

KROB SCANNERS



KROB SCANNERS s.r.o.
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Company Introduction and Products 2010

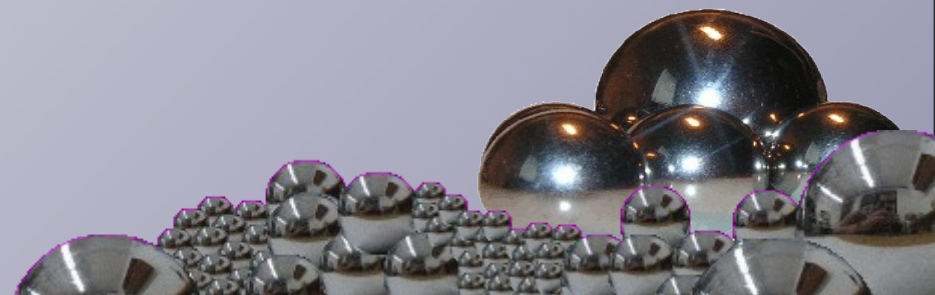


Welcome to the presentation of KROB SCANNERS

Contents of the presentation:

Introduction of Krob Scanners s. r. o.

Overview of basic types of machines and products



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About us:

The KROB company was founded in 1991 in Teplice, Czech Republic. Since then our company's main activities have centred on the development, the sale and the maintenance of testing and sorting machines for the examinations of the surface quality of ball bearings – our Ball Scanners of type BASC, BS and BSC.

- **Development** is entirely carried out by our own developing and testing unit. Prototypes are long-term tested not only in our company but also by renowned companies in Germany.
- **Manufacturing** - exerts 100 % testing of all parts and subassemblies on all levels of the manufacturing process and even before the final assembly of the machines. All electrical components are long-term burn-in proved. The next test series are done after the final assembly. All products by the KROB SCANNERS s.r.o. are long-term tested before dispatching.



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- **Sales** - nowadays the products by KROB SCANNERS s.r.o. are exported to the USA, Germany, Ireland, Italy, Poland, France, China and India. The company provides great attention to the delivery of replacement parts in the most minimal possible time.
- **Quality** - from 2005 the firm has been certified according to ČSN EN ISO 9001:2001.
- **Servicing** - KROB SCANNERS s.r.o. makes a big effort to ensure the fastest and highest quality service of its all products. We have our representative in the USA and now there is our service centre including our representative in India. Our future plans include the establishing of a service centre with a representation in Asia and a service centre in the USA.





Other activities:

- Service during and after warranty period
- The annual inspections - including the delivery of the calibration report and the yearly report on defects discovered during inspection and consequential remedy of these faults - are regularly required by many European customers.
- Medium repairs (after 5 - 10 years or after 20 000 working hours) - are recommended to all of our customers to preserve the good technical condition of the equipment up to the time of the general overhaul.
- General overhauls (after 10 - 15 years or after 50 000 working hours) - are recommended to all of our customers to preserve the good technical condition of the scanner.
- Training of operating personnel and technicians when required by the customer.
- Technical support for our customers





Know-how:

Electro-Optical Tester - EOT

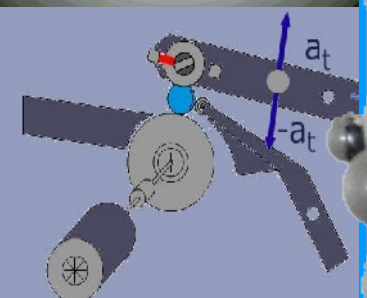
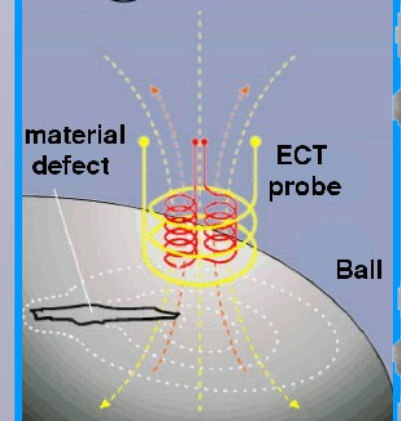
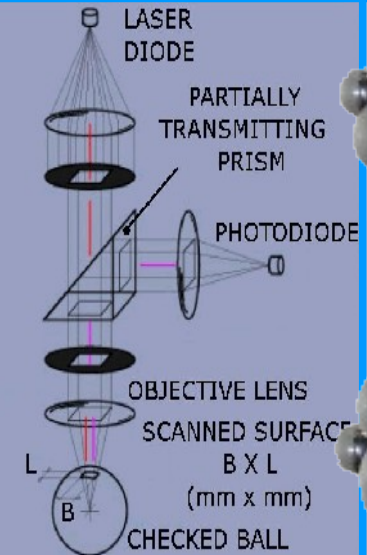
EOT exploits the reflectivity of the ball surface and evaluates the quantity of the reflected light in accordance with set sensitivity. The EOT sorts the balls into groups (outlets) "OK" or "EOT fault".

