Optical Control Systems ®

The solution for the polymer & petrochemical industries

Pellet | Powder | Quality Control

R & D, QC, Lab & on-line application

The original by OCS

High Speed Pellet Scanning Systems

PS200C

The PS200C inspection system is used to analyse transparent and opaque pellets. The pellets are inspected with a high-resolution 3-CCD-chip matrix colour camera for impurities, foreign bodies, or colour deviations. The testing material is fed into the appliance through a hopper. Feeding can be automated by means of an online hopper. The pellets are distributed as one layer before approaching the inspection zone. After the optical evaluation the contaminated pellets can be separated into a different container (sorting unit option).

Measuring errors are eliminated by use of numerous additional optical components. There is no colour dependency as with many other optoelectronic appliances. A high level of efficiency is achieved by powerful image processing software. The synchronisation of the transport system with the image processing offers a major contribution to the reproducibility of the measurement results.

Installation in the bypass guarantees production monitoring and rapid reaction to any occurrences. The system provides a variety of individual configurations, which guarantees an improved adaptation to specific requirements.

The measurement data are stored in a test report to enable future analysis. The recorded images and measured data can be observed on a screen during the measuring process. The results can be shown and printed in tables or graphs.

Along with a pure inspection of pellets the system can also be used to record, file and document. Each defined deviation is recorded in the measurement protocol via a multidimensional characteristics vector with an error map.

The system can be adapted exactly to the respective requirements with the help of the extensive software packages.

Performance Characteristics

- Modular architecture
  Easy to extend, simple, adaptation and upgrade
- Controls
  Menu-controlled windows interface and easy customisation
- Optimum lighting technology
  Use of special lighting technology, therefore independent of the material
- Real-time colour image analysis
  Fast evaluation and representation of the measurement results in various forms. Table with size classifications, time evolution, mosaic view, histogram, distribution
- Inspection synchronisation
  Transport unit, inspection unit and sorting unit (optional) are coordinated exactly to each other
- Sorting device
  Sorting and separate collection of contaminated pellets
- Tables
  Tabular display according to size, shape and colour
- Mosaic display
  Continuous display of the defected deviations as real images
- Features graphics
  Graph of the distribution over sizes, shapes and colours
- Time characteristics
  Graph of the distribution of the characteristics according to time evolution
- Process synchronisation
  Coupling the inspection system with external appliances, e.g. MODBUS
- Interfaces for external appliances
  Alarm interface and analogue scales
- Open database
  The recorded data can be converted into all standard file formats (BMP, JPEG, WMF, EMF, PDF, CSV)

Technical Data

- Camera
  3-CCD-chip colour matrix camera
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 8 lamps each 18 W
- Computer
  Industrial Intel®Core™ 2 Duo
  Up-to-date technology
- Software
  Operating system Windows XP
  Special Image Processing
- Physical interfaces
  Ethernet 10/100 M Base T, USB, RS 485, RS 232, digital & analogue I/O, Fieldbus
- Communication protocol
  MODBUS RTU, MODBUS TCP/IP, OPC, SQL, file transfer (customised), PROFIBUS
  Implementation to other Fieldbus-Systems possible
- Remote control
  Extender max. 100 m
  Service remote control
- Size dimension
  (l, w, h) 770 x 770 x 650 mm
  Weight approx. 100 kg
- Power supply
  230 V AC/115V AC, 50/60 Hz
- Temperature
  10 – 40 °C
- Instrument air: 6 bar

Technical alterations are reserved

PS400C

The PS400C inspection system is used to analyse transparent and opaque pellets. The pellets are inspected with multiple high-resolution 3-CCD-chip line colour cameras for impurities, foreign bodies, or colour deviations. The pellets are inspected in the free fall (further description as the PS200C). An additional feature for the PS400C is the determination of the **mixing ratio** of different coloured pellets, which is an essential feature for compounder & masterbatch manufacturer.

Purpose

- Contamination detection
- Contamination sorting (optional)
- Concentration measuring of mixed product

