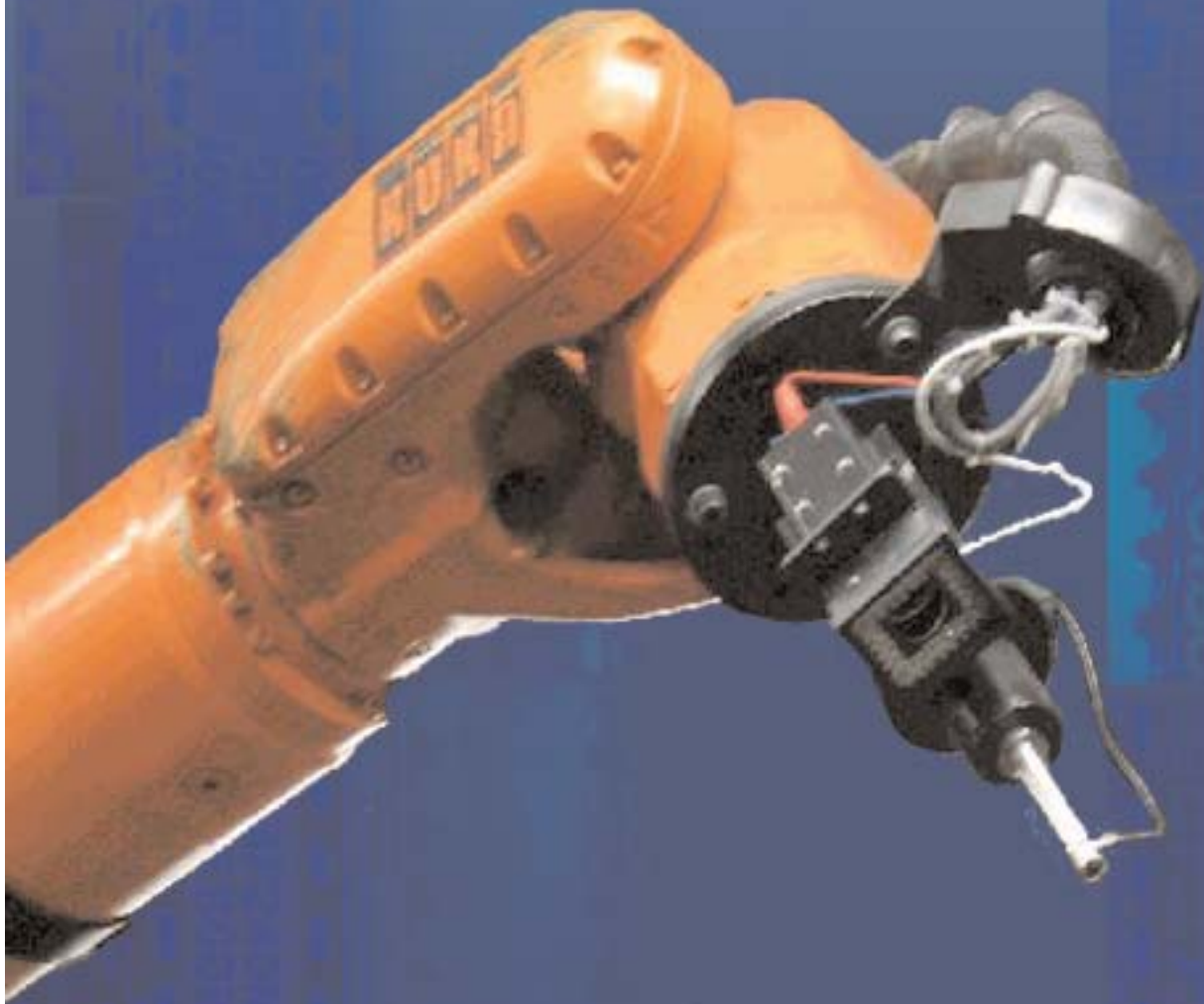




CYCLOPS



CYCLOPS is a completely automatic in-line system for the inspection, evaluation and monitoring of spot welds via ultrasound and using artificial vision for position control

