DIE SORTING

PRODUCT OVERVIEW

CONTENTS

OVERVIEW

MACHINE SPECIFICATIONS

		eSIM	DS Ecoline		DS Merlin		DS Laser
UPH (UP TO)		5.000	6.000		30.000/45.000		12.000
FLEXIBILITY	Flip	n/a	√		√		√
	Non-Flip	√	√		(√)		X
INPUT	Wafer	(√)	√		√		√
	T&R	√	√		X		X
	Jedec Tray / Custom Tray	(√)	√		X		√
	Hoop ring	X	√		X		√
OUTPUT	T&R	√	√		√		√
	Wafer	X	√ (12")		√ (24")		X
	Waffle Pack / Gel-Pak®	X	√		√		X
	Jedec Tray / Custom Tray	(√)	√		(√)		X
	Combination of 2 outputs in 1 machine	X	√		X		√
WAFER SIZE (6"/8"/12")		√	√		√		√
DIE SIZE RANGE (in mm)	Minimum	0.5 x 0.5	0.25 x 0.25		0.2 x 0.4		0.4 x 0.4
	Maximum	7.0 x 7.0	Flip	15.0 x 15.0	Standard	7.0 x 7.0	10.0 x 10.0
			Non flip	25.0 x 25.0	Option	9.0 x 9.0	
ELECTRICAL DIE TEST		√	X		X		X

MÜHLBAUER GROUP AT A GLANCE

MÜHLBAUER'S BUSINESS UNITS AND SITES

Founded in 1981 in the heart of Bavaria, the Mühlbauer Group has ever since grown to a leading global player in the fields of Parts & Systems, Semiconductor Related Products, Document Solution Related Products and TECURITY® Solutions. With around 3,500 employees, technology centers in Germany, Malaysia, Slovakia, the U.S.A. and Serbia and 35 sales and service locations worldwide, Mühlbauer created a strong competence network around the globe.

We continuously invest in the latest technologies and innovative processes to enhance our competences and provide you with optimized solutions. Our in-house precision part production MPS – Mühlbauer Parts & Systems – guarantees unlimited flexibility and highest customer satisfaction.

Our business unit AUTOMATION does not only develop and assemble individually customized production systems, but also provides matching software solutions for the production process of Document and Solution Related Products. Vision inspection technologies as well as semiconductor and RFID applications complete our comprehensive portfolio.

Our business unit TECURITY® is established as a competent partner for the implementation of security systems for identifying and verifying both documents and individuals. Our clients benefit from more than three decades experiential value which we have gained during the realization of over 300 ID projects worldwide.

Mühlbauer
Bosnia & Herzegovina

Mühlbauer
China

Mühlbauer
Germany

Mühlbauer
Malaysia

Mühlbauer
Serbia

Mühlbauer
Slovakia

Mühlbauer
USA

Service Hub Russia

HQ Germany

Production Center Germany
Production Center Slovakia

Production Center Bosnia & Herzegovina
Production Center Serbia

Service Hub Georgia

Service Hub Spain
Service Hub Turkey

Service Hub Iraq

Service Hub South Korea
Service Hub Japan

Production Center China

Production Center USA

Service Hub United Arab Emirates

Service Hub Taiwan

Service Hub India

Service Hub Mexico

Production Center Malaysia

Service Hub El Salvador

Service Hub Uganda

Service Hub Brazil

Service Hub South Africa

Service Hub Australia

MPS
Precision Parts & Surface Engineering

AUTOMATION
Production Equipment & Systems

WORLD OF TECURITY®
Government & Technology Solutions

MANUFACTURING EXECUTION SYSTEMS

MB MCES
PERSONALIZATION MANAGEMENT

MB MCES is a personalization management software, which integrates incoming data with product definitions and controls the associated physical and electrical personalization processes. MB MCES handles personalization data from a variety of different input methods and formats.