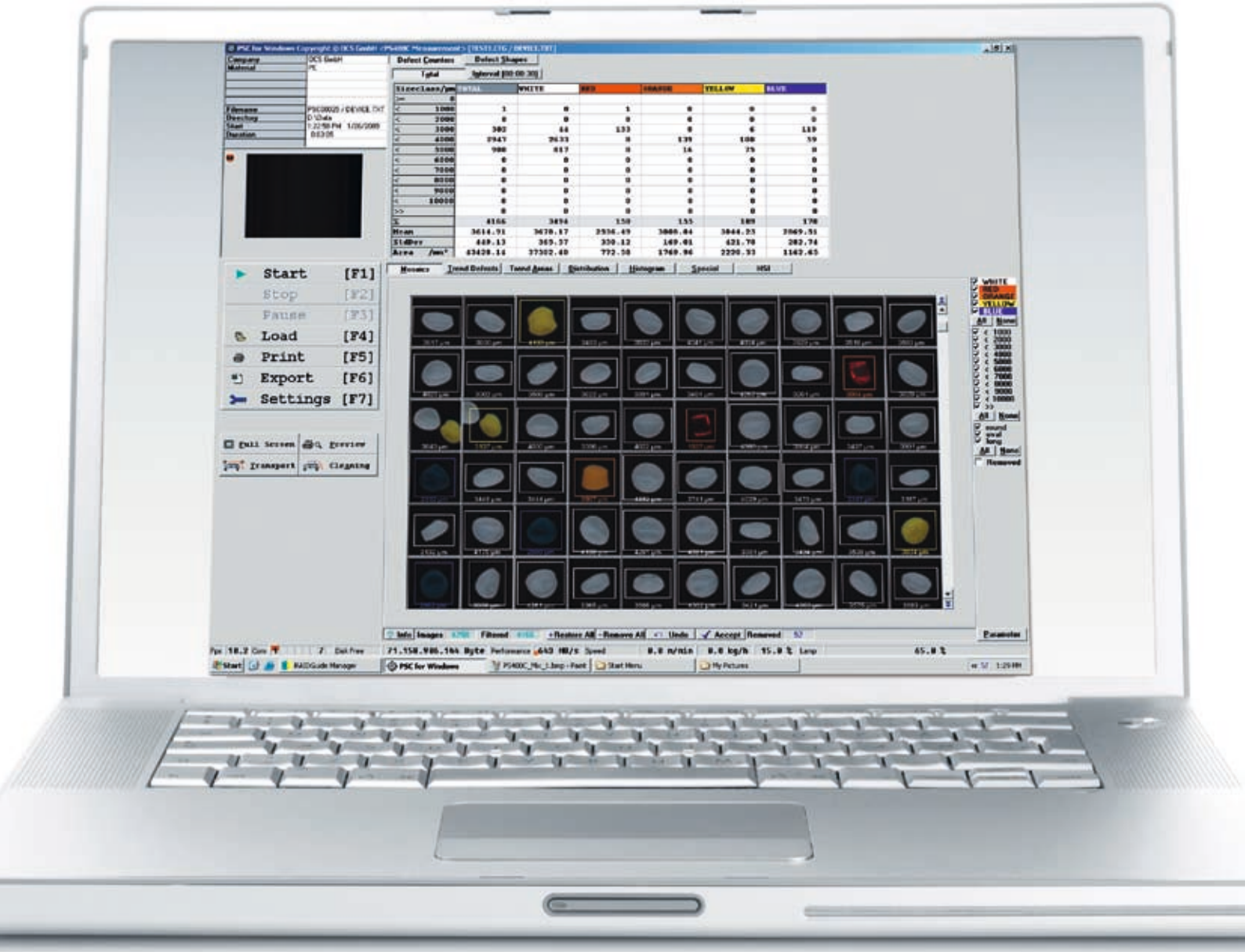
Setup

- Expandable modular concept
- Material dosage by vibration feeder
- Material acceleration by belt
- Scanning in free fall
- Colour line scan camera (scanning front side of pellet stream)
- Optional second colour line scan camera (scanning back side of pellet stream) for non-transparent pellets
- Throughput up to 400 kg/h (per base unit)
- Resolution 100 µm (others on request)
- Scan width 180 mm
- Optional sorter with 18 lanes
- Scalable (1 Server, up to 5 PS400C-Clients)
- Especially designed for highly transparent pellets

Technical Data

Camera

- 3-CCD-chip line scan camera
- Special lenses optimised for camera prism
- Max. line frequency 19,047 kHz
- Max. data rate 40 MB/s
- S/N ratio > 58 dB
- Power consumption: 13,2 W
- Automatic shading correction
- Automatic white balancing



