

Weld Quality Performance Evaluator



Benefits

- Estimation of joint performance (i.e., penetration and s-value) using in-line process monitoring data
- Use of analytical mathematical model automatically linking monitoring data to joint performance
- Facilitate Statistical Process Control and root cause of joint failure
- Capability for in-line closed loop process control and adjustment

Features

- Feature selection via cross validation, feature transformation, and partial least square
- Possibility of simultaneous evaluation of multiple joint performances
- Statistical Process Control charts made directly on joint performance
- Optimisation of process parameters for a specific performance output

Summary

The tool extends the state-of-art by developing a novel methodology by linking in-process monitoring signals with process joint performance. The tool is based on two main steps: (i) in-process process radiation monitoring (i.e., using photodiode); and (ii) data analytics correlating data to joint performance. To develop the analytical model the process signal is filtered into visible light, temperature and back-reflection using photodiode sensor. The filtered signal is then used to extract significant features, correlated to joint performance.

Optimum process parameters are then calculated which satisfy cycle time (welding speed) or minimum power demand.

Business Value

In-process weld analysis reduces NDT and destructive testing.

Direct output of weld quality reduces operator's interpretation errors.

Closed-loop process adjustment based directly on weld quality is achievable.

Welding process parameters can be optimised for a specific performance output.

