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6. Uluslararası Ankiros Döküm Kongresi

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Optimised Computer-Aided Product Planning & Costing in the Foundry Industries with the Help of RGU OPTI

September 2012

Dr. Christiane Pacyna-Friese, Kai Bembenek

Content

- **A Historical Approach**
  - A Study from 1968
  - Weight Calculation and Classification
- **Some Current Features of RGU OPTI**
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  - Cost Calculation
  - Pricing
  - Simulation Tools and Decision Helper
  - Information Systems for the Production
  - Integration of the Planning System

Is there a Future for Foundries?

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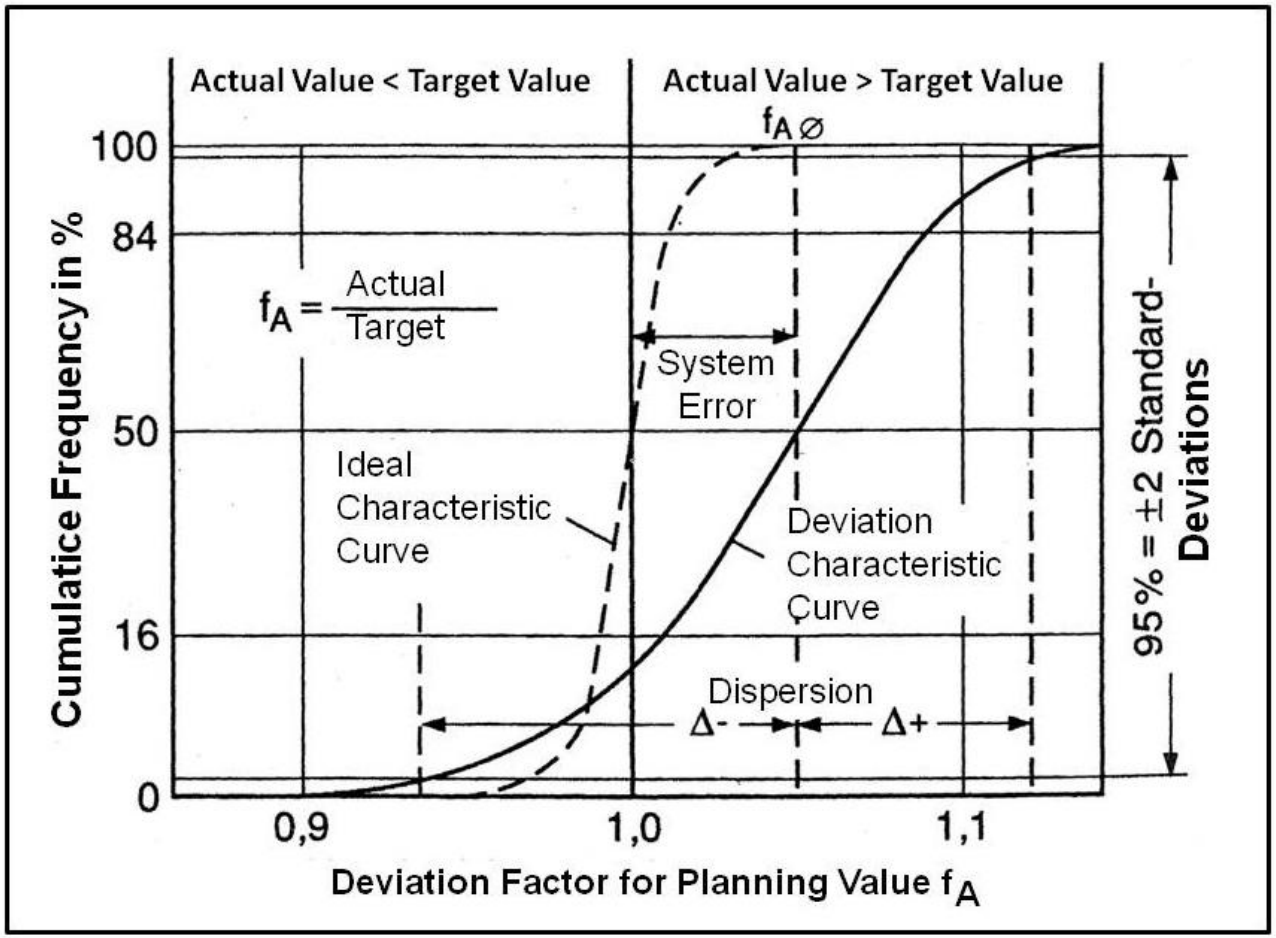
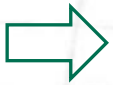


Is there a Future for Foundries?

Already in **1968** a study was published which proved the importance of product planning for the foundry industry



- **The lowest prime costs**
  - Optimise the processes – start with the biggest influences
- **The smallest system error of the deviation factors**
  - Analyse your system error (in detail)
- **The smallest dispersion of the deviation factors**
  - Analyse your dispersion (in detail)

Measures

Invest in more effective facilities, tools etc.

Revise your logistic processes, your suppliers etc.

Train you

Revise y

Elimate

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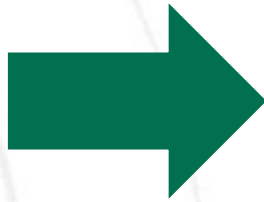
Clarify the details