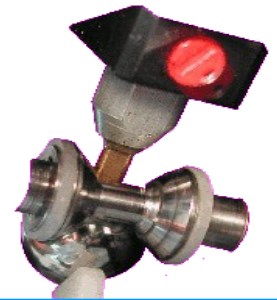
Eddy Current Tester High Sensitivity – ECT HS

ECT exploits the ferromagnetic properties of balls and by means of detection principles based on eddy-currents is able to detect some kinds of surface and subsurface defects of material. Depending on the size of these defects and set sensitivity of the sorting the balls are sorted into the outlets "OK" or "ECT fault". The upper limit of the frequency range has been raised from 1,2 MHz to 3,0 Mhz.

Electronic Vibration Tester - EVT

EVT method is an addition to the EOT and ECT methods of examination. EVT method measures and analyses the vibrations which are caused by the rotation of the ball in the monitoring point during the period of the scan.





StanDard Scanning:

STanDard Scanning – marked „STD“, is designed for customers with medium intensive applications.

STD Spherocone rollers intended for STD scanning have no colour markings neither the type without plastic protectors, nor the type with plastic protectors.



Type without plastic protectors

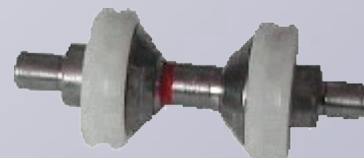


Type with plastic protectors

It is possible to renovate the spherocone rollers for STD scanning. **Renovated spherocone rollers** are marked with a red stripe between the hardmetals.

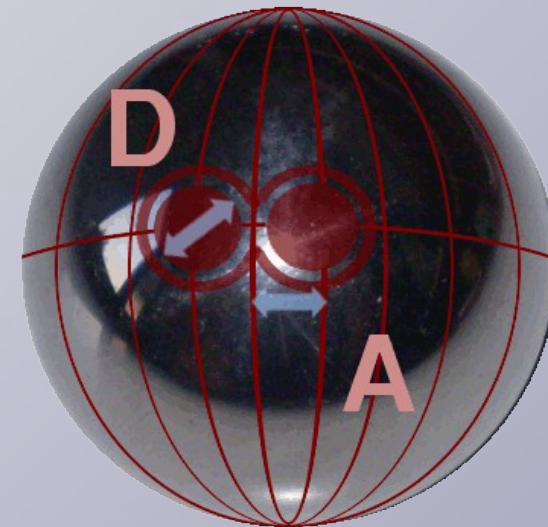


Type without plastic protectors



Type with plastic protectors

STD Scanning - STanDard:



$$A \leq D$$

A = Maximal meridian pitch

D = Diameter of ferrite core of ECT probe



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AeroSpace Scanning

AeroSpace Scanning – marked AS, is designed for customers with intensive applications. The scanning runs in condensed meridian system. Every surface point is scanned as a minimum twice by the ECT method .

Spherocone rollers intended for this scanning have blue marking.

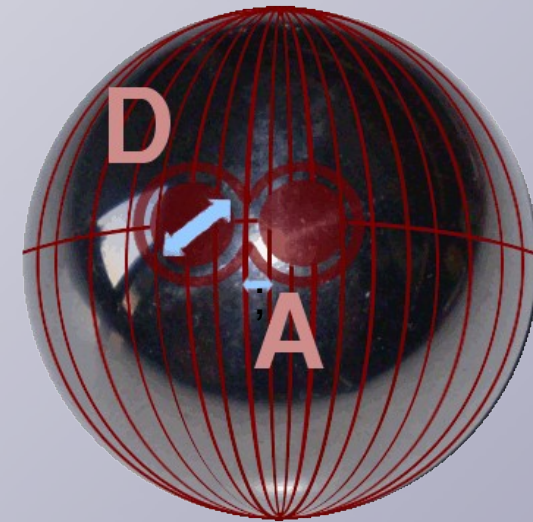


Type without plastic protectors



Type with plastic protectors

AS Scanning - AeroSpace:



$$A \leq 0,75 D$$

A = Maximal meridian pitch

D = Diameter of ferrite core of ECT probe





Width Different Scanning:

Scanning of type Width different – the most precise scanning with a very dense meridian system enables multiple verification of all surface of scanned balls by reduction in volume of controls (number of checked balls for an unit of time).