MB INCAPE
INTEGRATED PRODUCTION MANAGEMENT SOFTWARE

MB INCAPE is Mühlbauer's Production Management Software for the production and personalization of electronic cards and documents (e.g. ID cards, ePassports, Driver's Licenses, EMV or GSM cards). Combining data management, production control and material management, the system allows for highly automated processes. It processes customer- and application-specific production, personalization, quality control and document delivery scenarios with highest solution flexibility.

MB PalaMax®
TOTAL PROCESS TRANSPARENCY

MB PalaMax®, Mühlbauer's Smart Factory solution, is developed for card, tag or booklet productions, personalization factories and semiconductor backend shop floors to set and collect process data to monitor and improve the efficiency of production and personalization for later processing, visualization and statistical analysis.

MB tool.Leader
CONNECTOR BETWEEN SYSTEMS

MB tool.Leader is a software package which consists of several applications and serves as a reliable link between the individual systems involved in the production process. By means of MB tool.Leader, the entire process chain – from the incoming order to the final precision part – can easily be monitored and controlled. This real-time machine monitoring guarantees an automated production process. Production errors can be detected and solved at an early stage. Thus, MB tool.Leader reduces the machine downtimes, which in turn leads to an increase of the machine's productivity by up to 20 percent.

FEATURES & ADVANTAGES

Configurable workflow steps regarding personalization, quality assurance & issuance

Seamless connection to MB PalaMax® & MB Data Preparation

Fully-automated processing & production management

Simplified administration due to web-based operator clients

Scalability regarding different documents, machines & personalization locations

Monitoring of real-time performance of the production

Flawless integration of Mühlbauer's material management system (MB WAREHOUSE)

Seamless tracking of documents from point of production to issuance

Connection to card / document management systems via web service, database, file-based interface

Statistical tool analyze collected data & deliver customized statistics on OEE

Standard interface to personalization machines with integration of third-party machines possible

Tool which enables the remote operation of machines on the shop floor from a control centre

Integration of MB User Management

Tool which increases effectiveness & efficiency so that production becomes more profitable

Full coverage of production control requirements (security industry & EMV standards)

Enables production engineering to prepare & test a repeatable factory set-up. Factories can switch between products within minutes.

eSIM PERSO

TECHNOLOGY FOR MOBILE HIGH SPEED COMMUNICATION

Wearable gadgets, smart appliances and a variety of future data-sensor applications are often collectively referred to as the "Internet of Things" (IOT). The number of applications for IOT and M2M communication increases every day. With each technological iteration, many of these devices are getting smaller, but still need to perform a multitude of function with sufficient processing capacity. They also need to have a built-in, stand-alone cellular connectivity.

Our solution is already prepared to also fulfill future demands like smaller form factors, more fragile devices and increasing volumes.

ADVANTAGES

- Embedded SIM Card
- 20 years of Smart Card and Semiconductor experience
- Inhouse-developed Reader Technology + MCES
- Fastest personalization capacity (12/24/36 parallel coding stations)
- Smart Solution for M2M, IOT & Smart Connectivity

BENEFITS

- Fastest system on the market (up to 5000 UPH)
- Most precise handling system on the market: Mühlbauer can handle the smallest WLCSPS/BGAs down to 0.5 x 0.5 mm
- Highest yield with less rejects: Integration of a vision controlled positioning before placement into the test nest enables precise contacting

Tape and reel input   Encoding (test socket)   Laser personalization   Electronical & optical verification   Repack in tape and reel in sequence

FEATURES & ADVANTAGES

INPUT
- Standard: Carrier Tape / Blister Tape
- Optional: Jedec Tray, Wafer

OUTPUT
- Standard: Carrier Tape / Blister Tape
- Optional: Jedec Tray

TAPE WIDTH (INPUT / OUTPUT)
- Standard: 12 mm
- Optional: 8 mm / 16 mm

REEL SIZE
- Input: 7"/13"/22" single reel
- Output: 7"/13"

COVER TAPE
- Hot Sealing: temperature sensitive cover tape
- Cold Sealing: pressure sensitive cover tape