Lighting

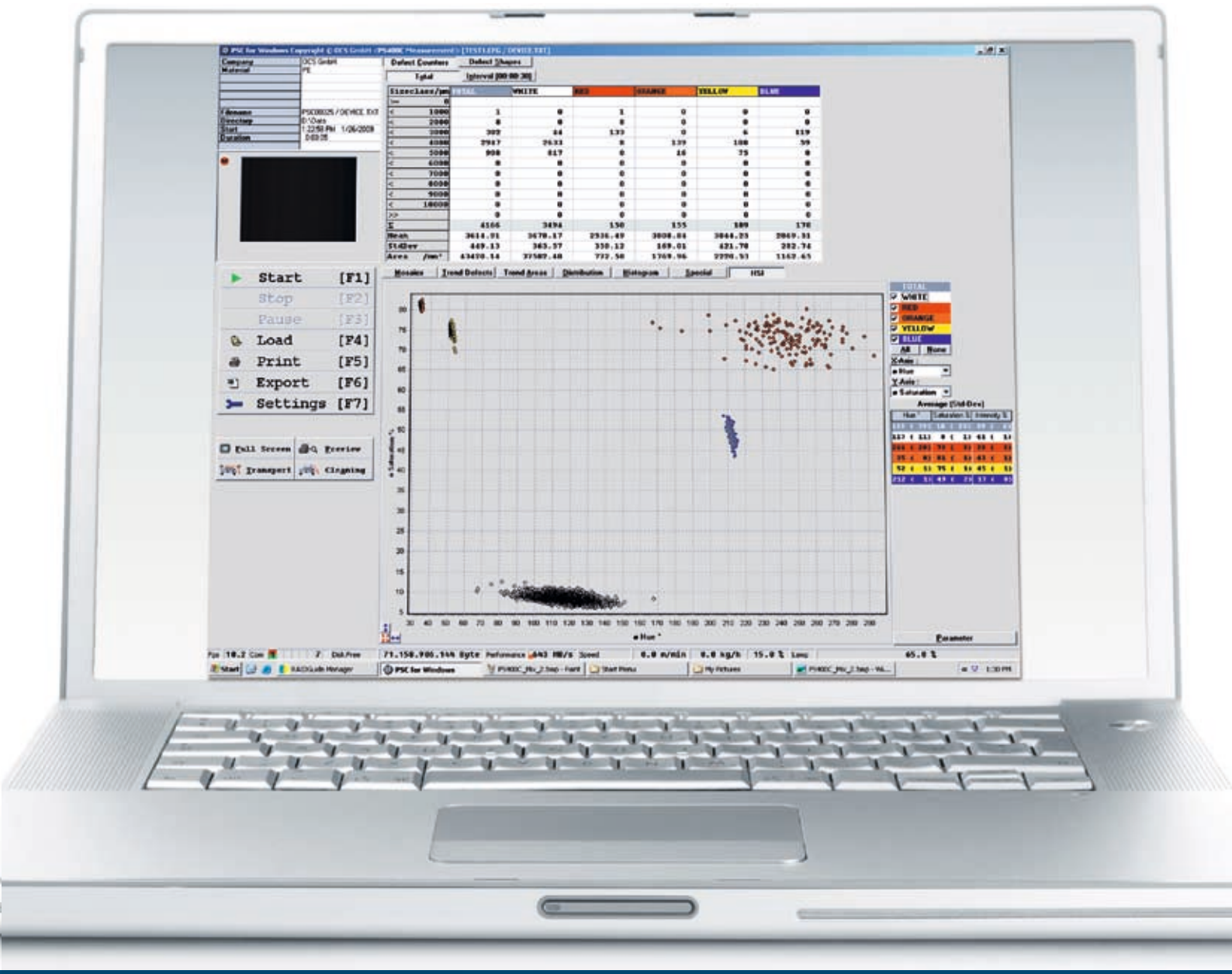
- PLC controlled
- Power supply 230 VAC/50 Hz
- 28 fluorescence lamps each 18 W
- Automatic brightness control

Material Feeding

- PLC controlled
- Conveyor belt
- Vibration feeder

Applications for PS200C & PS400C

- Opaque pellets
- Coloured pellets
- Transparent pellets
- Material throughput up to 200 kg/h (PS 200C)
- Material throughput up to 400 kg/h (PS 400C)



Contamination Detection with PS25C

The PS25C inspection system is used to analyse transparent and opaque pellets. The pellets are inspected with a high-resolution 3-CCD-chip colour camera for impurities, foreign bodies, or colour deviations.
The testing material is fed into the appliance through a hopper. Feeding can be automated by means of an extension module, e.g. a multi-hopper system or an online hopper.
Moreover, an accurate colour measurement in a special measurement chamber can be carried out by means of colour spectrometry CM2 (option).
The pellets are conveyed as one layer over the inspection zone via a vibrating channel. After the optical evaluation the contaminated pellets can be separated into a different container (sorting unit option).

Measuring errors are eliminated by use of numerous additional optical components. There is no colour dependency as with many other optoelectronic appliances.

A high level of efficiency is achieved by powerful image processing software. The synchronisation of the transport system with the image processing offers a major contribution to the reproducibility of the measurement results.

Optimum adaptation in laboratory operations or in measuring stations is a paramount factor in the quality control. Installation in the bypass guarantees production monitoring and rapid reaction to any occurrences. The system provides a variety of individual configurations, which guarantees an improved adaptation to specific requirements.