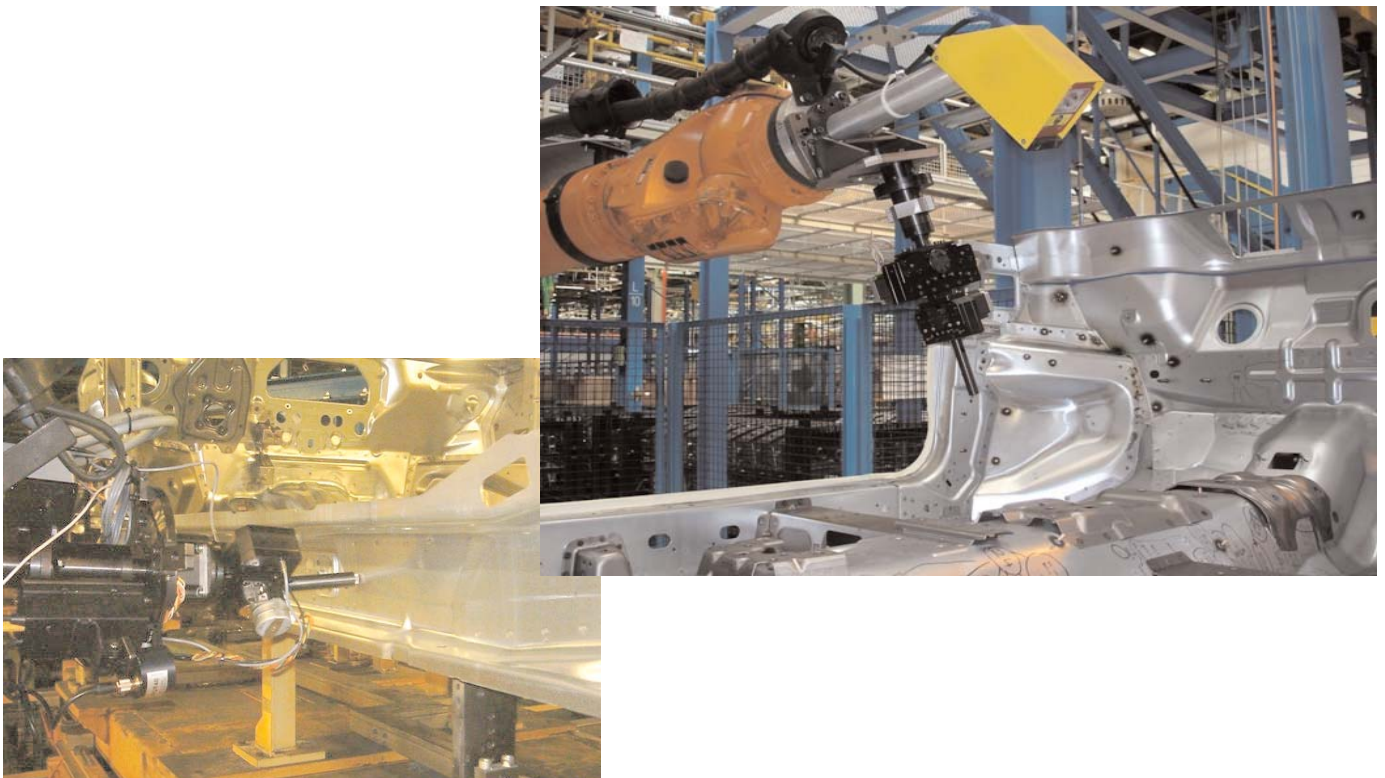
BENEFITS

Improvement of reliability: Ensures traceability, consistency and repeatability of ultrasonic tests.

Wider quality control scope: Faster inspection allows testing of a much larger number of spot welds and in-line inspection allows test of spot welds on each individual component.

Weld process monitoring: Real-time full availability of data on each component passing through the line for statistical analysis and control.

Cost saving: Avoids off-line tests, eliminates cost of manual inspection, reduces line stops and decreases wastage by faster identification of faults.