QUALITY REQUIREMENTS
- Placement accuracy: $\pm 30\,\mu m$
- Rotation: $\pm 1°$

QUALITY INSPECTION
- Die position
- Chip out inspection front and back side
- Bump presence inspection
- Die surface inspection
- OCR
- Laser mark position and inspection
- Surface Inspection
- Empty pocket check
- Die orientation check
- Sealing quality check
- Optional: sidewall inspection (SWI)

DIE SIZES
- down to 0,5 x 0,5 mm

FACILITIES
- Power: 400 V, 15 A, 50/60 Hz
- Air: 6 bar
- Vacuum (absolute): 0,2 bar

ENVIRONMENTAL CONDITIONS
- Room temperature: 23°C±3°C
- Humidity: 50% ±10%
- Clean room class: ISO 7

THROUGHPUT
- Up to 5.000 dies / hour (depending on encoding)

MACHINE DIMENSIONS
- Height: ~1990 mm
- Length: ~2900 mm
- Depth: ~2400 mm
- Weight: ~2000 kg

eSIM PERSO

DS VARIATION ecoLINE

DS MERLIN T&R

DS MERLIN W2W / PANEL

DS LASER

SYNERGIES WITH CARRIER TAPE

UPH

| 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |

DS VARIATION ecoLINE

MOST FLEXIBLE AND COST-EFFICIENT HANDLING SYSTEM

Mühlbauer's overall goal with the DS VARIATION ecoLINE is to significantly lower the initial investment cost while, at the same time, guaranteeing maximum functionality in one platform. Accordingly, the DS VARIATION ecoLINE excels especially through its cost efficient design and highly accurate AOI vision inspection capability. With the integrated high accuracy mode for the chip placement, a value of $20\mu m$ can be reached. All standard inspection features, especially the top, backside and sidewall inspection result in 100% six-side chip control. Our latest IR inspection for sidewall and backside detection helps to reach an even higher output quality. THE DS VARIATION eco-LINE can process a whole range of niche applications such as T&R, De-Taping, Tray & Waffle packs, as well as reconstructed wafers up to 12".

ADVANTAGES

- Low investment cost for maximal flexibility
- Up to 12" (300 mm) reconstructed wafer
- Fast conversion time between different products
- Flexible output configuration with 2 indexer (2-in-1)

BENEFITS

- Combined process capability 4-in-1
  » Tape and reel
  » Waffle pack and Jedec tray sorting
  » Reconstructed wafer
  » Wafer, tray and de-taping capability
- Including flip chip and 100% 6-side inspection
  » Defect detection of $10\mu m$ defects and $5\mu m$ on sidewall
  » NEW infrared sidewall inspection
- Highest placement accuracy
  » $\pm30\mu$ with DOT $\pm20\mu m$

| Combined solution | Carrier Tape | Waffle Pack/ Gel-Pak® | Reconstructed wafer | Jedec tape |

FEATURES & ADVANTAGES

INPUT
- Standard: Wafer
- Optional: Tape & Reel / de-taping, waffle pack, Jedec Tray / Custom Tray, hoop ring

OUTPUT
- Tape & Reel / De-taping
- Waffle Pack / Gel-Pak®
- Jedec Tray / Custom Tray
- Wafer (reconstructed wafer 12")
- Combination of 2 outputs in 1 machine

WAFER
- Mapping: wafer mapping software incl. barcode scanner MAP-host PC for data conversion into SCES/GEM format
- Size: Up to 12"

SPECIAL FEATURE
- 8/12/16/24/optional 32 mm Carrier tape cassettes
- Input tray adapter
- Input Carrier Tape feeder » De-taping
- High resolution AOI with 4, 9,12 or 25 Megapixel camera

DIE HANDLING
- Flip chip
- Direct pick & place
- Single bond head

QUALITY REQUIREMENTS
- Placement accuracy: $\pm 20\,\mu m$ / $\pm 30\,\mu m$
- Rotation: $\pm 0.3°$ rotation tolerance