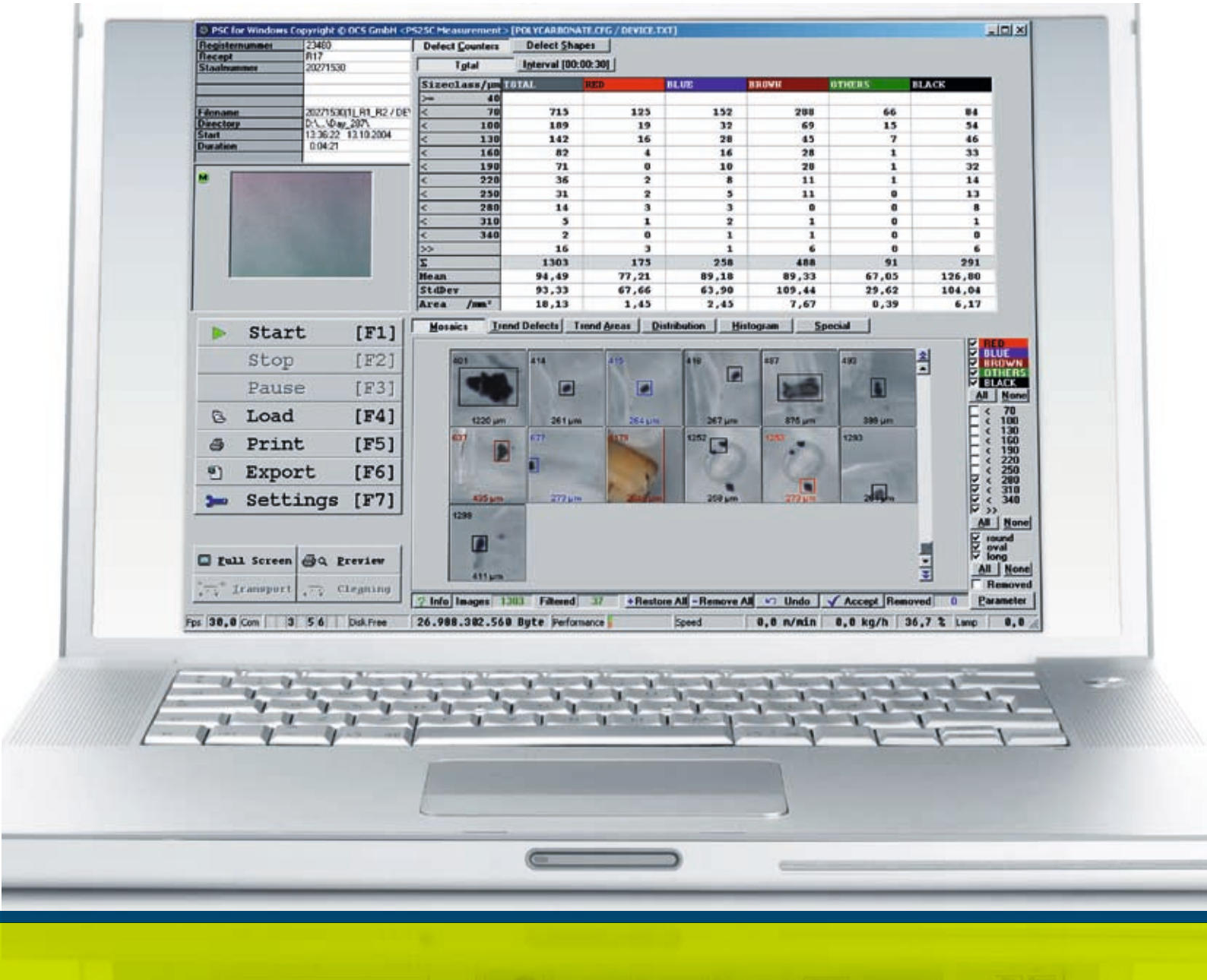
The measuring is stored in a test report to enable future analysis. The recorded images and measured data can be observed on a screen during the measuring process. The results can be shown and printed in tables or graphs.
Along with a pure inspection of pellets the system can also be used to record, file and document. Each defined deviation is recorded in the measurement protocol via a multidimensional characteristics vector with an error map.
The system can be adapted exactly to the respective requirements with the help of the extensive software packages.

Performance Characteristics

- Modular architecture
  Easy to extend, simple, adaptation and ugrade
- Controls
  Menu-controlled Windows interface and easy customisation
- Optimum lighting technology
  Use of special lighting technology, therefore independent of the material
  UV-Lighting (option), for inspection of fluorescent pellets
- Real-time colour image analysis
  Fast evaluation and representation of the measurement results in various forms
  Table with size classifications, time evolution, mosaic view, histogram, distribution
- Inspection synchronisation
  Transport unit, inspection unit and sorting unit (optional) are co-ordinated exactly to each other
- Sorting device
  Sorting and separate collection of contaminated pellets
- Tables
  Tabular display according to size, shape and colour
- Mosaic display
  Continuous display of the detected deviations as real images
- Features graphics
  Graph of the distribution over sizes, shapes and colours
- Time characteristics
  Graph of the distribution of the characteristics according to time evolution
- Process synchronisation
  Coupling the inspection system with external appliances, e.g. MODBUS interface
- Interfaces for external appliances
  Alarm interface, analogue scales, multi-hopper system, spectrometry, PSSD (PA66)
- Open database
  The record data can be converted into all standard file formats (BMP, JPEG, WMF, EMF, PDF, CSV)