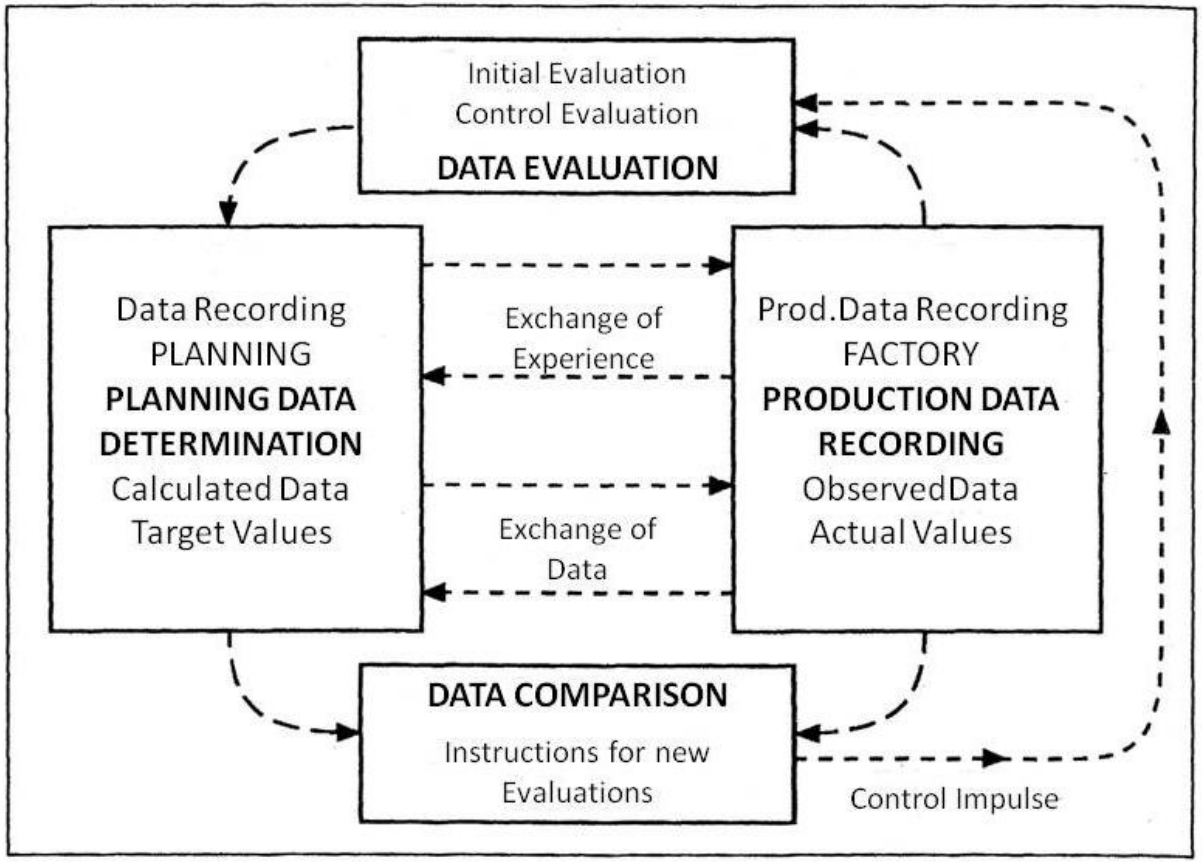
Start with the big issues

Figure out … and change it

Set up an effective control loop of information in your the factory



Control Loop of Information



The goal of a successful planning system is to set up and support the control loop of information in the factory in order to achieve an improvement of the calculation systems **step-by-step** and to show ways to more effective technical and logistical solutions.

Planning - Production - Feedback-Reporting - Analysing - Adjustment

The Results are still valid

Measures:

Invest in more effective facilities, tools etc.

Revise your logistic processes, your suppliers etc.

Train your staff … in the factory shops, in the offices

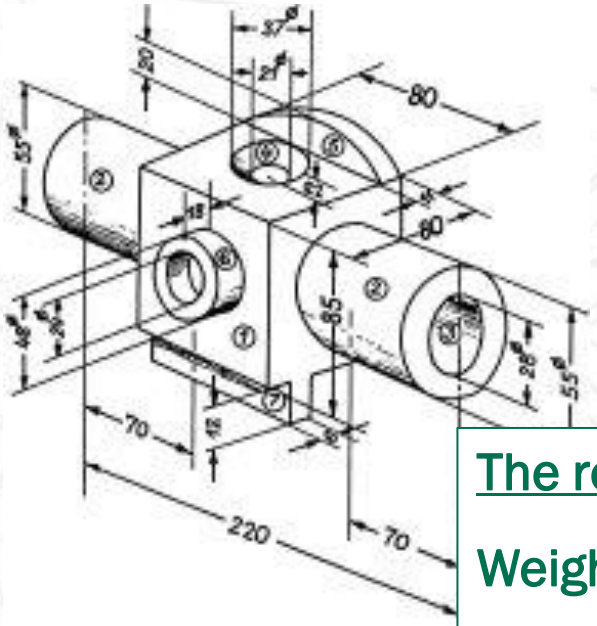
Revise your cost calculation and your cost building system

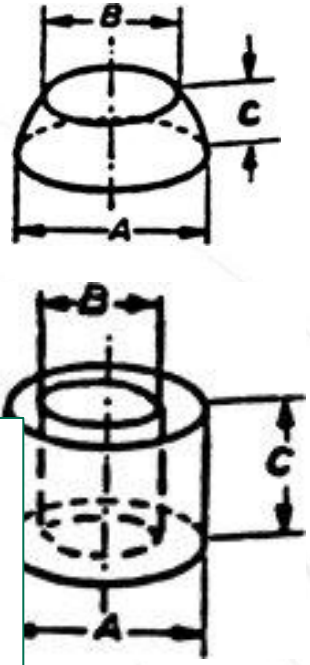
Elimate inappropriate basis data, formulas or nomograms, bad calculated weights etc

Eliminate errors, e.g. forgotten materials or operations, unsystematic calculation system (e.g. it depends on the person, difficulties are underestimated etc.)

Data Preparation, Calculation, Negotiation

Weight Calculation





The results are:

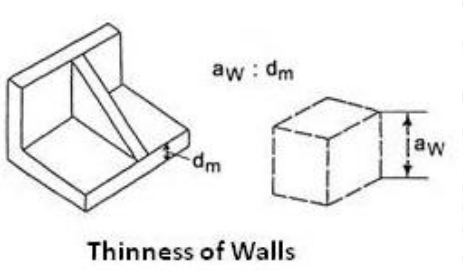
- Weight
- Modules
- Medium Wall Thickness

...