Spherocone rollers intended for this scanning have yellow marking.

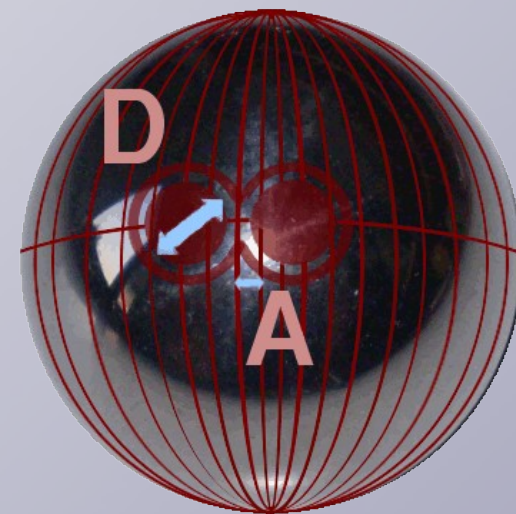


Type without plastic protectors



Type with plastic protectors

WD Scanning - Width Different

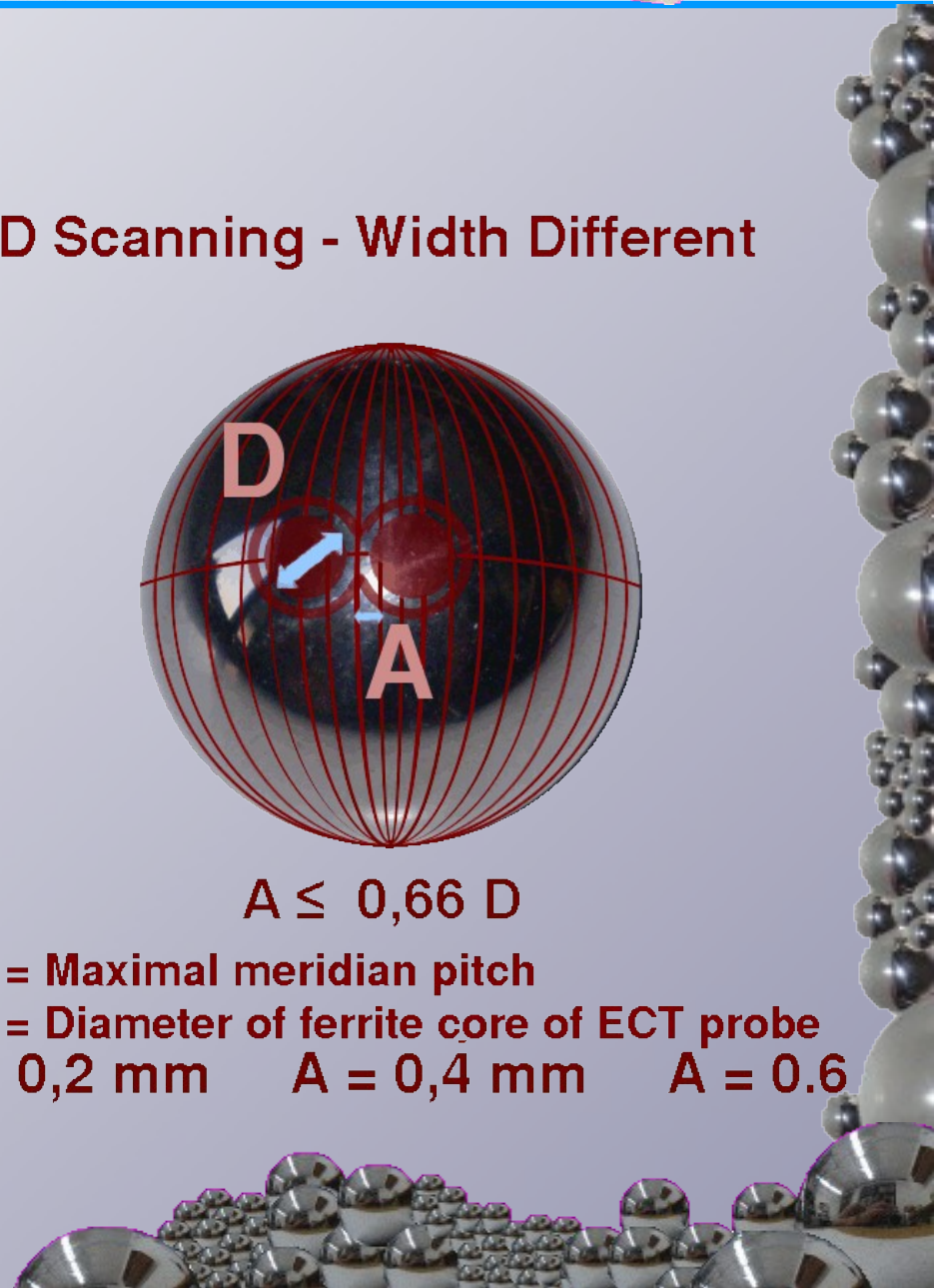


$$A \leq 0,66 D$$

A = Maximal meridian pitch

D = Diameter of ferrite core of ECT probe

A = 0,2 mm A = 0,4 mm A = 0.6



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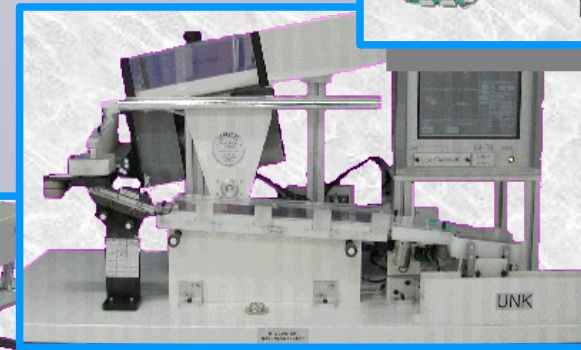
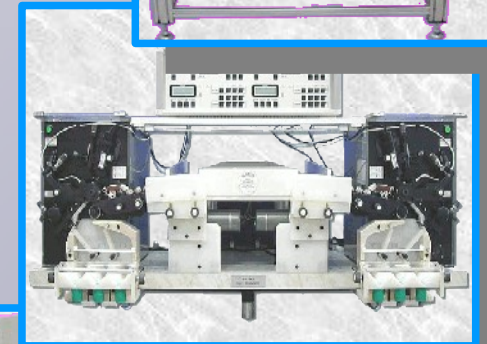
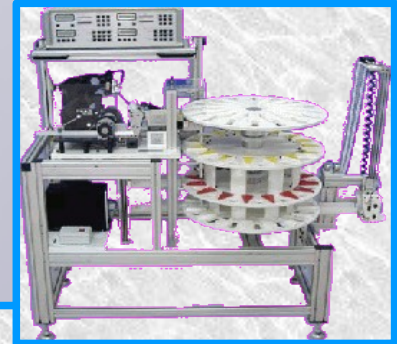