Technical Data

- Camera
  3-CCD-chip colour matrix camera
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 22 W
- Computer
  Industrial Intel®Core™ 2 Duo
  Up-to-date technology
- Software
  Operating system Windows XP
  Special Image Processing
- Physical interfaces
  Ethernet 10/100 M Base T, USB, RS 485, RS 232, digital & analogue I/O, Fieldbus
- Communication protocol
  MODBUS RTU, MODBUS TCP/IP, OPC, SQL, file transfer (customised), PROFIBUS
  Implementation to other Fieldbus-Systems possible
- Remote control
  Extender max. 100 m
  Service remote control
- Size dimension
  (l, w, h) 50 x 50 x 50 cm
  Weight approx. 30 kg
- Power supply
  230 V AC/115V AC, 50/60 Hz
- Temperature
  10 – 40 °C
- Instrument air: 6 bar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Rezept R17
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Defect Counters
Defect Shapes
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StdDev 93,33 67,66 63,90 109,44 29,62 104,04
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Preview
Transport
Cleaning
Mosaics
Trend Defects
Trend Areas
Distribution
Histogram
Special
RED
BLUE
BROWN
OTHERS
BLACK
All
None
round
oval
long
Removed
Parameter
Info
Images 1303
Filtered 37
+Restore All
-Remove All
Undo
Accept
Removed 0
Fps 30,0 Com 3 56 Disk Free 26.988.382.560 Byte Performance Speed 0,0 m/min 0,0 kg/h 36,7 % Lamp 0,0

Contamination Detection with PT2C

The Powder Testing System PT2C, equipped with a 3-CCD-chip colour camera, counts and classifies contaminations. Colour classes can be defined with the »teaching« tool to detect discolorations and foreign bodies which are different in colour from the bulk material, such as PVC, PP, PE, Salt etc. The system is capable of detecting contamination and discoloured powder particles (pink, yellow, brown, black etc.). These irregularities are sorted into different class sizes which are completely user definable. Furthermore, it is possible to define alarm limits. If these are exceeded, a potential-free contact is activated.

The PT2C can be used for laboratory purposes as well as for on-line inspection. The powder can be submitted as a sample or it can be withdrawn from the production line by creating a bypass. Using a bypass system gives the user the advantage of direct inspection of the material during the production process. This allows faster response in order to prevent off spec production.

The software offers a multitude of configuration possibilities, enabling the user to adapt the system exactly to individual requirements.

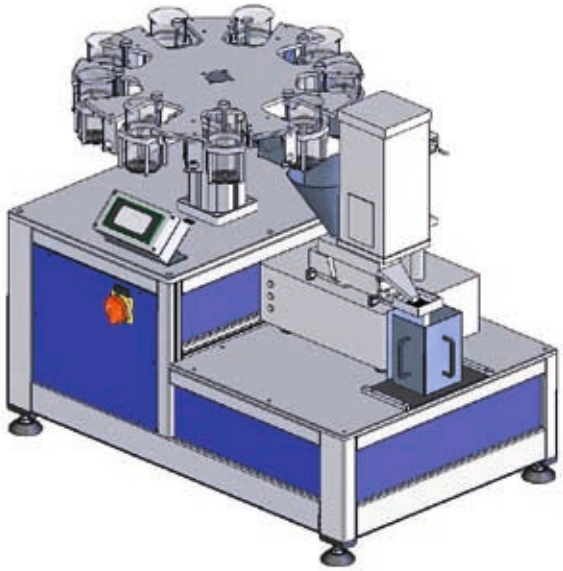
The inspection can be observed on a monitor and visible defects marked and indexed. Images of special importance can be stored and the data presented in a variety of graphs and tables. A colour printer documents the results. Configuration data, software settings and duration of the inspection can be easily accessed. This facilitates later or long-term evaluation.

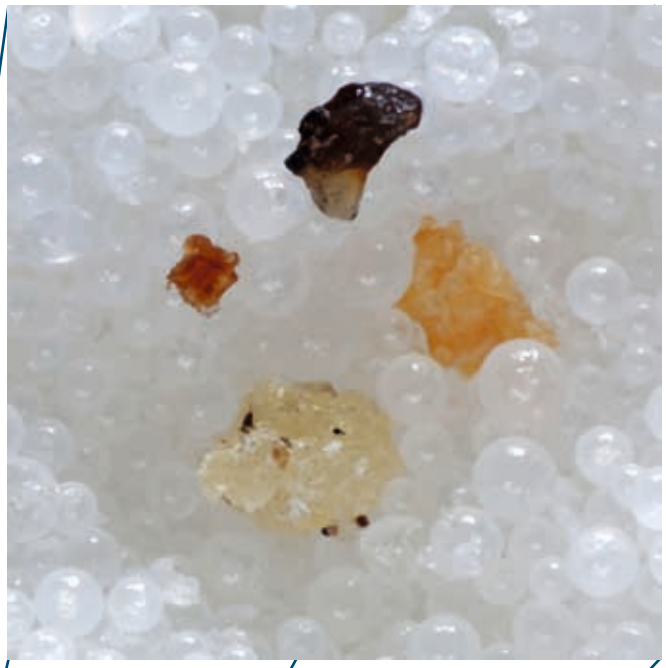
The Powder Testing System PT2C has a rated capability of inspecting up to 1 kg/hour. The actual throughput is dependent on the physical characteristics of the powder. The system can be integrated in any internal data processing system using an existing software interface, e.g. Ethernet. The unit is robust and maintenance-friendly.


