



DataTools

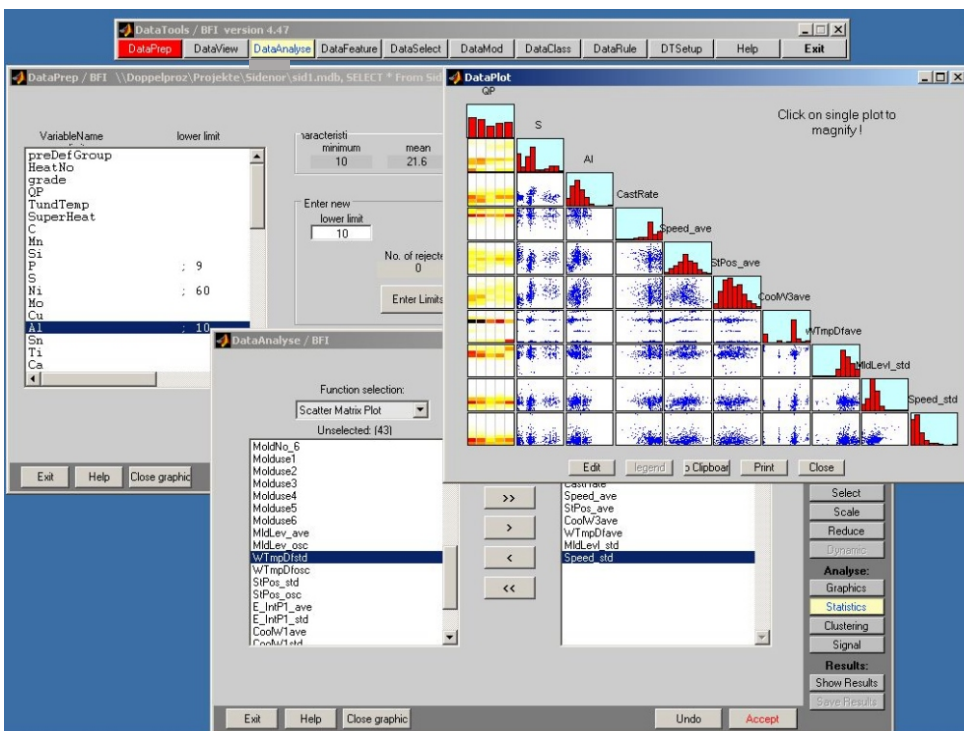
DataTools is a software suite for the data-based investigation of cause-and-effect relationships of quality problems, e.g. surface defects, inclusions, mechanical properties or flatness defects. It offers the user many possibilities to prepare the data, to visualise it and to find correlations between quality defects and process variables by using simple statistical methods or powerful Data Mining techniques. *DataTools* can deal with data from a complex chain of production processes. The complete suite consists of several separated tools which can handle all necessary data processing steps.

The basic concept:

- ▶ Product tracking
- ▶ Aggregation of quality and process data
- ▶ Data pre-processing
- ▶ Graphical data exploration
- ▶ Statistical data evaluation
- ▶ Detection of cause-and-effect relationships by using Data Mining techniques
- ▶ Generation of linguistic rules from data
- ▶ Building of quality models
- ▶ Simulation

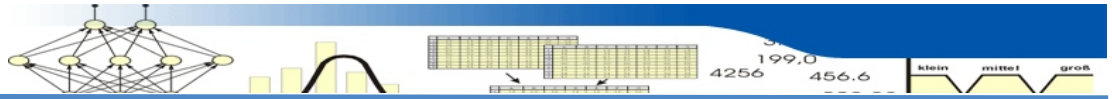
Capabilities you get:

- ▶ Information about cause-and-effect relations across the complete production chain
- ▶ Ideas and hints for changes of process parameters or maintenance actions to avoid defects
- ▶ Transparency in large data collections
- ▶ Cross process stage projection of length related data to products or segments
- ▶ Check and ensure the plausibility of data



Your benefits:

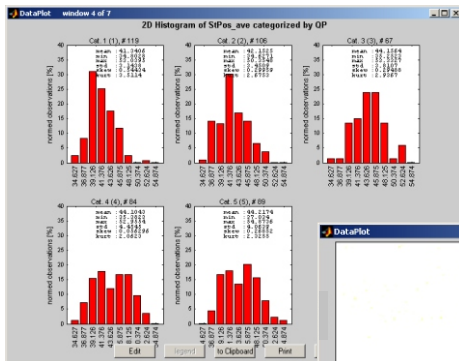
- ▶ Improved product quality by significantly decreased number of defects
- ▶ Increased yield
- ▶ Reduced production costs
- ▶ Short ROI of complex quality measurement devices



Statement of a *DataTools*-user:

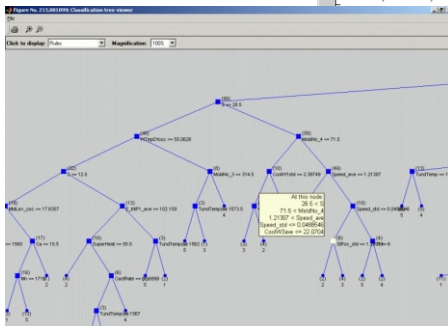
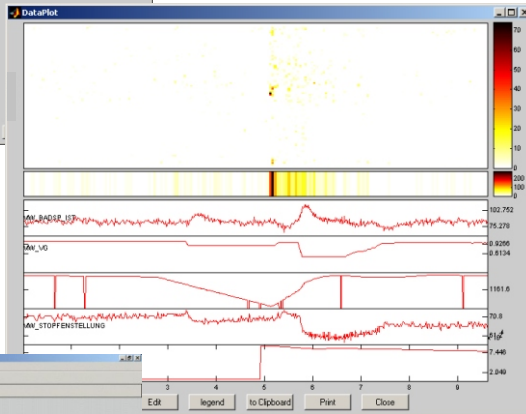
"With the application of *DataTools* to detect the causes of surface defects we have reduced the number of a special quality problem by more than 50% !"

Dipl.-Ing. T. Anstots, ThyssenKrupp Nirosta GmbH, during a presentation at the conference "Stahl'2003", 13.11.2003 in Duesseldorf



Categorised histogram to find relevant process variables for a special quality defect

Visualisation of surface quality of coil compared with process variables of slab casting process



Result of decision tree, to transfer quality and process data into linguistic rules

DataTools offers the possibility to integrate operator experience into the data evaluation process.

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Technical Details

Operating Systems: Windows NT / 2000 / XP

Languages: German, English, others in preparation

Licenses: Workplace / Concurrent Network licences

Data interfaces: Native Oracle 8/9i, MS-ACCESS 2000/2003, ODBC, ASCII, IBA Files, Argus Files, Parsytec SIS Data, Thickness data, BFI Flatness measuring roll, etc.

Pre-Processing: removing null-entries, outlier-test, quality grading, construction of data-groups, plausibility check, etc.

Graphics: x(index)-diagram, x(time)-diagram, x(y)-diagram, scatter-matrix-plot incl. brushing, bar-plot, input-output-comparison plot, surface quality plot, thickness profile, temperature profile, flatness diagram, box-whisker-plot, three-element-diagram

Statistical methods: descriptive statistics, categorised and normed histograms, linear correlation coefficient, cross-correlation, automatic comparison of categ. histograms, principal component analysis, multivariate regression

Clusteranalysis: c-means, fuzzy c-means, Isodata, MaxiMin, subclust, self organising map, nearest neighbour, nearest prototype

Data Mining methods: discriminatory analysis, decision tree with rule evaluation (different pruning methods), decisions trees with cross-validation (different pruning methods), genetic algorithm in combination with classifier, component plane of self organising map (automatic evaluation)

Classification: Nearest neighbour, nearest prototype, Bayes classifier, decision trees (C4.5, Oc1, CART), multi layer perceptron networks, radial basis function network, learning vector quantisation, support vector machine

Regression: Multivariate linear regression, time-series analysis (ARX, ARMAX, Box-Jenkins, Output-Error), ANFIS, recurrent networks, radial basis function network, multi layer perceptron network