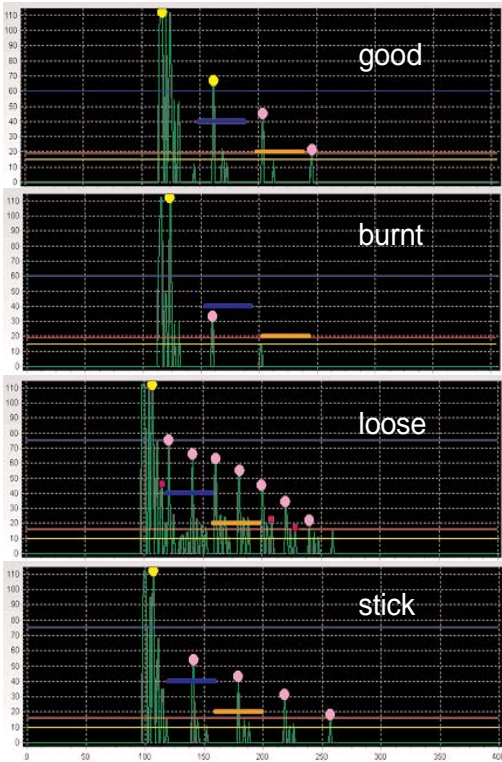


- In-line inspection of a user programmed sequence of spot welds in series within current cycle times or of a selected set of critical spot welds in each part
- Automatic positioning, orientation and evaluation utilizing an integrated vision system
- Automatic integrity evaluation of spot weld by means of ultrasonic testing
- Customised real-time data processing for communication to the line quality control for monitoring, weld process control and part rejection
- Automatic data storage in a data base for statistical analysis and recording of process history

Operation: The test sequence can be defined independently for different parts that pass through the line according to the particular plant strategy and the Q.A. requirements.

The ultrasonic test set-up, as well as the applicable warning and rejection thresholds, can be defined for each individual spot weld.

THE ULTRASONIC INSPECTION



CYCLOPS performs CONVENTIONAL ultrasonic spot weld inspection, in automatic mode and with dry contact probes.

The ultrasonic evaluation of spot welds is determined by the measurement of the distance between back-wall echoes, the differences of back-wall echoes attenuation rates and the presence and relative amplitudes of intermediate echoes.

The transducer has been designed and manufactured specifically for the CYCLOPS application to include an interchangeable spherical rubber delay for extra flexibility and added durability.

This unique innovation in transducer delay line technology offers a range of inspections with a single transducer. Differing material thickness of welded parts and weld diameters can be accommodated. This system is less likely to be affected by weld plane inclinations relative to the transducer position.

Transducers utilise dry coupling (no oil or grease) and can be used for around 20,000 inspections in normal operating conditions.

CYCLOPS utilises artificial vision technology to identify the spot weld and direct the ultrasonic transducer to the centre of the weld with high precision.

The ultrasonic transducer is fixed to the manipulator's "wrist" and moves through both x and y direction planes. CYCLOPS will sweep through all of the possible angles through the two planes until a suitable signal is received that will provide a precise and proper evaluation of the weld. CYCLOPS can be programmed to inspect a sequence of welds. A real-time evaluation of the weld position and shape is simultaneously performed.