OCS
Power ON
Lighting ON
Hauling ON
OCS
PT-2C

Performance Characteristics

- Controls
  Menu-controlled Windows interface and easy customisation
- Optimum lighting technology
  Use of special lighting technology, therefore independent of the material
- Real-time colour image analysis
  Fast evaluation and representation of the measurement results in various forms
  Table with size classifications, time evolution, mosaic view, histogram, distribution
- Inspection synchronisation
  Transport and inspection are co-ordinated exactly to each other
- Tables
  Tabular display according to size, shape and colour
- Mosaic display
  Continuous display of the detected deviations as real images
- Features graphics
  Graph of the distribution over sizes, shapes and colours
- Time characteristics
  Graph of the distribution of the characteristics according to time evolution
- Process synchronisation
  Coupling the inspection system with external appliances
- Interfaces for external appliances
  Alarm interface, multi-hopper system, sorter system
- Open database
  The record data can be converted into all standard file formats (BMP, JPEG, WMF, EMF, PDF, CSV)





Technical Data

- Camera
  3-CCD-chip colour matrix camera
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 18 W
- Computer
  Industrial Intel®Core™ 2 Duo
  Up-to-date technology
- Software
  Operating system Windows XP
  Special Image Processing
- Physical interfaces
  Ethernet 10/100 M Base T, USB, RS 485, RS 232, digital & analogue I/O, Fieldbus
- Communication protocol
  MODBUS RTU, MODBUS TCP/IP, OPC, SQL, file transfer (customised), PROFIBUS
  Implementation to other Fieldbus-Systems possible
- Remote control
  Extender max. 100 m
  Service remote control
- Size dimension
  (l,w,h) 50 x 50 x 50 cm
  Weight approx. 30 kg
- Power supply
  230V AC/115V AC, 50/60 Hz
- Temperature
  10 – 40 °C

Pellet Size & Shape Distribution System PSSD

The PSSD is a modular inspection system for the rapid analysis & classification of the size and shape of granules. The pellets which are to be inspected are moved by the vibrating table and are measured individually in the free fall between the camera and the light source. This universal measurement principle enables the system to analyse up to 50 kg granules per hour, depending on the granule size and it's bulk density.

allow for a fast response to production problems. The measured data are stored in a control protocol on the image processing computer to enable future analysis, and this data can be transferred to the control room. During the measurement process, the images and the stored data are displayed in real time on the monitor. The results can be shown in a table or in a graphic and can be printed as well.

The use of a high resolution CCD camera with automatic controllable lighting offers a continuous reproducibility of the measured results. This instrument can analyse granules and particles from 70 µm upwards (20 µm option), independent of their colour.

The optimal operation in a laboratory environment, as well as in an online measurement station is a paramount factor in the quality control. This instrument offers a huge variety of customised configurations to fit the customer's needs and objectives perfectly. For example, when installed in a bypass of the production line, this system will

Not only can this instrument perform a precise analysis and classification of the granules, it can also be used for recording, archiving and documentation purposes. Each variation of the pellets shape, size, diameter, elongation, roundness, roughness and/or convexity will be recorded in the measurement protocol on a multidimensional characteristics vector with an error map.

With this tailor-made and sophisticated software package, this instrument will perfectly fulfill all your needs!


OCS
PSSD
OCS
OCS

Performance Characteristics

- Modular architecture
  Possibility of extension, easy adaptation and upgrade
- Utilisation
  Windows interface and easy customisation
- Optimal lighting techniques
  Use of a special lighting technique to avoid colour related troubles during the pellet analysis
- Real-time image analysis
  Fast evaluation, analysis and representation of the measured results in different formats: table with size classifications, time evolution, mosaic view, histogram, distribution
- Table view
  Results displayed in table according to the shape, size, diameter, elongation, roundness, roughness, and/or convexity
- Mosaic view
  Continuous display in real picture of the variations
- Graphic of the characteristics
  Graphical display of the repartition by size, shape, etc.
- Time evolution
  Graphical display of the repartition of the characteristic according to the time evolution
- Process synchronisation
  Interconnections between the inspection system and external instruments
- Interface for external applications
  Alarm interface, digital balance, etc.
- Open database
  The data from the protocol can be easily converted into the entire common database format (MS Access, Excel, etc.)