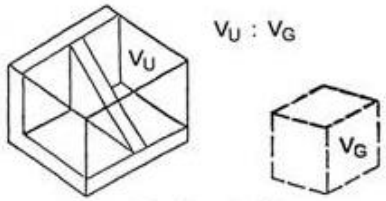
Usually today done by simulation tools

Classification

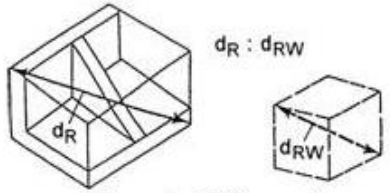
To provide the foundries better possibilities to use their historical data the so-called **part classification** was integrated in the planning methods of RGU-Opti. Because of the use of **dimension-less classification-characteristics** it is easier to find **similar parts** in order to use them as the basis for new calculations. On the other side the determined formulas become together with the volume class **scalable**.



Thinness of Walls



PackingBulk



Elongated Dimension

Cause Variable Analysis

Cause Variable Analysis MA-TS

Selection:

Target: **Operation 2 Moulding** Calculation run **1 . 29**

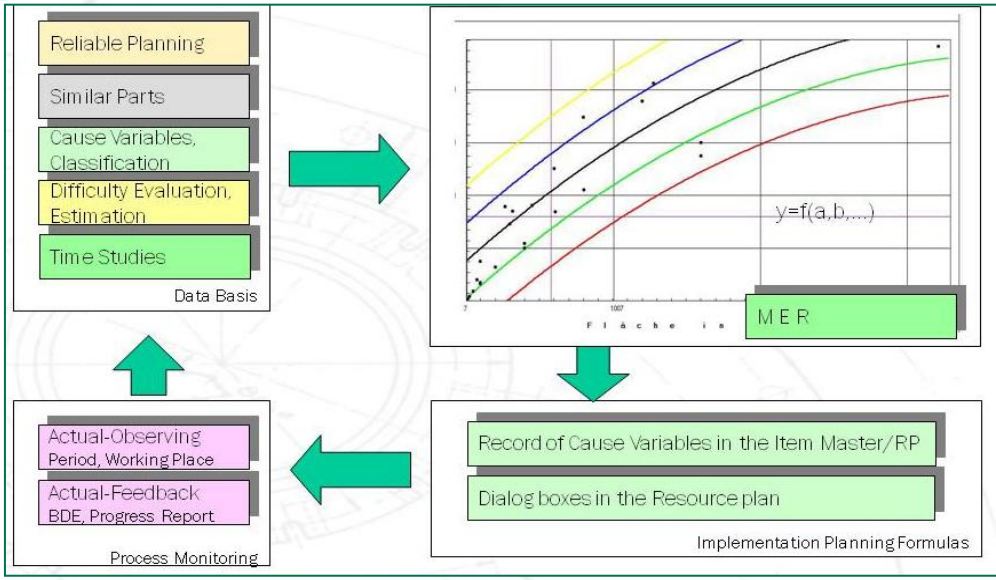
Cause Variables

Variable	T-Index	log	Constant	Std Error	T-Test
ABG2fo	(43)	☑	2,52478900	0,1691	14,9332
D	(13)	☑	-0,11576230	0,0398	-2,9105
VKL	(16)	☑	0,30073640	0,0502	5,9907
VK	(18)	☑	0,07648648	0,0211	3,6272
GVF	(23)	☑	-0,05323470	0,0218	-2,4473
VS	(25)	☑	0,66364510	0,0492	13,4947
F	(26)	☑	-0,56886670	0,0492	-11,5715

Coefficient of Determination in %	=				**94,83319**
Coefficient of Correlation	=				0,97382
Conficence Level (FRatio)	=				2438,06421
Standard error for the Estimation	=				**0,56108**
Degree of Freedom total	=	803	**N1 =**	6	**N2 =** 797