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Second part - Products

In this second part basic types of machines and products of KROB SCANNERS will be introduced to you. To be specific, we will acquaint you with these types:

- **Ball Scanners type BASC**
- **Ball Scanners type BS**
- **Ball Scanners type BSC**
- **Hardness Tester type HT and HTA**
- **Diameter Sorter type DS and DSA**
- **Ball Batcher type BB and BBA**
- **Ball Transporter type BT and BTG**





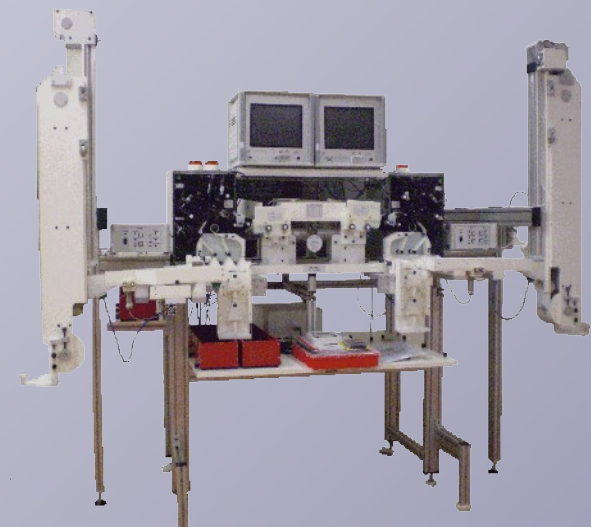
Ball Scanners Type BS: **BS 0203 AS, BS 2542 AS**