Distribution cloud of different particles

Technical Data

- Camera
  CCD Line Scan Sensor 4096 Pixel
  160 MHz
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 32 W
- Computer
  Industrial Intel®Core™ 2 Duo
  Up-to-date technology
- Software
  Operating System Windows XP
  Special Image Processing
- Physical interfaces
  Ethernet 10/100 M Base T, USB, RS 485, RS 232, digital & analogue I/O, Fieldbus
- Communication protocol
  MODBUS RTU, MODBUS TCP/IP, OPC, SQL, file transfer (customised), PROFIBUS
  Implementation to other Fieldbus-Systems possible
- Remote control
  Extender max. 100 m
  Service remote control
- Size dimension
  (l,w,h) 100 x 50 x 50 cm
  Weight approx. 60 kg
- Throughput
  Up to 50 kg/h
- Power supply
  230V AC/115V AC, 50/60 Hz
- Temperature
  10 – 40°C

Particle Size Distribution

Pellet Analyser PA66

The product quality in the plastic processing industry demands that the raw material itself conforms to the necessary requirements with regard to purity, colour and property of the pellets.

It is a red signal for the raw material producer if the pellets have coloured or black inclusions that are generated in the synthesising and/or pelletising section.

It is just as critical if polymer dust and fines occur in the process that indicate non-optimal transport conditions in the area of loading/

unloading trucks and bagging. However, if the fines were shown to have been created in the synthesising area, it would be the responsibility of the downstream cyclone classifying to create "fines"-free pellets before delivery.

Undesired loose impurities on the pellets are carried in, for example, through contaminated conveying air (filter) or in an unclean silo vehicle, and therefore manufacturer, transporters and end processor will be affected hereby. In this case it is essential to have accurate testing documentation available in order to monitor and eliminate the cause of the defects. Moreover, additional costs in further processing can be prevented.

The constantly increasing production speeds in processing demand that the pellet quality complies with technical developments. Continuity with regard to a defined pellet size distribution is required, because at high loads the feed behaviour in the processing machines can react sensitively to even minor fluctuations of a more or less wide distribution. In this context, the pellet shape (e.g. lense/cylinder/dice/sphere) is equally important. Additional interference occurs in processing pellet mixtures if it has to be guaranteed that the composition remains stable in the processing (no segregation). The same applies to masterbatches or the subsequent metering of additives.

The PELLET ANALYSER PA66 system complies with the precondition through the combination of the highly sensitive PSSD, PS25C and real colour measurement CM2 (option).

Impurities are measured in the PS25C inspection system with the help of a 3-CCD-chip colour camera according to colours, sizes and shapes.

High-performance evaluation software processes the raw data into extremely variable visual graphics and tables, and also into representations of the defects (mosaic display).

As a modular inspection system the PSSD system counts and measures the size and shape of pellets. The pellet size and shape can be determined in 10 different classes. The PSSD system also detects twins, triples, spikes and dog-bones as well as pellets with fines and tails. The system can indicate dust and tails proportion. By counting all measured pellets the pellet weight (pellets/g) can be determined, in combination with a weighing device. The colour measurement CM2 (option) determines the colours of the pellets on-line with a spectrometer and presents the data in various standards (e.g. L,a,b values).

With a suitable layout the system can be operated both off-line and on-line.

The time history for each production batch is documented and filed through the automatic storage of all measured data.

Colour Measurement System CM2

The CM2 system serves the automatic colour measurement of plastic granules. The granules are carried in a special measuring channel.
In the process it develops a granule column, which can be brought to the optimal measuring temperature through an air flush. In the measuring channel there is an opening which serves the measurement.

A rotary feeder (optional) provides a continuous transport of the granules. A colour spectrometer records the colour spectrum of the granules through the instrumentation opening and determines the colour of the granules.
Different colour displays or standards can be realised e.g. CIE-L,a,b/X,Y,Z as well as Yellowness Index. The data can be rounded up and assigned to a process control system.