QUALITY INSPECTION (AOI)
- Die front-side inspection (10-12 μm defects)
  - » Die position using pattern matching or die edge detection
  - » Die surface inspection
  - » Chip-out inspection
  - » Bump quality Inspection (bump presence, bump size (2,5D), bump position, bump bridging, bump height / co-planarity measurement
- Die back-side inspection (10-12 μm defects)
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position & inspection
  - » Surface inspection

- Sidewall inspection (5-10 μm defects)
  - » 6 chip sides can be inspected with full speed
  - » G 2: sidewall defect detection down to 10μm
  - » G 3: sidewall defect detection down to 5μm (IR capability)
- Place inspection
- Tilted die inspection
- Post place inspection (IR (optional) - 8 μm defects)
- After sealing inspection

AVAILABLE OPTIONS
- IR inspection
- Integration possible of MB PalaMax®

DIE SIZES
- Minimum: 0.25 x 0.25 mm
- Maximum (Flip & Non-Flip)
  - » Standard: 15 x 15 mm
  - » Optional: 0.25 - 4 mm, 0.5 - 7 mm, 1 - 25 mm

FACILITIES
- Power: 400 V, 16 A, 50/60 Hz
- Air: 6 bar, oil-/waterfree
- Vacuum (absolute): 0,2 bar

ENVIRONMENTAL CONDITIONS
- Room temperature: 23°C±3°C
- Humidity: 50% ±10%
- Clean room class: ISO 7

THROUGHPUT
- Flip: Up to 6,000 dies/hour
- None-flip: Up to 5,000 dies/hour

MACHINE DIMENSIONS
- Height: ~2000 mm (without signal light)
- Length: ~2550 mm
- Depth: ~1950 mm
- Weight: ~2300 kg

eSIM PERSO ⬡

DS VARIATION ecoLINE ⬢

DS MERLIN T&R ⬡

DS MERLIN W2W / PANEL ⬡

DS LASER ⬡

SYNERGIES WITH CARRIER TAPE ⬡

UPH

| 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |

DS MERLIN TAPE & REEL

THE WORLD'S BENCHMARK IN DIE SORTING

With the new DS Merlin, Mühlbauer was able to achieve a new record throughput of up to 45,000 UPH – already including full vision and sidewall inspection. On top of the significantly increased speed, the DS MERLIN shows 20% lower cost of ownership compared to MERLIN 30k. The completely new construction method of the MERLIN's core module features a special die ejector and a pick & place wheel instead of the conventional bond head system. The machine and product setup have also been significantly simplified. With the completely automatic self-alignment system complex and long-lasting operator-related changeovers and set-up times are no longer required. New products can be introduced faster and easier than ever before. Due to the new construction, the inspection system with latest IR technology on sidewall and backside inspection reaches an even higher output quality. A more intuitive software interface and an enhanced wafer handling complete this brandnew die sorting system.
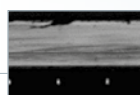
ADVANTAGES

- 8th generation of Mühlbauer Flip Chip Tape & Reel Die Sorter
- Lower cost of ownership » no bond heads anymore
- Simple Process Tape & Reel
  - » Beating the 30.000 or 45.000 UPH incl. vision inspection
  - » Ready for ultra small die handling (0.2 x 0.4 mm)
- Integrated AOI 6-side inspection
- Automatic reel changer available

BENEFITS

- Including flip chip and 100% 6-side inspection
  - » Defect detection of $9\mu m$ defects and $5\mu m$ on sidewall
  - » Infrared: sidewall and backside IR Inspection (down to $5\ \mu m$)
- Full speed incl.100% sidewall inspection + IR capability
- 100% traceability with MB PalaMax®

Visible light: only surface visible

Infra red light: inner defects visible
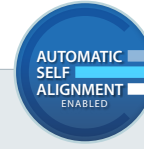
Carrier Tape

Surf Tape

Punched Tape

Paper Tape

FEATURES & ADVANTAGES

INPUT
- Standard: Wafer

OUTPUT
- Standard: Tape & Reel

WAFER
- Wafer mapping software incl. barcode scanner
- MAP-host PC for data conversion into SCES/GEM format
- Size: up to 12"