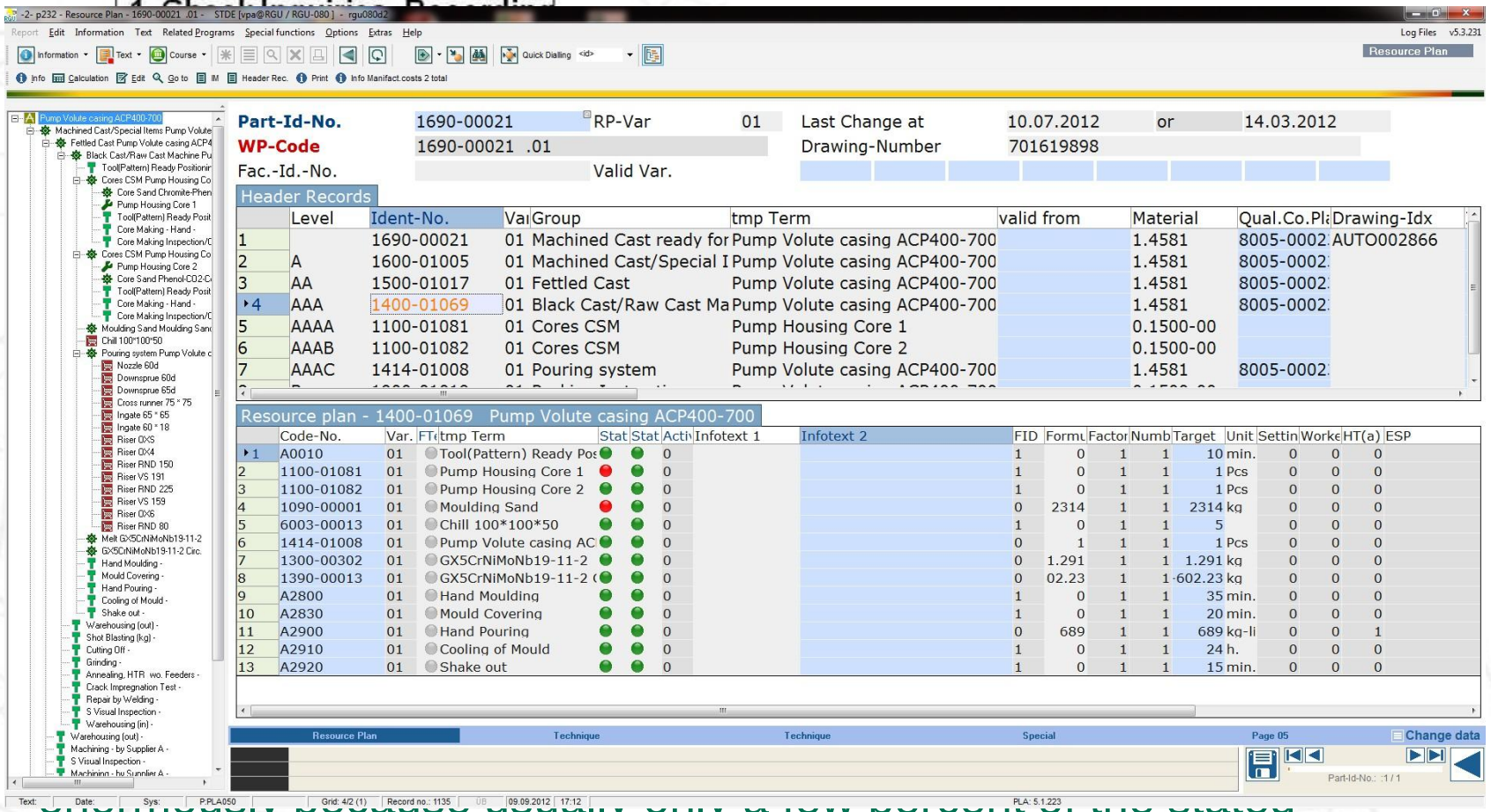
Logarithmic Regression equation 1 . 29

Moulding time	ABG2fo	=	e	^	2,524789
Thinness of Walls		*	D	^	-0,115762
Circuit Volume		*	VKL	^	0,300736
Core Volume		*	VK	^	0,076486
Total.Vol.-Factor		*	GVF	^	-0,053235
Prop. Mould Volume ltr		*	VS	^	0,663645
Mould Volume Factor		*	F	^	-0,568867



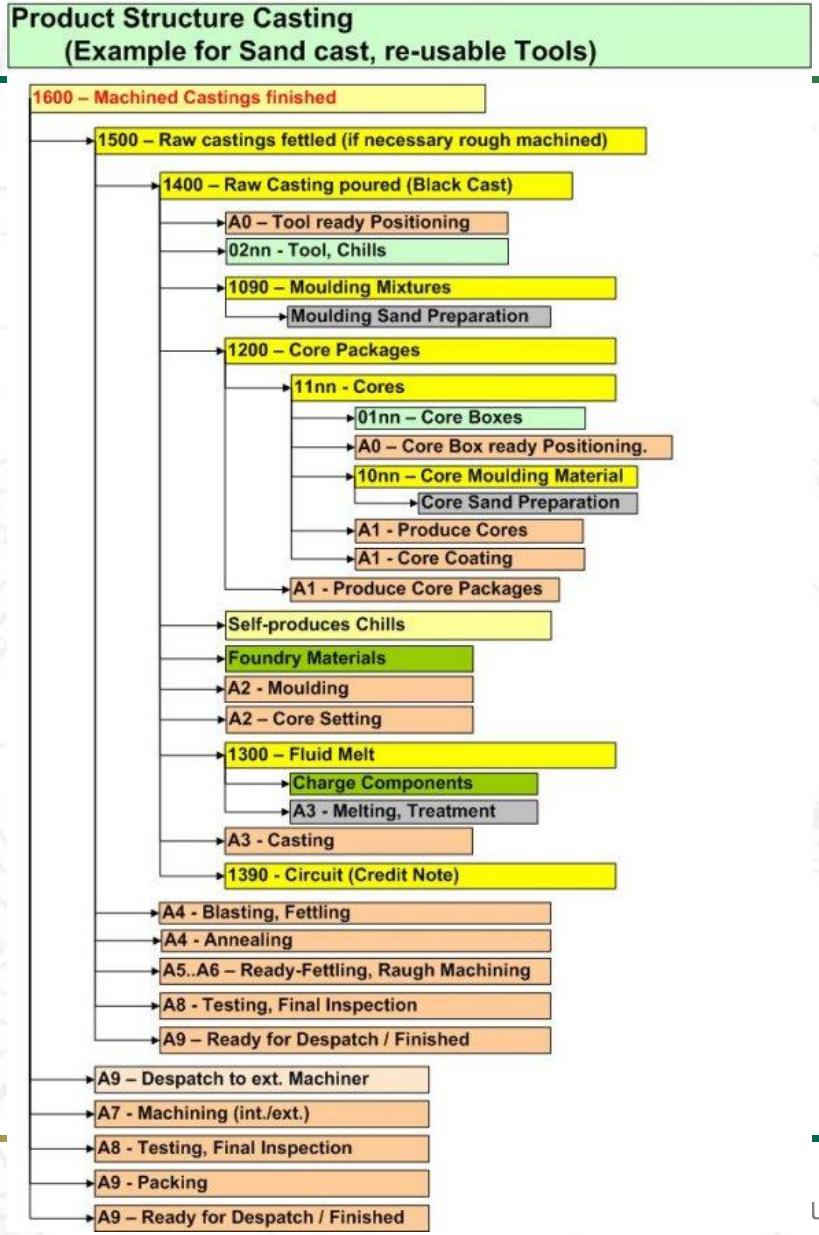
This gives an example for the logarithmic equation of moulding times. The evaluated formulas are useful for the calculation of moulding times of requested parts.

