ibaDatywyzer-PSG

In brief

- Offline tool for generating rolling mill schedules on reversing stands
- Uses the current process data, no modelling
- Does not depend on materials, can be employed flexibly
- Can be integrated in the existing infrastructure, no transfer of know how to third parties
- Complete documentation
- Easy to use

Optimizing pass schedules – raising productivity

Overview

The ibaDatawyzer-PSG (Pass Schedule Generator) for rolling mills is a PC based software solution for reversing mill stands. The software can be integrated into existing automation environments and can be adapted to the configuration of the stand by the operator.

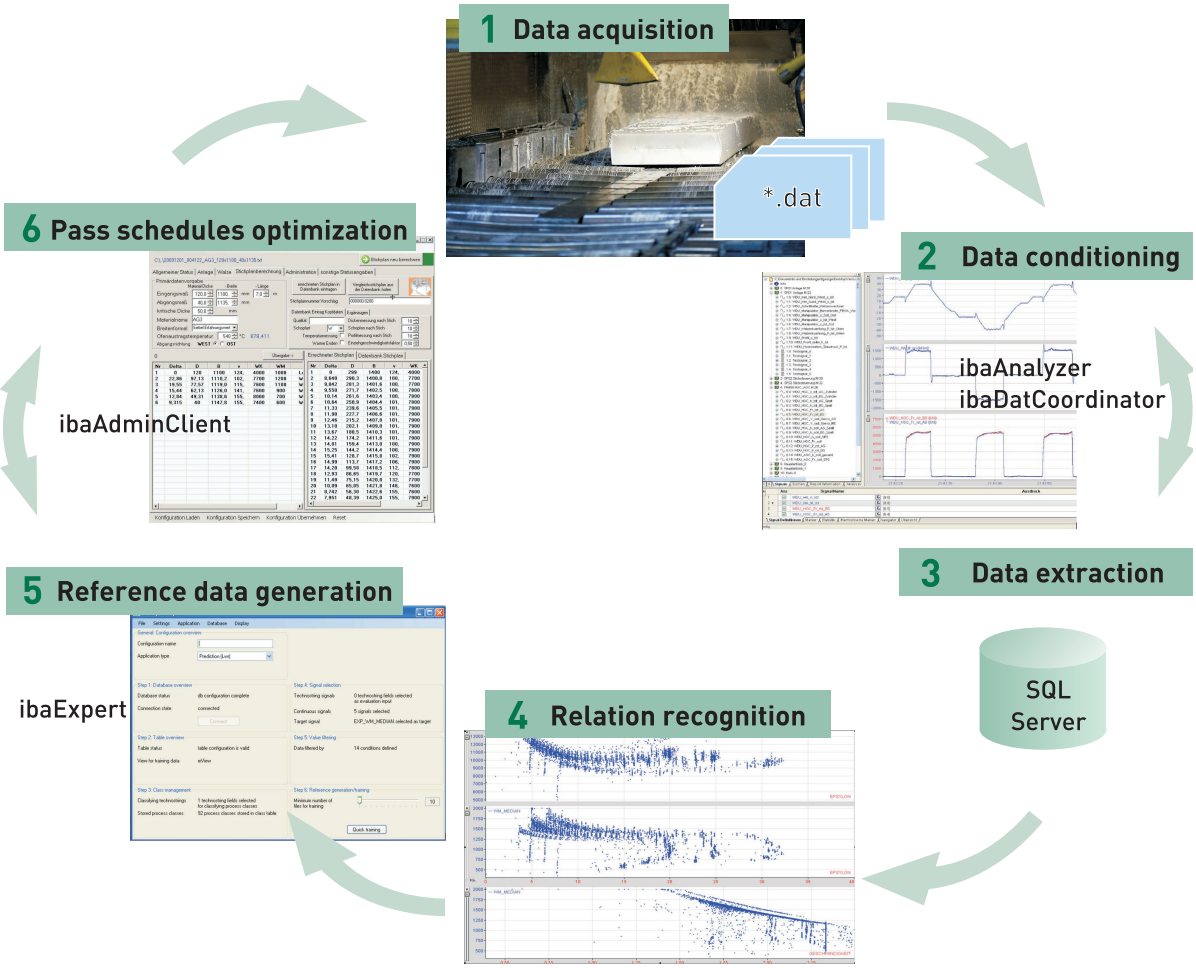
For generating the pass schedules, the measuring values of the plant – as captured with ibaPDA-V6 and processed by the ibaAnalyzer – are used. No mathematic models are used.