SPECIAL FEATURE
- Automatic self-alignment system for fully automatic product and machine setup (operator-independent)
- 8, 12 or 16 carrier tape cassettes

DIE HANDLING
- 100% Flip Chip
- Two Pick & Place wheels (no turret system)
- Special die ejector, but standard wafer foil
- No bond heads
- Automatic self-alignment

QUALITY REQUIREMENTS
- Placement accuracy: $\pm 30\,\mu m$
- Rotation: $\pm 20 \mu m$ with high accuracy and $\pm 0.3°$ tolerance

QUALITY INSPECTION (AOI)
- Die front-side inspection ($9 \mu m$ defects)
  - » Die position using pattern matching or die edge detection
  - » Die surface inspection
  - » Chip out inspection
  - » Bump quality Inspection (bump presence, bump size (2,5D), bump position, bump bridging, bump height / co-planarity measurement
- Die backside inspection ($9 \mu m$ defects)
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position
  - » Laser mark inspection
  - » Surface inspection
- Sidewall inspection (5-10 μm defects)
  - » All 6 chip sides can be inspected with full speed
  - » G 2: sidewall defect detection down to $10 \mu m$
  - » G 3: sidewall defect detection down to $5 \mu m$ (IR capability)

- Place inspection
- Tilted die inspection (die height over the tape)
- Post place inspection
- After sealing inspection

AVAILABLE OPTIONS
- IR inspection, Die back-side at die on tool, post place, after sealing
- Automatic reel changer
- Integration possible of MB PalaMax®

REJECTS BY VISION
- Defect dies are directly rejected
  - » higher machine uptime

DIE SIZES
- Minimum: 0.2 x 0.4 mm
- Maximum:
  - » Standard: 7.0 x 7.0 mm
  - » Optional: 9.0 x 9.0 mm (other sizes available)

FACILITIES
- Power: 400 V, 16 A, 50/60 Hz
- Air: 6 bar, oil-/waterfree
- Vacuum (absolute): 0,2 bar

ENVIRONMENTAL CONDITIONS
- Room temperature: 23°C $\pm$3°C
- Humidity: 50% $\pm$10%
- Clean room class: ISO 7

THROUGHPUT
- Flip: up to 45,000 dies/hour with flip and sidewall
- None-flip: Up to 45,000 dies/hour

MACHINE DIMENSIONS
- Height: ~1950 mm
- Length: ~2350 mm
- Depth: ~1600mm
- Weight: ~2500 kg

eSIM PERSO

DS VARIATION ecoLINE

DS MERLIN T&R

DS MERLIN W2W / PANEL

DS LASER

SYNERGIES WITH CARRIER TAPE

UPH

| | 10000 | 20000 | 30000 | 40000 | 50000 |

DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

HIGH SPEED WAFER-TO-WAFER / WAFER-TO-PANEL

With the new DS MERLIN, Mühlbauer was able to achieve a new record throughput of more than 40,000 UPH – already including full vision and sidewall inspection. On top of the significantly increased speed, the DS MERLIN shows 50% lower cost of ownership compared to other wafer-to-wafer solutions. The completely new construction method of the DS MERLIN's core module features a special die ejector and a pick & place wheel instead of the conventional bonding technology. The machine and product setup have also been significantly simplified. With the completely automatic self-alignment system, a complex and long-lasting operator-related changeovers and set-up times are no longer required. New products can be introduced faster and easier than ever before. Due to the new construction, the inspection system with latest IR technology on sidewall and backside inspection reaches an even higher output quality. A more intuitive software interface and an enhanced wafer handling complete this brand-new die sorting system.
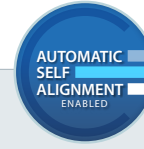
ADVANTAGES

- High speed Wafer-to-Wafer machine (up to 25.000 to over 40.000 UPH)
- 12" wafer reconstruction or panel size up to 24" x24" (600x 600 mm)
- Flip or Non-flip capability
- 100% Vision Inspection
- Simple process Wafer-to-Wafer / Wafer-to-Panel / jedec tray
  » Ready for ultra small die handling 0.2 x 0.4 mm
- Best compromise between speed and accuracy improvement