BS 0203AS and **BS 2542** are testing and sorting machines for the non-destructive examination of the surface-quality of ball-bearings. At BS 0203AS the monitoring point is equipped with two sensors of defectometric system – **optical (EOT)** and **eddy current (ECT)** and **Module CTR** for monitoring the rotation of the spherocone roller. BS 2542 is equipped with three sensors of defectometric system – **optical (EOT)**, **eddy current (ECT)** and **vibration (EVT)** and **Module CTR** for monitoring the rotation of the spherocone roller. Balls are fed from the center to the left and the right monitoring point.

EOT, ECT and EVT methods enable a simultaneous examination for point defects and polish defects (the optical method and EVT) and for cracks, flats or shape defects (the eddy-current method). The check for point defects is evaluated in comparison to either relative or absolute standards.



BS 0203 AS



BS 2542 AS

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Ball Scanners Type BASC **BASC 0306 AS, 0610 AS, 1014 AS, 1418 AS, 1825 AS**

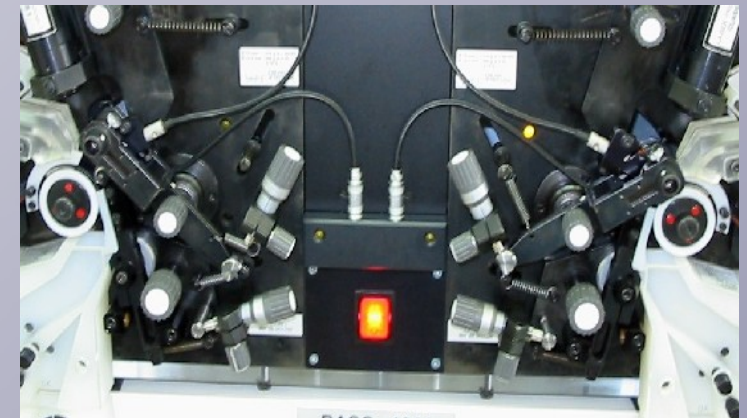
Ball Scanners of Type BASC are testing and sorting machines for the non-destructive examination of the surface-quality of ball-bearings. The monitoring point is equipped with three sensors of the defectometric system – **optical (EOT)**, **eddy current (ECT)** and **vibration (EVT)**. The machines are equipped with the **Module CTR** for monitoring the rotation of the spherocone roller.

The machine has two separate control systems that allow an independent functioning of the right side and the left side of the machine. Balls are fed from side to the left and the right monitoring point.

The three simultaneously-used testing methods - optical EOT, eddy-current ECT and vibration sensor EVT - enable a simultaneous examination for point and polish defects (the optical method) and for cracks, flats or shape defects (the eddy-current method and EVT). The check for point defects is evaluated in comparison to either relative or absolute standards.



BASC 0306 AS



Monitoring point with CTR

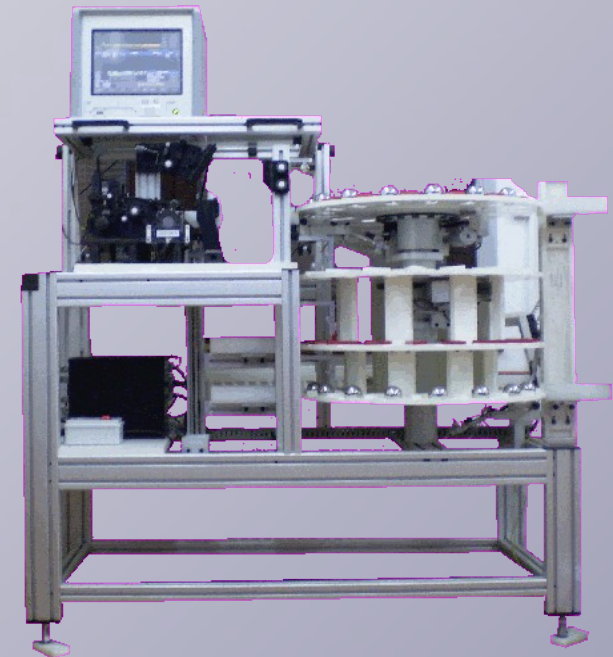


Ball Scanners Type BSC **BSC 4070 AS**

BSC 4070 AS is a testing and sorting machine for non-destructive examination of the surface-quality of ball-bearings.

