



## Granulation optimization by an Optical Online Particle Analyser, RHEWUM's SizeChecker 100

Prepared by Sigurd Schuetz



Welcome!



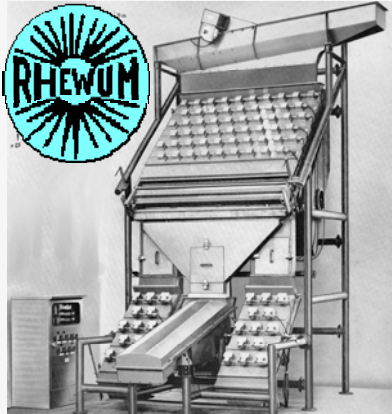
### AGENDA:



- INTRODUCTION
- WORKING PRINCIPLE
- SET-UP AND OPERATION
- ONLINE PARTICLE ANALYSIS
- RESULTS AND APPLICATIONS



## 1.1 Introduction:



- RHEWUM is a family owned, independent private limited company with a professional management
- focussed in developing, designing and manufacturing various screening machines for more than 5 decades
- Key products: different screening technologies for various applications, worldwide
- 100 employees in Remscheid - Germany, representatives worldwide

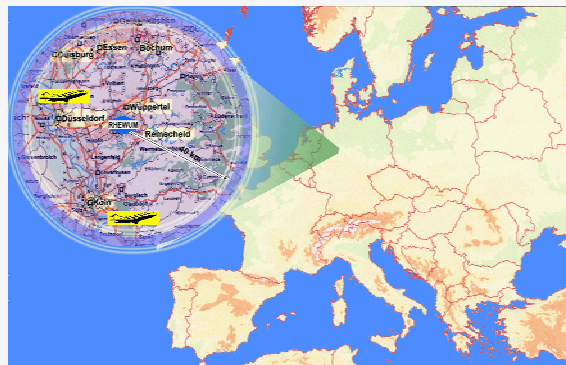


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## 1.2 Location of RHEWUM:



- Located in Remscheid, in the vicinity of Duesseldorf and Cologne Airport



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### 1.3 Extract references:

	Grand Paroisse		AB Achema	

- Extract of our more than 5000 entries counting reference list



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### 2.1 Traditional production control:



- Optimization via sieve tower and weighing scale:
- Frequency: 1 sample per hour
- Impacts on production by the change of process parameters are delayed



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## 2.2 SizeChecker: Main components



Left side: control cabinet



Right side: Detection unit

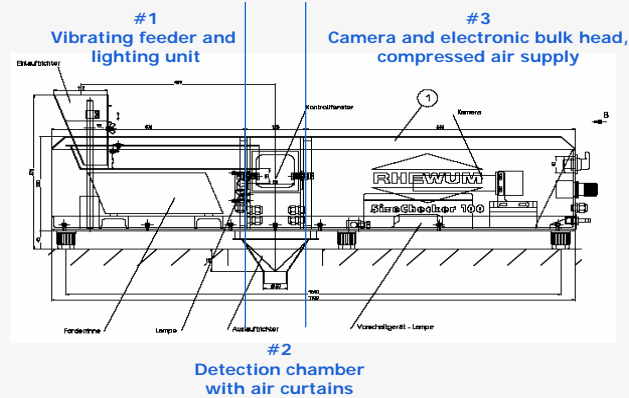


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## 2.3 Detection unit, components



- Overview detection unit

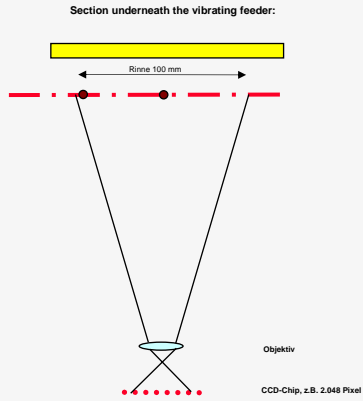


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## 2.4 Working Principle:



- Material is distributed to a mono-layer by a vibrating feeder
- CCD Camera is focussed in a light source
- Falling particles are detected as shades in front of the light
- Shades are evaluated