Offer Preparation in RGU-Opti



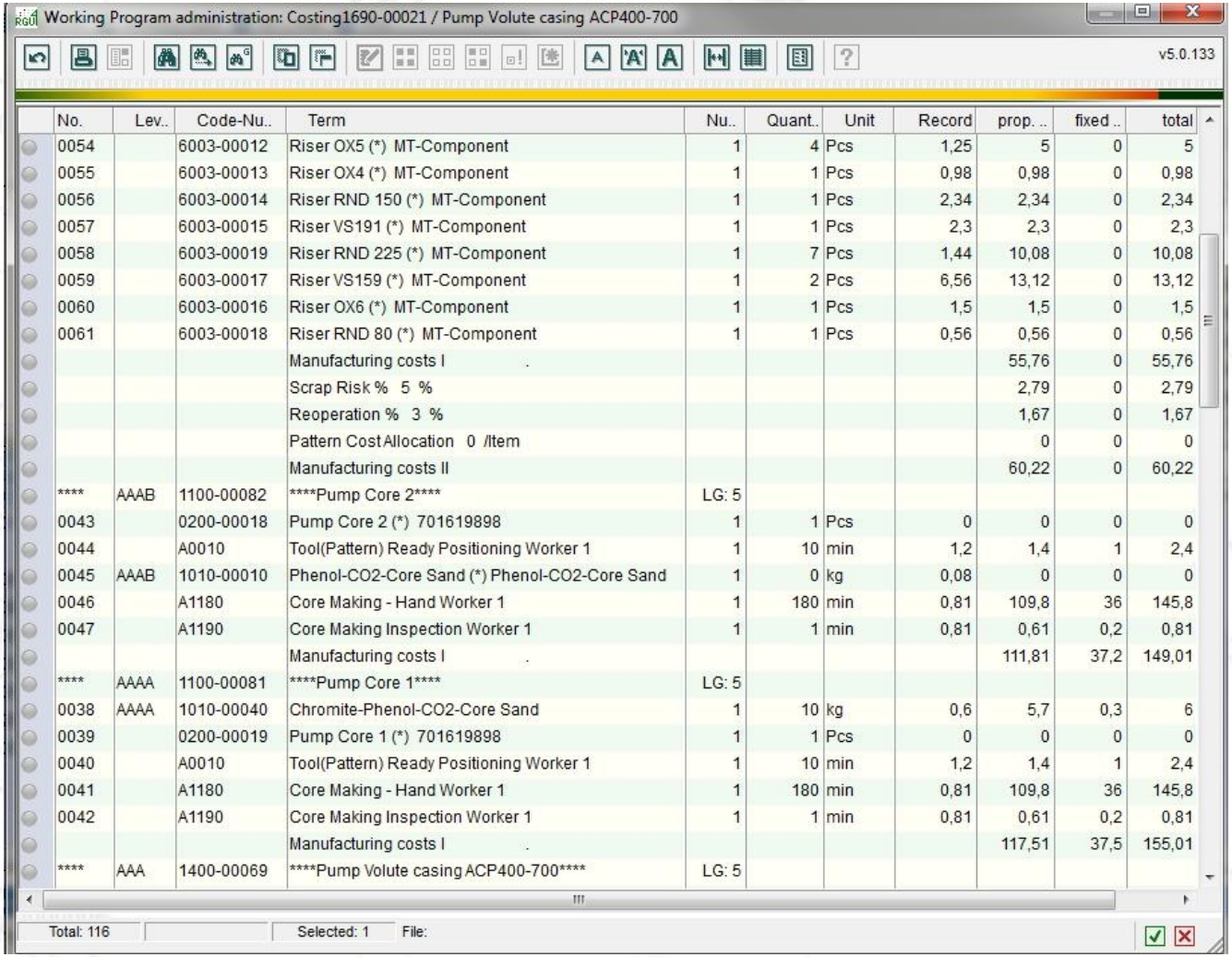
quotations will become an order.

RGU-Opti‘s Recommended Product Structure



Materials, operations, tools and patterns, quality control plans and services are possible elements of the resource plan **including instructions for the shop floors, videos or pictures**.