The monitoring point is equipped with **one optical probe** and **two eddy-current probes**. The two simultaneously used testing methods – optical EOT and eddy-current ECT – enable a simultaneous examination for point defects and polish defects (the optical method) and for cracks, flats or shape defects (the eddy-current methods). The eddy-current probes are placed above the ball surface so, that their mutual angular displacement is 90° (cross layout – the first probe has max. sensitivity in the direction perpendicular to the direction of ball movement and the second probe in the parallel direction). The main advantage of this layout is its ability to detect very dangerous cracks and defects under the ball's surface.

Balls are fed from the inlet container disc to the monitoring point.



BSC 4070 AS



Hardness Tester Multifrequency **HT MF, HTA MF**

The **Hardness Tester Multifrequency** employs a non-destructive method in which the electrical parameters of the balls are assessed as they pass through a coil. These electrical parameters present a picture of the chemical and crystallographic composition of the structure of the ball's surface so that we are indirectly able to monitor the type of composition and the hardness of the balls.

The machine functions on the basis of multifrequency and can examine balls using **4 independent frequencies in 4 separate coils** through which the balls pass. Each coil has its own monitoring and assessment system.

The machine employs a method of comparison with known, previously monitored calibration balls. The balls are sorted into „OK“ exit (satisfactory) or „HT BAD“ exit (defected) according to results of the hardness's measurement.



**Hardness Tester Multifrequency
HTA 0306 MF**



Diameter Sorter

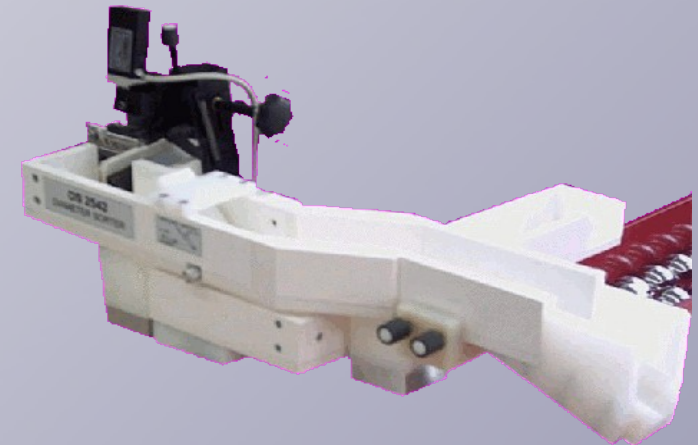
DS

The **Diameter Sorter** is a testing and sorting machine which sorts the balls into two groups - balls within the specified dimensions and those outside the dimensions.

It is used to sort the balls according to a size following the OK exit of the Ball Scanner.

Balls are sorted by means of a linear sensor. From the exit "OK-BALLS" the balls are transported to the prismatic part of the track. Here the balls are assessed with three points of contact (two fixed, one moveable sensor).

Following the monitoring process the balls are dispatched by means of a gate into an 'OK' exit for good balls or into the container for bad balls N.I.O 'BAD'. The level of sorting (required dimension including permitted tolerances) may be freely selected.



Diameter Sorter

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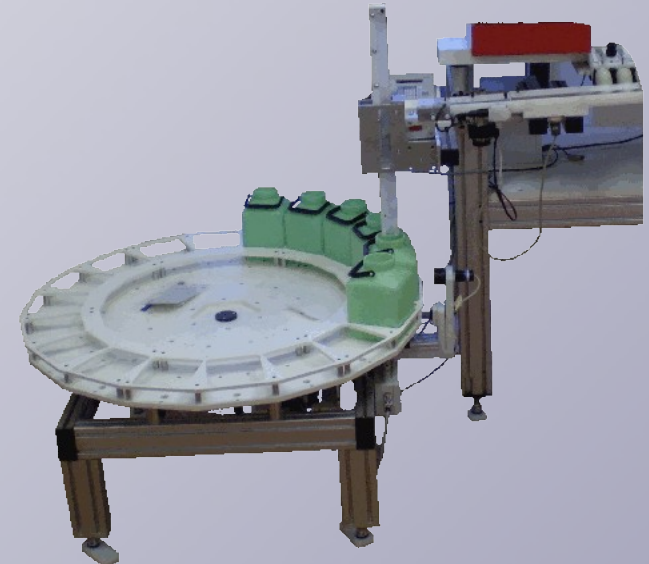
Ball Batcher

BB

The **Ball Batcher** is a machine for an automatic, accurate and fast batching of steel balls into plastic containers or cardboard boxes for transport or storage without any risk of mutual damage. It is designed to be located behind the OK exit of the Ball Scanner.