Technical Data

PS25C

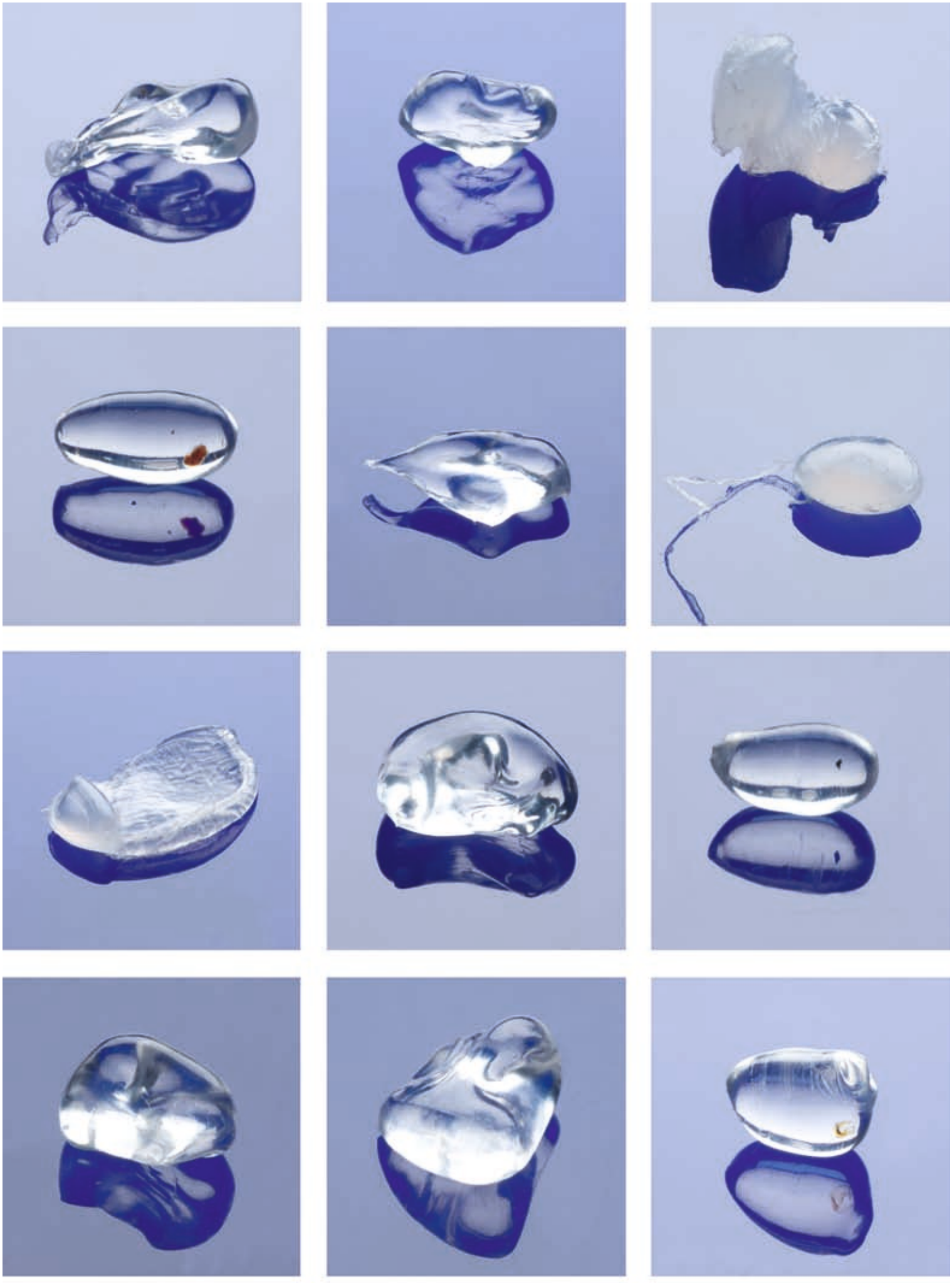
- Camera
  3-CCD-chip colour matrix camera
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 22 W

PSSD

- Camera
  CCD Line Scan Sensor
- Lighting
  High frequency synchronised fluorescent lamp white light spectrum;
  Power consumption: 32 W
- Computer
  Industrial Intel®Core™ 2 Duo
  Up-to-date technology
- Software
  Operating system Windows XP
  Special Image Processing
- Physical interfaces
  Ethernet 10/100 M Base T, USB, RS 485, RS 232, digital & analogue I/O, Fieldbus
- Communication protocol
  MODBUS RTU, MODBUS TCP/IP, OPC, SQL, file transfer (customised), PROFIBUS
  Implementation to other Fieldbus-Systems possible
- Remote control
  Extender max. 100 m
  Service remote control
- Size dimension
  (l,w,h) 120 x 50 x 170 cm
  Weight approx. 120 kg
- Power supply
  230 V AC/115V AC, 50/60 Hz
- Temperature
  10 – 40 °C

»Optimise your production through precise quality control«

OCS



Return of Investment (ROI)

Quality Increase by constancy, continuity, on-time re-adjusting, alarm settings, limitation values, fast reaction, remix/transition, general plant overview, error prevention, value-free judgement.

Scrap/Sub-standard product minimising
The plant performance is increased significantly, because of the direct insertion of influence. Furthermore parts of scrap/sub-standard can be re-used/re-mixed, because all parameters are under control permanently- the plant will be more efficient.

Transition time reduction because all the analytical values are available permanently. This enables the operation team, to finish the transition much more earlier, instead of waiting for Lab results.

Cost savings because of operation availability (stable process, no waiting time for analytical results), limited energy consumption, and maintenance in one hand (no multi maintenance contracts, spare parts promptly obtainable and experts available on short term).

Optimising product sequences
The process is well overseen, will be in control durably and the operation conditions can be changed very fast and flexible.

Additionally

- **Accurate and continuous automatic analysis**
- **24 hour online production surveillance**
- **Trend analysis parallel to production**
- **Logging of the production process**
- **Accurate and consistent automatic grading**
- **Reduction of customer returns and complaints**

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