BENEFITS

- Including flip chip and 100% 6-side inspection
  » Defect detection of $9\mu m$ defects and $5\mu m$ on sidewall
  » Infrared: sidewall and backside IR inspection (down to $5\,\mu m$)
- High placement accuracy $\pm 20\,\mu m$ - $\pm 15\,\mu m$ (optional)
- 100% traceability with MB PalaMax®

FEATURES & ADVANTAGES

INPUT
- Standard: Wafer (up to 12")

OUTPUT
- Standard: panel size (150 x 300 mm)
- Optional: wafer size (up to 24"), panel size (up to 24" x 24") jedec tray / waffle pack

WAFER
- Wafer mapping software incl. barcode scanner
- MAP-host PC for data conversion into SCES/GEM format
- Size: up to 12"

SPECIAL FEATURE
- Automatic self-alignment system for fully automatic product and machine setup (operator independent)

DIE HANDLING
- Option A: 100% flip chip
- Option B: 100% non-flip chip

QUALITY REQUIREMENTS
- Placement accuracy: $\pm 20\,\mu m$ $\pm 15\mu m$ with high accuracy mode
- Rotation: $\pm 1°$ rotation tolerance

QUALITY INSPECTION (AOI)
- Die front-side inspection ($9\mu m$ defects)
  - » Die position using pattern matching or die edge detection
  - » Die surface inspection
  - » Chip out inspection
  - » Bump quality Inspection (bump presence, bump size (2,5D), bump position, bump bridging, bump height / co-planarity measurement
- Die backside inspection ($9\mu m$ defects)
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position
  - » Laser mark inspection
  - » Surface inspection
- Sidewall inspection (5-10 μm defects)
  - » All 6 chip sides can be inspected with full speed
  - » G2: sidewall defect detection down to $10\mu m$
  - » G3: sidewall defect detection down to $5\mu m$ (IR capability)
- Place inspection
- Tilted die inspection
- Post-place inspection (IR (optional)- 8 μm defects)
- After sealing inspection

AVAILABLE OPTIONS
- Global alignment
- Integration possible of MB PalaMax®
- Output map generation
- Output trace file (with accuracy per / chip)
- Panel handling at SMEMA Standard

REJECTS BY VISION
- Defect dies with front or backside defects are rejected directly and not placed into output medium
  - » higher machine uptime

DIE SIZES
- Minimum: 0.2 x 0.4 mm
- Maximum:
  - » Standard: 7.0 x 7.0 mm
  - » Optional: Up 9.0 x 9.0 mm (other sizes available)

FACILITIES
- Power: 400 V, 16 A, 50/60 Hz
- Air: 6 bar, oil-/waterfree
- Vacuum (absolute): 0,2 bar

ENVIRONMENTAL CONDITIONS
- Room temperature: $23°C \pm 3°C$
- Humidity: 50% $\pm 10\%$
- Clean room class: ISO 7

THROUGHPUT
- Flip: 40.000 dies/hour with flip and sidewall
- Non Flip: > 40.000 dies/hour with flip and sidewall

MACHINE DIMENSIONS
- Height: ~1950 mm
- Length: ~2350 mm
- Depth: ~1600mm
- Weight: ~2500 kg

eSIM PERSO

DS VARIATION ecoLINE

DS MERLIN T&R

DS MERLIN W2W / PANEL

DS LASER

SYNERGIES WITH CARRIER TAPE

UPH

| 10000 | 20000 | 30000 | 40000 | 50000 |

DS LASER

THE MOST GENTLE METHOD OF DIE HANDLING

With the new DS Laser, Mühlbauer has developed a particularly gentle die handling method. Instead of a mechanical die release system, the DS Laser works with a laser shot which releases the die from the wafer. Compared to the use of standard die ejector needles, the chip is exposed to no mechanical stress during the lift. The good dies are picked up from the wafer, flipped by 180° and placed face down into the carrier tape. Different automatic optical inspection features such as top, bottom and sidewall inspection and IR (in combination with an automatic replacement function of bad dies in the tape pocket) guarantee an optimal output yield with 100% optical inspection of all dies.