The operator is defined as the only user of the tool. He configures the ibaDatawyzer-PSG according to the plant configuration and can make changes in the rolling mill strategy or optimize the parameters. In both cases, this will lead to shorter process times, more transparency, higher acceptance among staff and an enhanced product tolerance. You do not need time-consuming and costly configurated models. The know how rests always in the hands of the operator.

Analyzing the measuring values like empty rolling gap, thickness, temperature, rolling force, rolling torque or rolling speed is the starting point of all optimization measures. These physical units define the current status of the rolling process. This way, all technical and technological parameters needed for generating pass schedules are considered.

By predicting the rolling force quite exactly, geometric sizes like thickness, flatness and profile can be configured optimally.

The ibaDatawyzer-PSG can also be used, in case you want to process new materials (alloys) or materials with a changed chemical composition. In those cases, you can first use pass schedules of materials that have a similar chemical composition or similar properties. These pass schedules are then optimized and adapted to the new demands. This way, you can shorten developing times.



Basic principle

For the rolling process, you find on each reversing stand a rolling strategy. Plant boundaries, technological boundaries, product tolerances and general experiences have an influence on the rolling strategy. As an example: for the requirements concerning the maximum thickness reduction per pass, geometric values, plant boundaries (mechanical, electrical) and technological conditions are tested. The ibaDatawyzer-PSG uses the measured current data for calculating the optimal rolling strategy, considering the technical and technological conditions of the line and the plant.

Implementation

The *.dat files recorded in course of the rolling process, form the basis of data processing and of calculating the reference values. The courses of electrical signals like rolling force, rolling torque, current and nominal speed values as well as digital values for system enabling are recorded in the *.dat file during the process. Moreover, you can define information on the product to be rolled in the *.dat file, like information on the material (chemical analysis) or input and resulting dimensions. The ibaAnalyzer does a plausibility check for all the measuring signals recorded in the *.dat file. The data are subsequently stored in a database.

Individual approximation to limit values

For processing and optimizing the captured data, machine learning and statistical evaluation methods are used. In a first step, the statistically processed data are divided into material groups that are defined by the operator. On demand, in the following nominal values are generated that are calculated on the basis of process and plant specific limit values. The operator can modify the process specific limits for an optimum pass schedule to be generated.

It is the main goal to manufacture the rolling stock by employing just a minimum of forming stages. Of course, for each pass the intermediate dimensions and the technological values like rolling torque and rolling force are calculated.

If you can predict the rolling force quite precisely, product specific parameters like thickness, flatness and profile can be defined exactly. Flatness and profile are produced by distributing the load during the last passes. The load distribution is done by considering the consistency of the profile that is formed when a certain material thickness falls below a certain critical limit. When this limit is exceeded, there is no more cross-flow in the material and there any deviations from flatness do not occur. This means that the precalculated and the current rolling force have to match within very tight limits for the nominal values in order flatness and profile can be realized. The ibaDatawyzer-PSG offers this decisive feature.

Complete documentation

ibaDatawyzer-PSG does not only offer transparency in the rolling process, but also helps to supply a complete documentation of the forming process. You do not need complex tables any more.

This way, you can manage the pass schedules much more efficiently: communication between all participants becomes much more transparent and processes become standardized. The know how always stays in the hands of the operator and is not passed on to third parties.

Useful support when rolling new or modified alloys

ibaDatawyzer-PSG for rolling mills can merely adapt to unknown materials. You can create a reference list by using similarities (from already rolled materials) like the name of the material or the chemical composition. This reference is then used as a basis for generating pass schedules.

As soon as the new material is being rolled, the adaptive data are replaced by the current values. Machine learning is activated again.

Simulating temperature behavior

Sometimes, special material characteristics depend on the chemical composition, but much more often it is generated by combining forming and cooling (also heating). ibaDatawyzer-PSG for rolling mills can simulate the rolling processes. The user defines the hold time for cooling a material and the generator calculates the rolling force.

Easy production scheduling

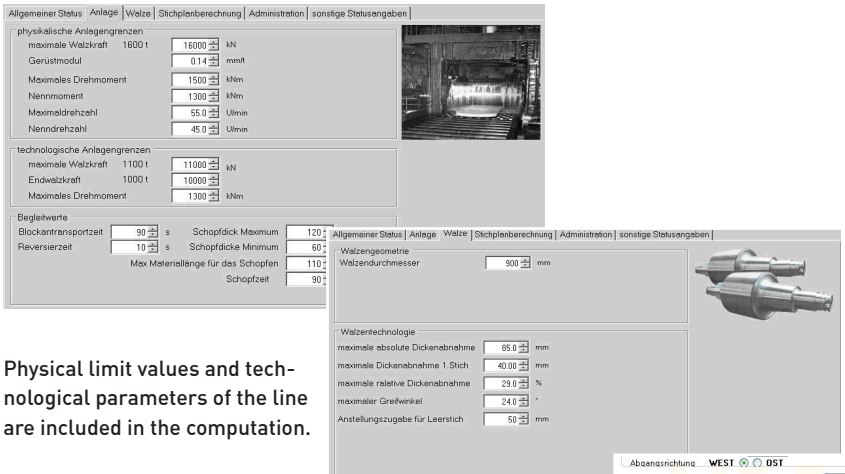
For integrating the ibaDatawyzer-PSG smoothly into the production process, we offer an interface to the productivity database of the rolling mill.