On-line Cost Calculation



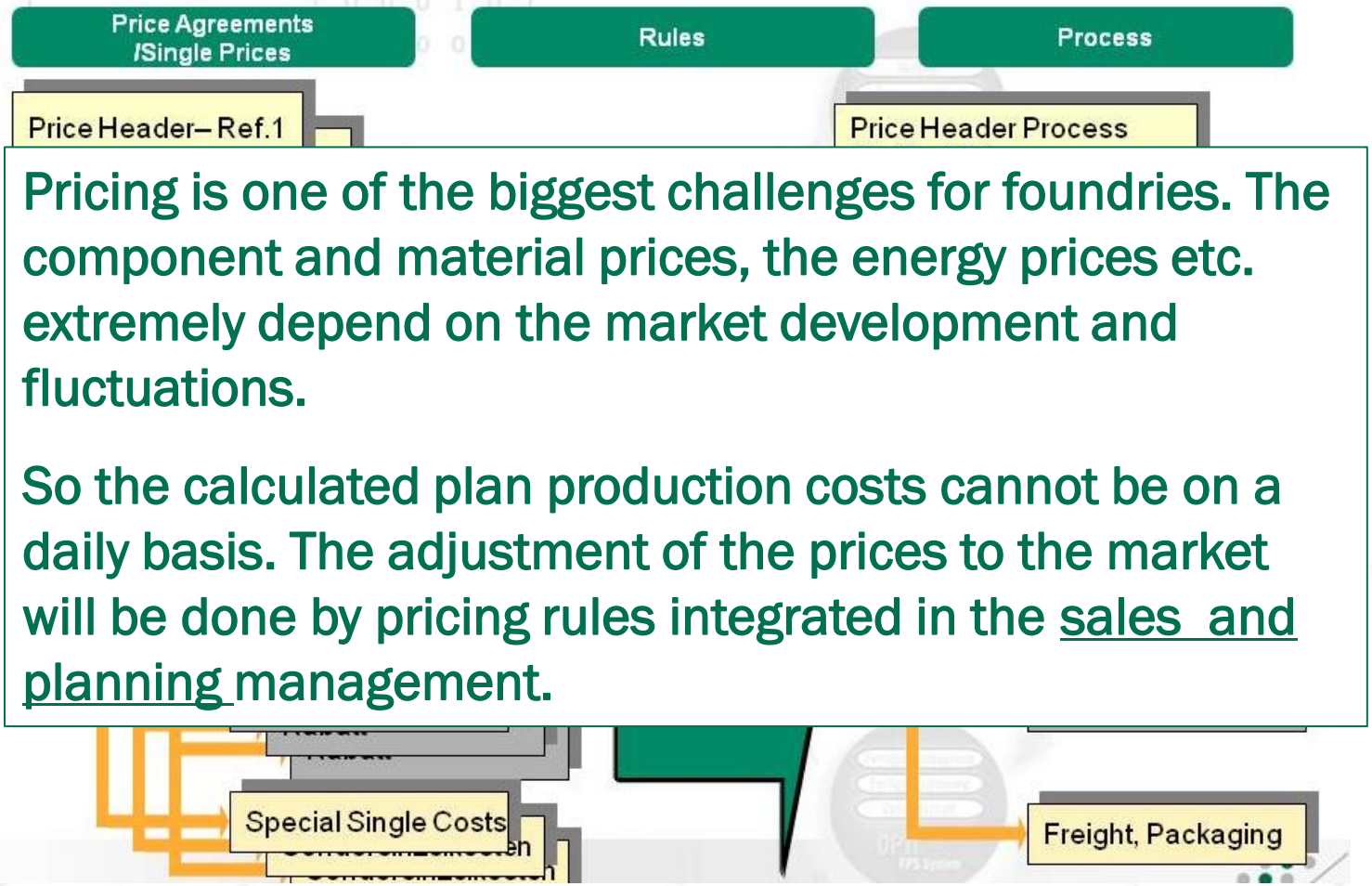
No.	Lev..	Code-Nu..	Term	Nu..	Quant..	Unit	Record	prop. ..	fixed ..	total
0054		6003-00012	Riser OX5 (*) MT-Component	1	4	Pcs	1,25	5	0	5
0055		6003-00013	Riser OX4 (*) MT-Component	1	1	Pcs	0,98	0,98	0	0,98
0056		6003-00014	Riser RND 150 (*) MT-Component	1	1	Pcs	2,34	2,34	0	2,34
0057		6003-00015	Riser VS191 (*) MT-Component	1	1	Pcs	2,3	2,3	0	2,3
0058		6003-00019	Riser RND 225 (*) MT-Component	1	7	Pcs	1,44	10,08	0	10,08
0059		6003-00017	Riser VS159 (*) MT-Component	1	2	Pcs	6,56	13,12	0	13,12
0060		6003-00016	Riser OX6 (*) MT-Component	1	1	Pcs	1,5	1,5	0	1,5
0061		6003-00018	Riser RND 80 (*) MT-Component	1	1	Pcs	0,56	0,56	0	0,56
			Manufacturing costs I .					55,76	0	55,76
			Scrap Risk % 5 %					2,79	0	2,79
			Reoperation % 3 %					1,67	0	1,67
			Pattern Cost Allocation 0 /Item					0	0	0
			Manufacturing costs II					60,22	0	60,22
****	AAAB	1100-00082	****Pump Core 2****	LG: 5						
0043		0200-00018	Pump Core 2 (*) 701619898	1	1	Pcs	0	0	0	0
0044		A0010	Tool(Pattern) Ready Positioning Worker 1	1	10	min	1,2	1,4	1	2,4
0045	AAAB	1010-00010	Phenol-CO2-Core Sand (*) Phenol-CO2-Core Sand	1	0	kg	0,08	0	0	0
0046		A1180	Core Making - Hand Worker 1	1	180	min	0,81	109,8	36	145,8
0047		A1190	Core Making Inspection Worker 1	1	1	min	0,81	0,61	0,2	0,81
			Manufacturing costs I .					111,81	37,2	149,01
****	AAAA	1100-00081	****Pump Core 1****	LG: 5						
0038	AAAA	1010-00040	Chromite-Phenol-CO2-Core Sand	1	10	kg	0,6	5,7	0,3	6
0039		0200-00019	Pump Core 1 (*) 701619898	1	1	Pcs	0	0	0	0
0040		A0010	Tool(Pattern) Ready Positioning Worker 1	1	10	min	1,2	1,4	1	2,4
0041		A1180	Core Making - Hand Worker 1	1	180	min	0,81	109,8	36	145,8
0042		A1190	Core Making Inspection Worker 1	1	1	min	0,81	0,61	0,2	0,81
			Manufacturing costs I .					117,51	37,5	155,01
****	AAA	1400-00069	****Pump Volute casing ACP400-700****	LG: 5						

Total: 116 Selected: 1 File:

Example:

Hand made
Steal Casting

Pricing in RGU-Opti



Pricing is one of the biggest challenges for foundries. The component and material prices, the energy prices etc. extremely depend on the market development and fluctuations.

So the calculated plan production costs cannot be on a daily basis. The adjustment of the prices to the market will be done by pricing rules integrated in the sales and planning management.

Pricing in RGU-Opti

The adjustment of the prices to the market will be done by pricing rules integrated in the sales and planning management.

- Energy surcharges adjustment
- Material surcharges adjustment
- Price increases using price master data
- Additional costs for special services, weight differences
- Online prices on a daily basis of the London Stock Exchange
- …

The results are still valid

Measures:

Invest in more effective facilities, tools etc.

Revise your logistic processes, your suppliers etc.

Train your staff … in the factory shops, in the offices

Revise your cost calculation and your cost building system

Elimate inappropriate basis data, formulas or nomograms, bad calculated weights etc

Eliminate errors, e.g. forgotten materials or operations, unsystematic calculation system (e.g. it depends on the person, difficulties are underestimated etc.)

Simulation, Decision Helper

Simulation Tools and Decision Helper

It is possible to calculate cast parts by **simulated cost basis** of

- new machines
- new processes
- new suppliers
- estimated costs of the next period of time
- etc.