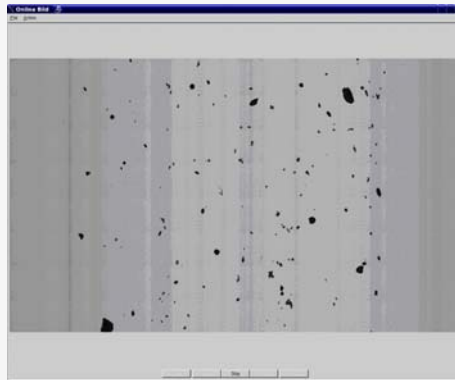


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## 2.5 Input CCD-Camera



- On line picture generated by CCD-Camera, particles are black shades

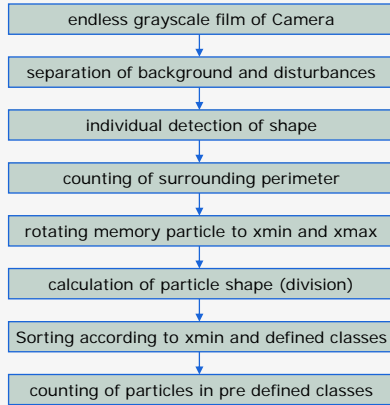


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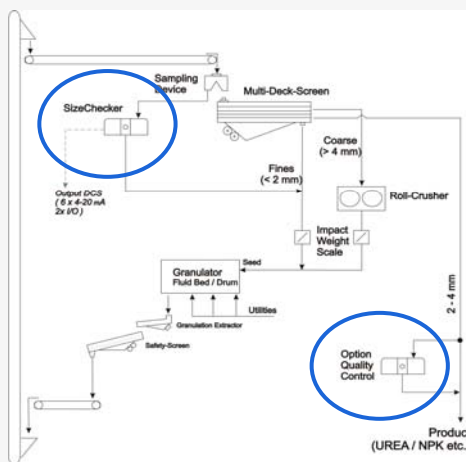
## 2.6 Logic diagram



- Principal logic diagram of SizeChecker
- Realized in parallel working field programmable gate array's (FPGA's)



## 3.1 Set-Up and Operation



- Typical granulation circuit with granulator, screen and crusher
- Possible locations of SizeChecker in continuous mode





### 3.2 Present installation:



- Since 24.05.2005 the SizeChecker Prototype is operating in a Fertilizer Factory in Krefeld, Germany. The duty is the continuous measurement of the grain size distribution of NPK which is being produced in a drum granulator
- Bypass Product of approx 25 kg/h will be measured, analyzed and filed.

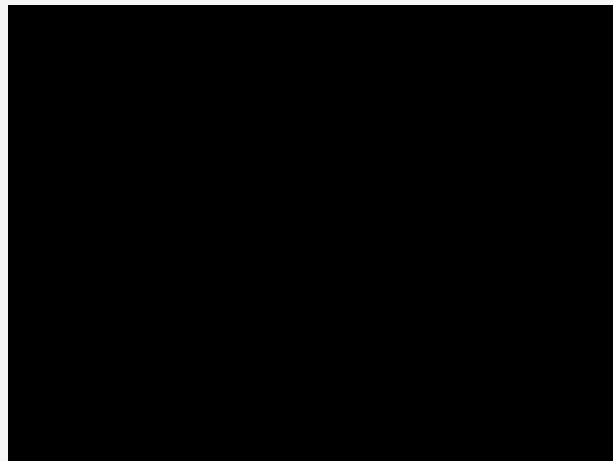


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### 3.3 Film clip, present installation, 2:28 min.

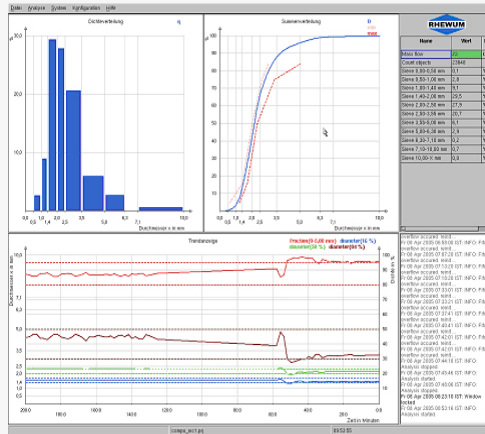


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### 4.1 Screen-shot, main window