The system has a throughput of up to 12,000 UPH for flip chip, including vision inspection.

ADVANTAGES

- Simple process Tape & Reel
  - » Beating the 12.000 UPH
  - » Ready for ultra-thin die handling (down to 20 μm)
  - » Pick-from-glass capability
- Sensitive die handling: Laser shot to release die from wafer
- Chip is exposed to no mechanical stress during the lift process
- Improved FOUP handling with robotic arm

BENEFITS

- Ability to test the singulated dies on wafer-level to avoid chip-outs during the sawing process
- Including flip chip and 100% 6-side inspection
  - » Defect detection of 9 μm defects and 5 μm on sidewall
  - » Infrared: sidewall and backside IR inspection.
- Easy parameter set: adjustable beam diameter range (1.25-10 mm) and changeable laser mask

Carrier Tape   Surf Tape   Punched Tape   Paper Tape

FEATURES & ADVANTAGES

INPUT
- Standard: Wafer

OUTPUT
- Standard: Tape & Reel

WAFER
- Wafer mapping software incl. barcode scanner
- MAP-host PC for data conversion into SCES/GEM format
- Size: up to 12"

ALTERNATIVE CONTACTLESS DIE RELEASE TECHNOLOGY
- No die ejector needles
- Thermal release wafer foil thin
- Applicable for standard & THIN dies below $30\mu m$
- FOUP handling included (robotic transport to the wafer expander)
- No frame required

MASK LASER SOLUTION
- Easy parameter set and even chip release
- Parallel heat dissipation

NEW WLCSP
- Test of singulated die on wafer level before pick up

DIE HANDLING
- 100% flip chip process
- Dual bonding head

QUALITY REQUIREMENTS
- Placement accuracy: $\pm 30\ \mu m$

QUALITY INSPECTION
- Die frontside inspection ($9\mu m$ defects)
  - » Die position using pattern matching or die edge detection
  - » Die surface inspection
  - » Chip out inspection
  - » Bump quality Inspection (bump presence, bump size (2,5D), bump position, bump bridging, bump height / co-planarity measurement

- Die backside inspection ($9\mu m$ defects)
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position & inspection
  - » Surface inspection
- Sidewall inspection (5-10μm defects)
  - » 6 chip sides can be inspected with full speed
  - » G 2: sidewall defect detection down to 10μm
  - » G 3: sidewall defect detection down to 5μm (IR capability)
- Place inspection
- Tilted die inspection (die height over the tape)
- Post-place inspection (IR (optional) - 8μm defects)
- After sealing inspection

AVAILABLE OPTIONS
- IR sidewall inspection
- Integration possible of MB PalaMax®
- Automatic reel changer

DIE SIZES
- Minimum: 0.4 x 0.4 mm
- Maximum:
  - » Standard: 7 x 7 mm
  - » Big die size range: 0.6 x 0.6 mm - 10 x 10 mm

FACILITIES
- Power: 400 V, 16 A, 50/60 Hz
- Air: 6 bar, oil-/waterfree
- Vacuum (absolute): 0,2 bar

ENVIRONMENTAL CONDITIONS
- Room temperature: 23°C ± 3°C
- Humidity: 50% ± 10%
- Clean room class: ISO 7