The **melting optimisation system** is an integrated part of RGU OPTI. Using this tool it is also possible to simulate the use of offered components, scrap etc. in order to find out which offers fit best to the material requirements of the melting shops.

The results are still valid

Measures:

Invest in more effective facilities, tools etc.

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Elimate inappropriate basis data, formulas or nomograms, bad calculated weights etc

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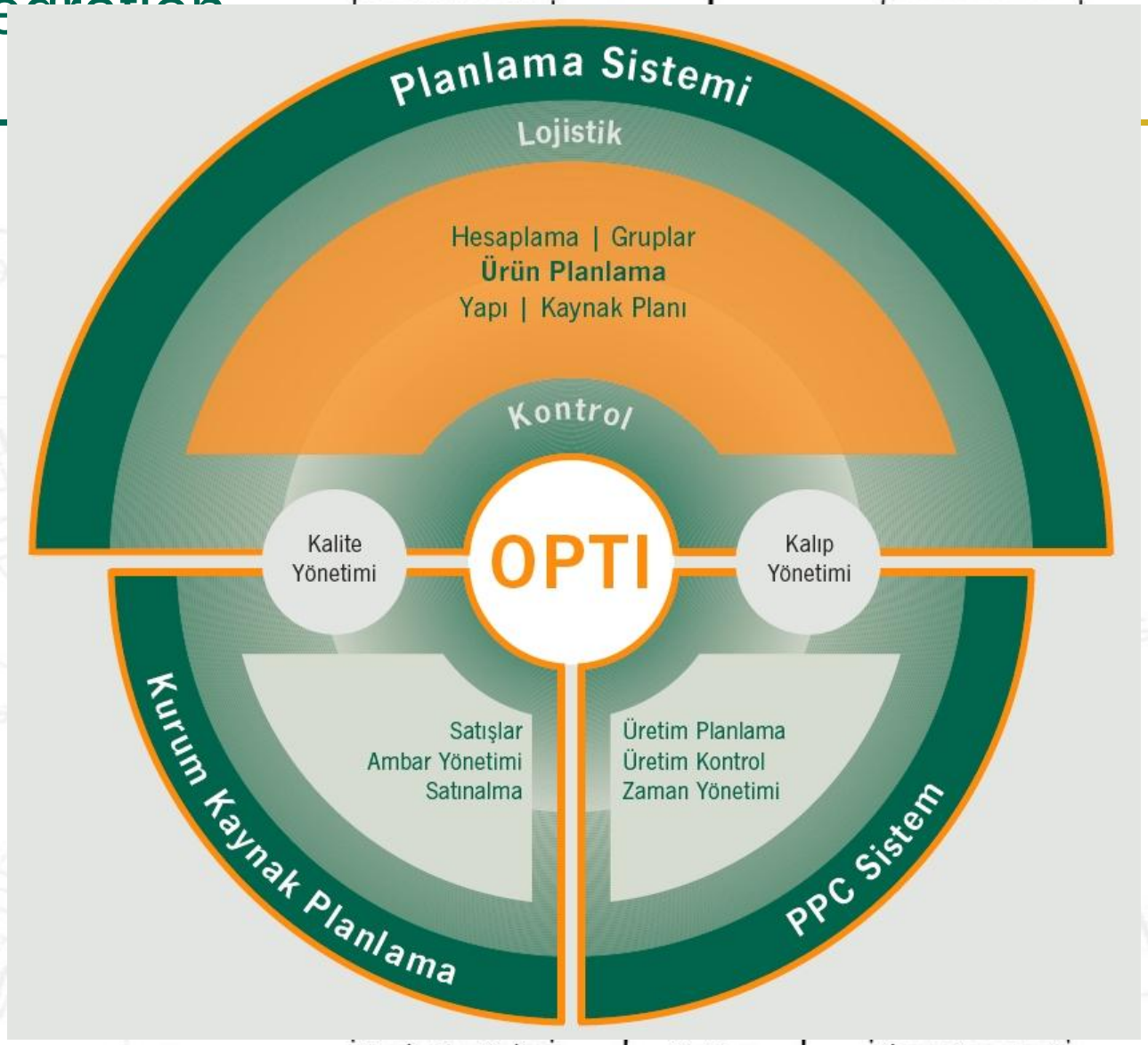
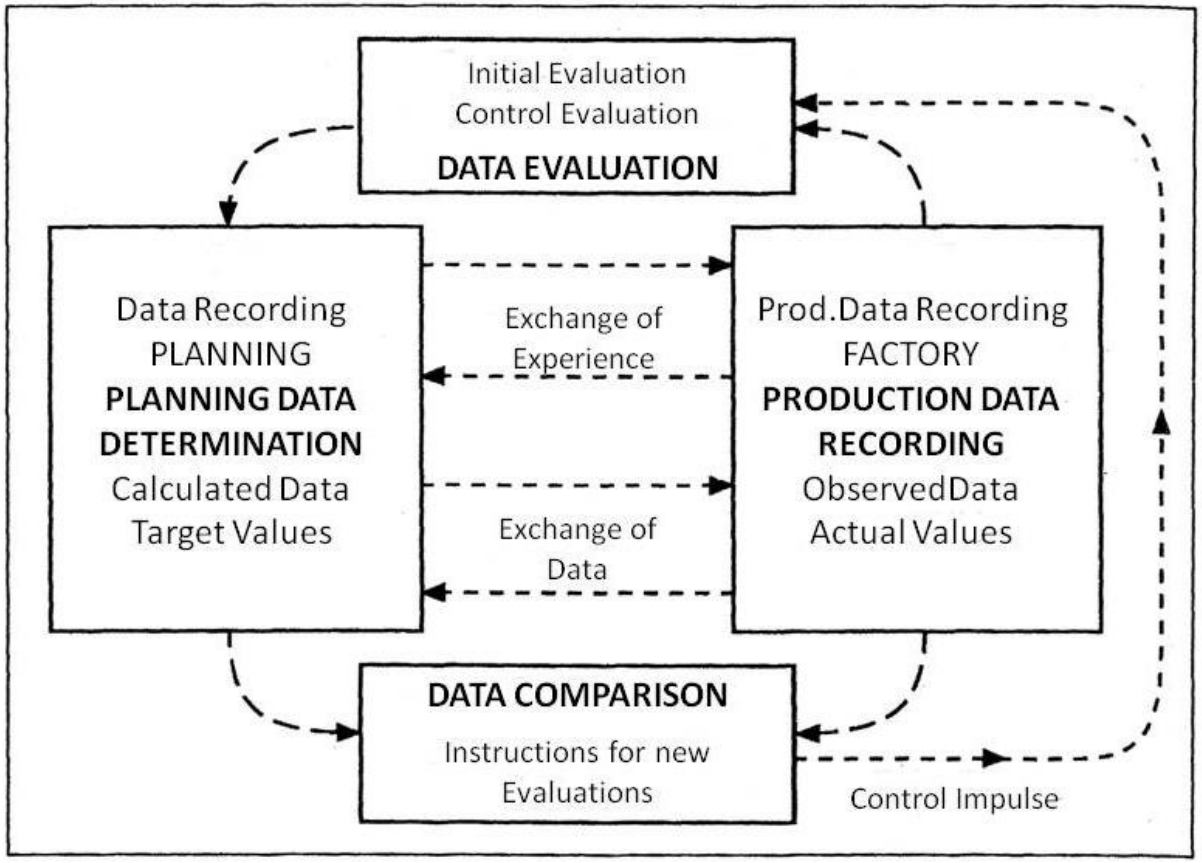
Online-Information