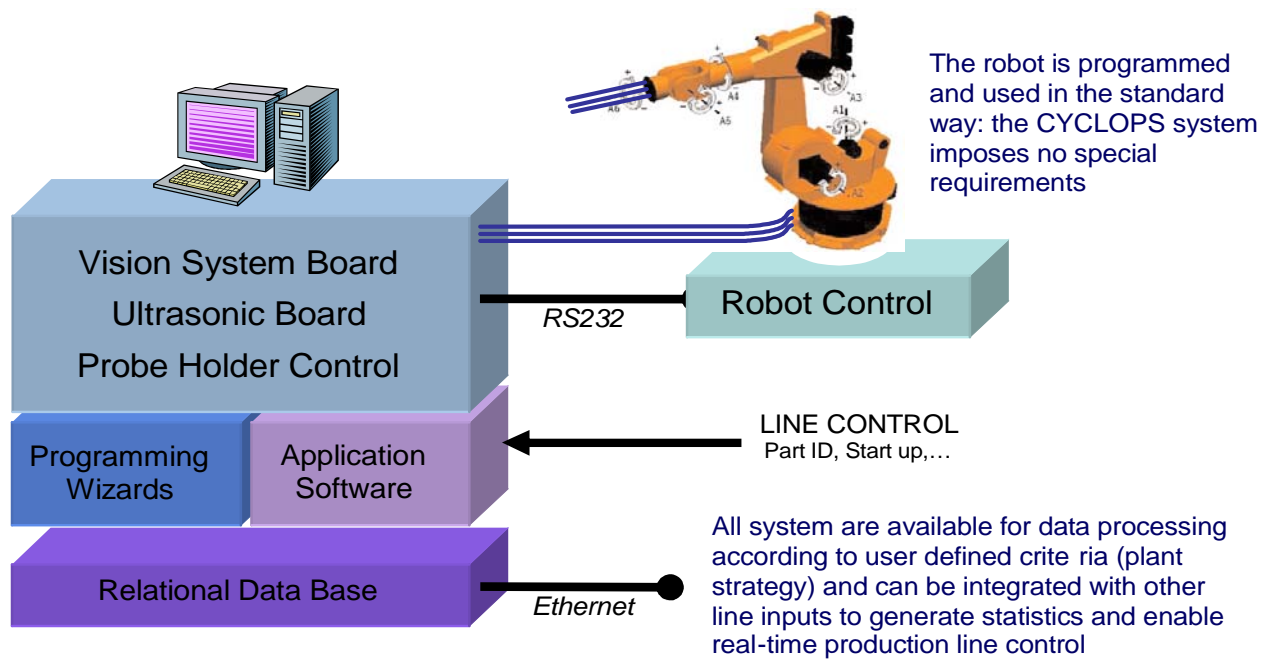


EVALUATION AND MONITORING

Specific software provided as part of the basic system components evaluates the result automatically and classifies the spot weld into one of five categories: good spot weld; too small; stick weld; loose weld or burnt weld.

After each test all data are readily available and are also stored in a relational data base in a MS Excel compatible format. Together with pre-existing data such as the part reference, spot and weld gun identification, actual welding parameters, etc. the results can then be processed for monitoring, traceability and actions.

BASIC SYSTEM COMPONENTS

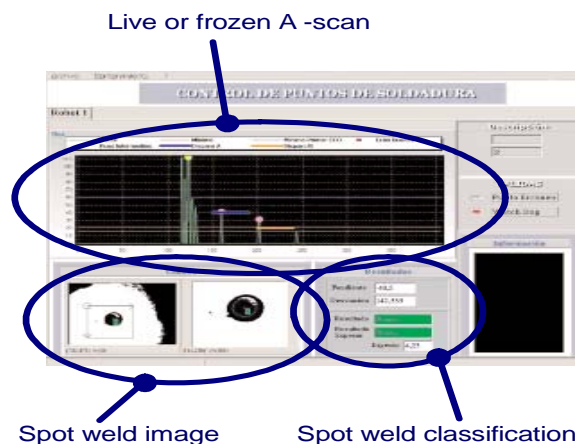


Industrial Manipulator (recommended: KUKA KR30 or higher) with 6 degrees of freedom (not included)
 Transducer's orientable holder 2 degrees of freedom:
 Artificial vision: PC board, monochrome camera and 24V LED light source.
 Ultrasonic system: PC board and a longitudinal wave transducer with a flexible delay for dry coupling.
 Industrial PC with electronics and I/O communication control in a 19" rack.

The application software, including a programming wizard, automatically evaluates the ultrasonic signal and visual input, classifies the weld, adds the result to the data base and updates the history records and statistics.

Different threshold levels can be defined for warning and rejection and, additionally, detailed data is available for automatic monitoring of the weld process.

A dedicated programming interface and ultrasonic configuration window are accessible to users with access permissions.



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