THROUGHPUT
- Flip: Up to 12,000 dies/hour with flip

MACHINE DIMENSIONS
- Height: 2465 mm (without signal light)
- Length: 2533 mm
- Depth: 1924mm
- Weight: 2300 kg

eSIM PERSO

DS VARIATION ecoLINE

DS MERLIN T&R

DS MERLIN W2W / PANEL

DS LASER

SYNERGIES WITH CARRIER TAPE

UPH

	2000	4000	6000	8000	10000	12000

SYNERGIES WITH CARRIER TAPE

ONLY MÜHLBAUER OFFERS A PERFECTLY MATCHING SOLUTION FOR CARRIER TAPE & DIE SORTING

IN THE AREA OF DIE SORTING, MÜHLBAUER IS THE ONLY COMPANY WORLDWIDE

- which can handle dies as small as 0.2 x 0.2 mm and down to 50 μm thickness with the highest level of precision and speed
- offering die sorting equipment with up to 40.000 UPH (including 100% vision inspection)
- offering an "all in one" platform solution for different kinds of applications

TRUST IN THE MOST EXPERIENCED SUPPLIER IN TERMS OF PRECISION, SPEED AND QUALITY!

MÜHLBAUER NOW LASERS BARCODES ON CARRIER TAPE. WE INVENTED A LASER STATION TO MARK CARRIER TAPE ON DS MACHINES!

MÜHLBAUER VISION

FOR 100% QUALITY OUTPUT

TO ENSURE 100% QUALITY OUTPUT, ALL OUR SYSTEMS CAN OPTIONALLY BE EQUIPPED WITH MÜHLBAUER'S VISION SYSTEMS. MÜHLBAUER VISION CAN DISPLAY ALL INSPECTION RESULTS AND RECOGNIZE ANY DEVIATIONS IN P2, FOR A- AND B-DIMENSION.
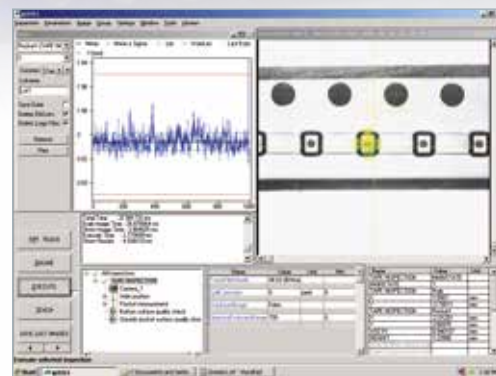
YOUR ADVANTAGES

- Immediate identification of quality problems
- Improved throughput and productivity
- Improved cost of ownership
- Products meeting highest quality standards
- No influence on equipment or machine throughput
- Less waste of material due to fast identification of defects

MATRIX SCAN

The matrix scan ensures a constant quality check independent from pocket size or tape width. Therefore, Mühlbauer systems provide the trust and confidence our customers require to deliver superior tapes and to ensure utmost security during the transportation of highly sensitive components.

PRODUCT PORTFOLIO

YOUR ONE-STOP-SHOP TECHNOLOGY PARTNER

AUTOMATION

CARDS & ePASSPORTS
- IC Module Production
- Card Body & Smart Card Production
- Holderpage & Booklet Production
- Card & ePassport Personalization
- Packaging & Mailing

RFID / SMART LABEL
- Antenna Production & Inlay Assembly
- Converting
- Personalization

SEMICONDUCTOR BACKEND
- IC Module Production
- Carrier Tape Production
- Die Sorting

INDUSTRIAL INSPECTION SYSTEMS
- Packaging
- Metal Working
- Special Solutions

FUTURE TECHNOLOGIES
- Concentrator Solar Technology
- Flexible Solar Cell Technology
- Solar Panel Technology
- eSIM PERSO
- LED Technology

TECURITY®

- ID Card Solution
- ePassport Solution
- MB IDVERSO® Border Management Solution
- Driver's License & Vehicle Registration Solution
- Production Facilities

PARTS & SYSTEMS

- Precision Parts
- Surface Engineering

CONSULTING
- Identification of Customer Requirements
- Planning & Design
- Implementation
- Ongoing Operations

SERVICE
- Worldwide Locations for Service & Support
- Worldwide Spare Parts Supply
- Reaction Time & Full Service Contracts
- Service & Maintenance Management
- Updates & Upgrades
- Teleservice, Remote Access & Hotline (24 hours)
- Training & Support on Different Levels
- Production & Administration Support

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