Durchlaufzeiten in der Putzerei in Kalendertagen

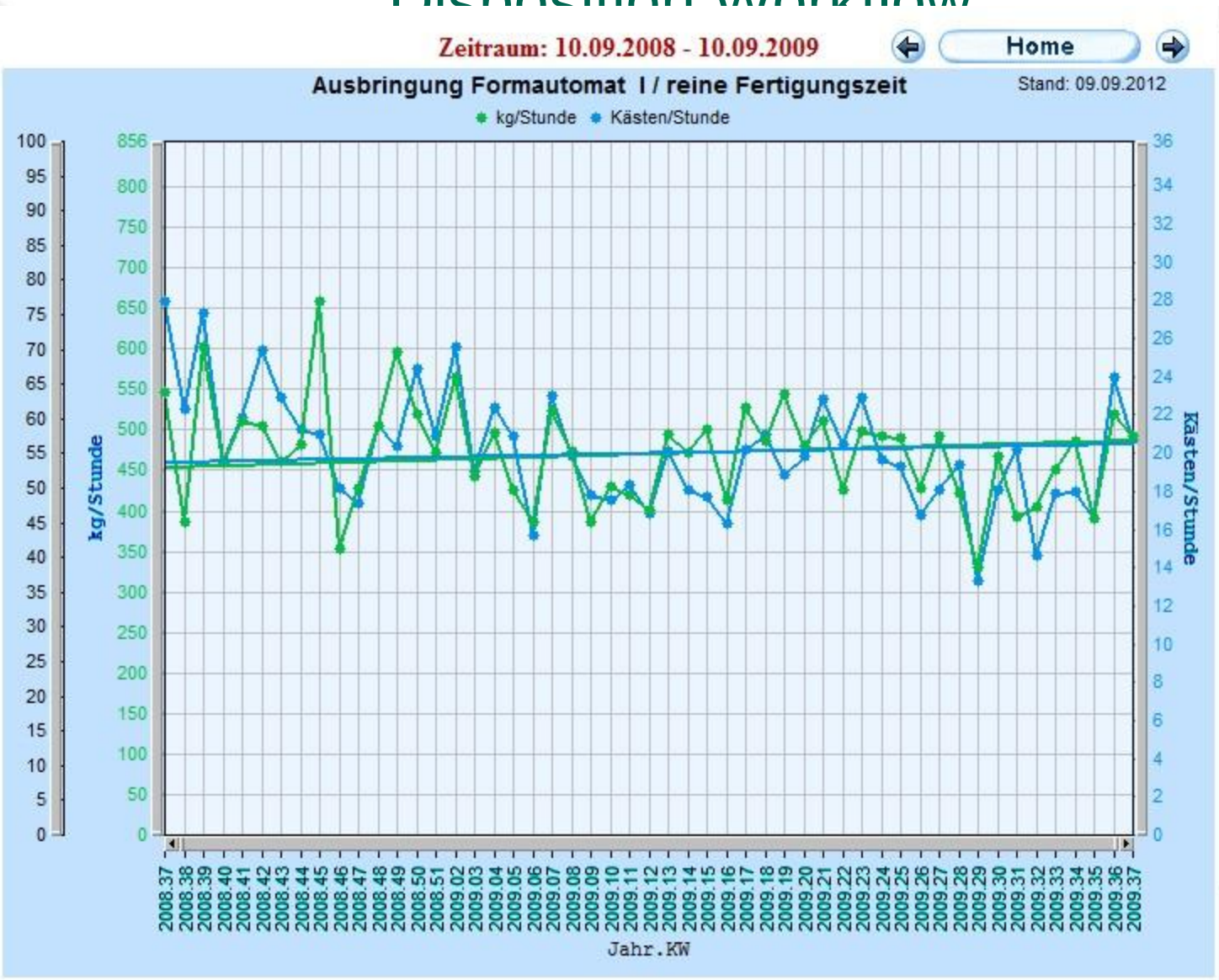
Integration



Set up the Control Loop



Disposition Workflow



RGU

The company RGU in Dortmund, Germany, serves foundry companies for more than 25 years. The product planning was and is the heart module where all other modules are connected to. The ensured knowledge about own costs, processes and the possibilities to improve them is the key to success.

Thank

you

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Attention !

You like more information?

Hall 3, Stand E126