The automatic batching machines of type BB are intended for the batching of balls with diameter from range 9,5 -14,3 mm, 13,40 - 18,25 mm and 18,0 - 25,4 mm. The BB machines for the balls smaller than 6 mm are supplied upon an agreement with the customer.

The main function of Ball Batchers is the fast and accurate packing of O.K. balls which go through their check in the BASC and through the O.K. exit over the **COUNTER** where the balls are counted. Then they continue into the **SOFT EXIT** which transports the balls without mutual damage into the containers which are placed on the **CAROUSEL** (plastic battles, paper boxes).



Ball Batcher 1014

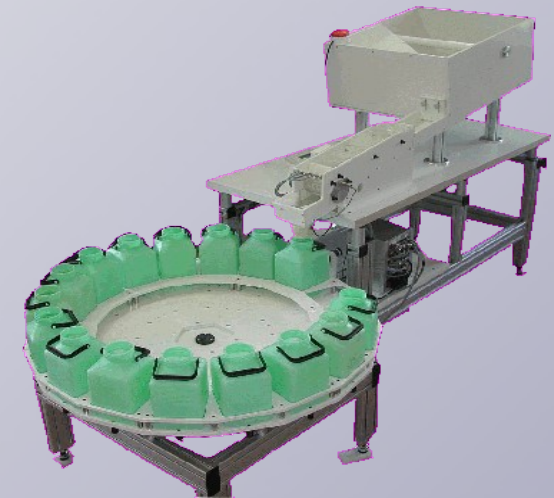


Ball Batcher Autonomous **BBA**

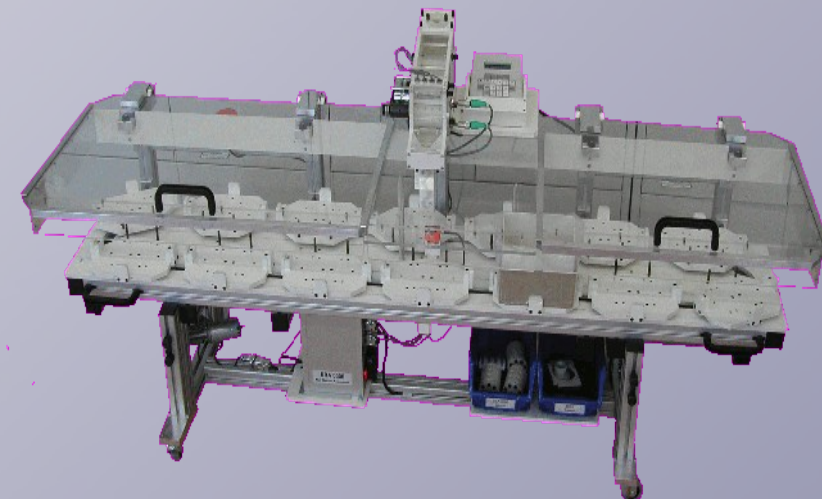
The **Ball Batcher Autonomous** is a machine for an automatic, accurate and fast batching of steel balls into plastic containers or cardboard boxes for transport or storage without any risk of mutual damage.

The complementary machines of type BBA are produced in several variants, all including the following common features:

- With entry hopper / or without entry hopper (the hopper can accommodate up to 200 kg of balls).
- BBA 0610 up to BBA 1014 in the variant designed for wet balls
- With storage for transport packaging (cardboard boxes, plastic bottles etc) which can be in the form of a carousel or trolleys which move around an oval track.
- The version with the oval track can have its counter either in the middle or on the side of the track.
- The equipment can be supplied as a mobile unit with wheels allowing it to be transported to where it is needed.