All common database architectures can be integrated. The user can read existing pass schedules into the generator and get them analyzed. The relations of the process values are shown by graphs and all required values are presented clearly. With grouping and filter functions you can find out optimization potentials. The user can choose and disable single data points by a mouse click if these points exceed certain limits. A new pass schedule is calculated automatically according to the criteria belonging to a certain material class. The schedule can be compared in a transparent way and optimizing potential can be found.

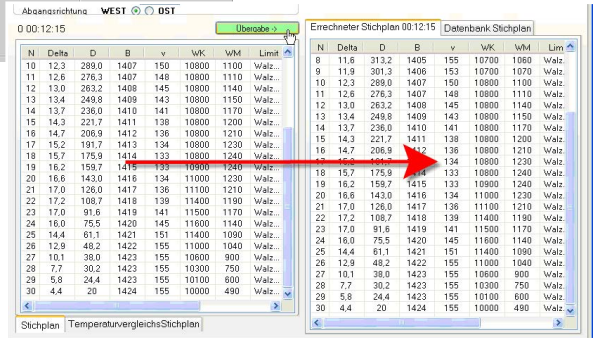
By a mouse click, the user can store the newly calculated pass schedules in the productivity database and use them. This way, the pass schedules can be managed and the effort for production scheduling is minimized.

Summary

The ibaDatawyzer-PSG for rolling mills allows you to use highly cyclical captured measuring data that have been used mainly by maintenance staff, for describing the rolling process. The measuring data stored in a database, checked for plausibility and processed, form the basis for generating rolling mill schedules customized for the plant without using mathematical reference models. These measuring data contain all relevant physical causal relations needed for the process description. By means of approximation methods, rolling forces and rolling torques can be calculated. The exactness of these methods allows you to use technical and physical limits optimally. As the limits can be defined in different menus, the decrease in thickness can be limited for the single passes. Respecting these limits, pass schedules are generated to manufacture an optimized product with a minimum number of passes.



Physical limit values and technological parameters of the line are included in the computation.



The pass schedules in tabular form can be compared with older pass schedules.

Technical Data

Short description		
Designation	ibaDatawyzer-PSG	
Designation	Offline tool for generating rolling mill schedules	
Order number	36.000101	
System		
Version	Application, Offline tool	
Software	Windows XP Professional, Windows 7 - only 32 Bit systems	
Hardware	Minimum: IBM compatible computer, P4 1,6 GHz, 1024 MB RAM; Recommendation: Multicore CPU 2 GHz, 2048 MB RAM	
Configuration		
Data acquisition	Electrical signals and information in the *.dat format	
Data processing	Processing and verification by the ibaAnalyzer	
Mathematical relations	Using mathematical algorithms	
Generating reference data	Filtering and processing reference data, considering the technical and technological plant configuration	
Generating pass schedules	Rolling strategy	Realized according to the customers demands
	Predefined parameters	Considering the technical and technological parameters
	Primary data	Simple way of generating subsequent pass schedules
	Metallurgy	Classification according to material or material groups
Documentation	Logging of the generated pass schedules as *.txt and *.dat files	
Implementation	Transfer of the generated pass schedules to the productivity system (data base connection)	
Operation / Information		
	Overview of pass schedules in tabular form	
	Comparison with existing pass schedules, verification	
	Statistical process analysis using graphs	
	Logging of all calculation steps	
	Considering infrastructure of customer	
	Calculating pass schedules for any dimensions	
Scope of delivery		
ibaLogic V4	Automation system Licenses: ibaLogic for Win2000 / XP, Dll's for ibaLogic; ibaLogic OPC Variables unlimited; ibaLogic IO Signals 64; ibaLogic Files Signals 64	
ibaAnalyzer	Viewing, preparing and processing *.dat files Licenses: DB Extract	
ibaDatCoordinator	Coordinating the processing stages in ibaAnalyzer	
ibaExpert	Process analysis and generating reference data	
ibaAdminClient	Predefining parameters, viewing, comparing and optimizing generated pass schedules	
Services		
	Support when integrating in the plants system architecture Implementation and commissioning Documentaion and training	

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Measurement and Automation Systems