- Upper left: Grain size distribution as bar chart
- Upper right: grain size distribution as cumulative curve
- Lower left: Trend curve of grain sizes
- Lower right: System messages

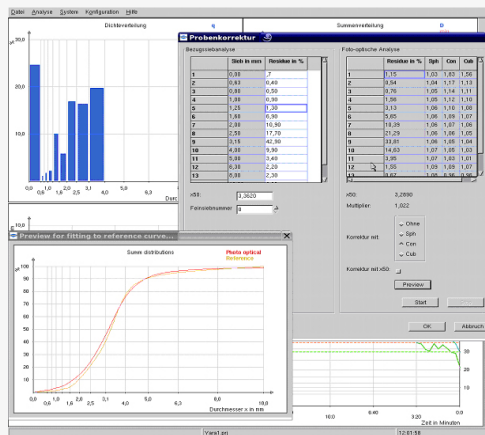


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### 4.2 Screen-shot, product adaptation



- Product adaptation is possible, the same sample shall be measured on the sieve tower as well as the SizeChecker.
- Physical correction factors will be calculated, differences will be shown.
- Support of non-representative samples



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### 5.1) Interfaces: Logfile

```

LOGFILE RHEWUM-SIZECHECKER
DATE 13.09.2005 TIME 12.30.50
-----
COMPANY: RHEWUM GmbH USER: Dr. Coppens
SETTINGS: Powtech2005 Capacity optional: no
-----
Count Objects: 123876
-----
Fraction Density Qty Sphericity Cubicity Concavity
x q3 Q3 SPH cub con
[mm] [%] [%]
-----
0,000 00,89 00,00 1,093 1,073 1,290
0,500 03,94 00,89 1,185 1,155 1,118
0,710 05,92 04,83 1,210 1,265 1,125
1,000 09,55 10,74 1,122 1,219 1,185
1,400 17,35 20,29 1,117 1,036 1,063
2,000 21,48 37,64 1,178 1,145 1,193
2,800 14,80 59,12 1,249 1,293 1,039
3,150 08,15 73,92 1,229 1,211 1,187
4,000 01,08 82,07 1,011 1,124 1,091
4,500 01,27 83,15 1,258 1,268 1,028
5,600 06,18 84,43 1,245 1,192 1,063
6,300 06,46 90,61 1,060 1,008 1,095
7,100 02,67 97,07 1,184 1,175 1,090
8,000 00,26 99,74 1,047 1,171 1,056
-----
Average 1,156 1,167 1,116
-----
Parameter: Q(x=2,50 mm) = 51,06 µ
            x(Q=16%) = 1,220 mm
            x(Q=50%) = 2,477 mm
            x(Q=84%) = 5,232 mm
    
```

- The results gained will be displayed in Log-Files and collected in three different intervals.
- Such files can be accessed via Network (TCP-IP protocol on Ethernet)



### 5.2 Optional Interfaces: DCS + MS-Excel



- Interface to DCS:
  - 6 programmable analog signals (size or residue) can be transferred to the DCS (0-20 mA or 4-20mA or 0-10V)
  - 2 Programmable digital signals for alarm functions
- MS-Excel Files (Network Access):
  - Endless Excel File summarizing the signals described before and/or daily report file summarizing all gained information





### 5.3 Granulator control at Compo:



- Beside the Granulator control unit, a remote control of the size Checker is installed.
- The operator knows with a delay of max. 5 Minutes the granulated grain size distribution.
- Future outlook: signals measured (x50, Residue on 5,0 and 2,0 mm) shall become part of the control loops.



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### 5.4 SizeChecker Applications



- Production optimization of granulators and crushers
- Production supervision (against clogging or cracking effects on screening machines)
- Quality control of raw materials

**EVERYWHERE A FREQUENT GRAIN ANALYSIS BENEFITS**



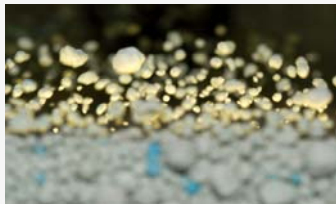
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Further information on the  
SizeChecker or on Screening machines?  
<http://www.rhewum.com>

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Thank you!