BBA 1014 with hopper and table



BBA 1014 without hopper and table



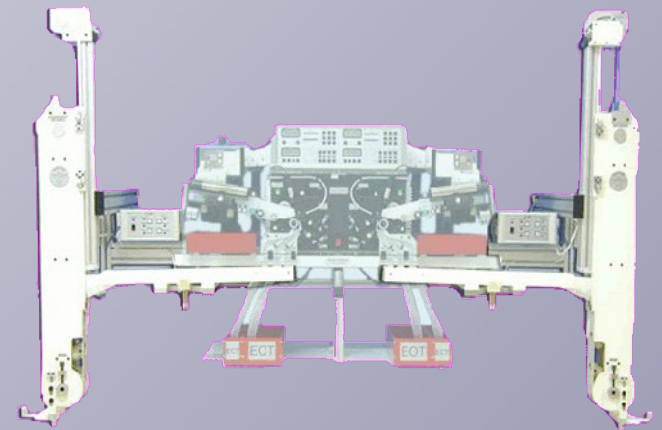
Ball Transporter BT

The **Ball Transporter** BT is an additional device to the Ball Scanners type 1418,1825,2542.

BT machine transports balls that have been checked and sorted into the "OK EXIT" by the Ball Scanner to the transport container (box) which is placed under the "OK EXIT". The belt conveyor with transport buckets (pockets) transports the balls from "EXIT OK" to the bottom of the container (box) in such a way that balls are not damaged by mutual jolts.



The lower part of BT



Ball Transporter 2542

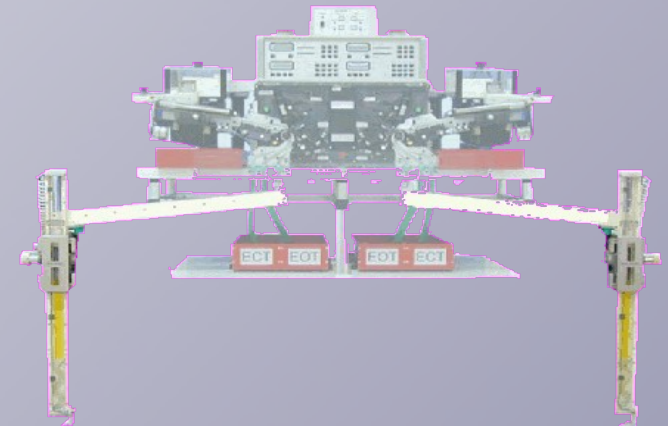


Ball Transporter Gravitational **BTG**

The **Ball Transporter Gravitational BTG** is a device that transports balls smaller than 14 mm checked by the Ball Scanner and sorted in the "OK" outlet to the transporting container (box) which is placed under the "OK EXIT". The labyrinth damps ball falls from the "OK EXIT" to the bottom of the container (box) in such a way that balls are not damaged by mutual jolts. This device can also be used anywhere in the production line.



Tentacle



Ball Transporter Gravitational 1014



News

- Since the year 2009 we have been supplying all Ball Scanners of Type BASC and BS only in the AS design. The machines supplied with this design can be used both in the STD (StanDard) and AS (AeroSpace) regimes. The customer just needs to apply the correct type of spherocone roller for the chosen regime.
- New electronic system called CU TS (Central Unit Touch Screen) – since the year 2009 we have been supplying our automatic testing and sorting machines only with the electronics in the form of a Touch Screen (the control unit CU TS), which replaces the previous electronic system called Main Housing of Electronics.
- Printout from the control unit CU TS for all Ball Scanners and Hardness Testers – Monitoring Report.



New products

- **Ball Scanner of Type BSW 1014 AS (wet inspection)**
- **Hardness Tester Autonomous Multifrequency HTA 0306 MF**
- **Hardness Tester Multifrequency HT 1014 MF**
- **EOT AS – Electronic-Optical Tester with increased sensitivity for the inspection of wet balls (intended for the machine BSW 1014 AS)**
- **Modernised Ball Scanners from 0306 to 2542 mm (with higher performance and other improvements)**
- **Ball Batcher Autonomous BBA 0306**
- **Ball Batcher BB 1014**



In preparation

- **Ball Scanner of Type BS 4058**
- **Ball Scanner of Type BS 5575**
- **Ball Scanner of Type BSC 70100**
- **Hardness Tester Autonomous Multifrequency HTA 0203 MF**
- **Ball Scanner of Type BS 1.4 - 2.0**
- **Ball Transporter of Type BTE**

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Thank you for your attention!

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