



# DIE SORTING

PRODUCT OVERVIEW



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OVERVIEW

MACHINE SPECIFICATIONS

		E-SIM	DS ECO-LINE		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		√
VISION / AOI	Front Side	√	√		√		√
	Back Side	√	√		√ + IR* + LG**		√
	Sidewall	√	√ + IR*		√ + IR* + LG**		√ + IR*
	Place	√	√		√		√
	After sealing	√	√		√ + IR*		√ + IR*
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
			Non flip	25.0 x 25.0	Option	Flip Chip Non flip	9.0 x 9.0 12.0 x 12.0
ELECTRICAL DIE TEST		√	X		X		X

\*IR- Infrared inspection  
\*\*LG-Laser groove inspection



# 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



**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.



Configurable workflow steps regarding personalization, quality assurance & issuance



Fully-automated processing & production management



Scalability regarding different documents, machines & personalization locations



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



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



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



Integration of MB USER MANAGEMENT



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



Seamless connection to MB PALAMAX® & MB DATA PREPARATION



Simplified administration due to web-based operator clients



Monitoring of real-time performance of the production



Seamless tracking of documents from point of production to issuance



Statistical tool analyze collected data & deliver customized statistics on OEE



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



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



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



# E-SIM 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 + MB 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
- Use for sensor testing and liquid lens calibration

## 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:  $\pm 30 \mu\text{m}$
- Rotation:  $\pm 1^\circ$

### 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:  $23^\circ\text{C} \pm 3^\circ\text{C}$
- Humidity:  $50\% \pm 10\%$
- 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



E-SIM PERSO

DS VARIATION  
ECO-LINE

DS MERLIN T&R

DS MERLIN  
W2W / PANEL

DS LASER

SYNERGIES WITH  
CARRIER TAPE

UPH

1000 2000 3000 4000 5000 6000



Tape and reel input



Encoding  
(test socket)



Laser  
personalization



Electronical &  
optical verification



Repack in tape and  
reel in sequence

# DS VARIATION ECO-LINE

## MOST FLEXIBLE AND COST-EFFICIENT HANDLING SYSTEM

Mühlbauer's overall goal with the DS VARIATION ECO-LINE is to significantly lower the initial investment cost while, at the same time, guaranteeing maximum functionality in one platform. Accordingly, the DS VARIATION ECO-LINE 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 20µm 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)
- Advanced high speed mode – run up to 7.000 UPH

## BENEFITS

- Combined process capability 4-in-1
  - » Tape and reel
  - » Waffle pack and Jedec tray sorting
  - » Reconstructed wafer or hoop ring
  - » Wafer, tray and de-taping capability
- Including flip chip and 100% 6-side inspection
  - » Defect detection down to 7µm defects and 5µm on sidewall
  - » Infrared: Sidewall inspection
- Highest placement accuracy
  - » ±30µm with DOT ±20µm

## 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") + Hoop ring
- 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: ±20 µm / ±30 µm
- Rotation: ±1.5° rotation tolerance

### QUALITY INSPECTION (AOI)

- Die front-side inspection
  - » 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
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position & inspection
  - » Surface inspection

- Sidewall inspection
  - » All 6 chip sides can be inspected with full speed
  - » Visible light: SIDEWALL defect detection down to 10µm without speed loss
  - » Visible light and infrared light: SIDEWALL defect detection down to 5µm with IR capability
- Place inspection
- Tilted die inspection
- Post place inspection
- After sealing inspection

### AVAILABLE OPTIONS

- IR inspection
- Integration possible of MB PALAMAX®

### DIE SIZES

- Minimum: 0.25 x 0.25 mm
- Maximum
  - » Flip
  - Standard: 15.0 x 15.0 mm
  - Optional: 20.0 x 20.0 mm
  - » Non flip
  - Standard: 25.0 x 25.0 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

UPH

1000 2000 3000 4000 5000 6000



Combined solution



Carrier Tape



Waffle Pack/  
Gel-Pak®



Reconstructed  
wafer



Jedec tape



E-SIM PERSO

DS VARIATION  
ECO-LINE

DS MERLIN T&R

DS MERLIN  
W2W / PANEL

DS LASER

SYNERGIES WITH  
CARRIER TAPE

# 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.



ARC

MERLIN 50K

## ADVANTAGES

- 8<sup>th</sup> 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 9µm defects and 5µm on sidewall
  - » Infrared: sidewall and backside IR Inspection (down to 5 µm)
- Full speed incl. 100% sidewall inspection + IR capability
- 100% traceability with MB PALAMAX®

## 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
- 100% Non Flip
- Two Pick & Place wheels (no turret system)
- Special die ejector, but standard wafer foil
- Automatic self-alignment

### QUALITY REQUIREMENTS

- Placement accuracy:  $\pm 30 \mu\text{m}$
- Rotation:  $\pm 20 \mu\text{m}$  with high accuracy and  $\pm 0.3^\circ$  tolerance

### QUALITY INSPECTION (AOI)

- Die front-side inspection (9µm 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 (9µm 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
  - » Visible light: sidewall defect detection down to 10µm without speed loss
  - » Visible light and Infrared light: sidewall defect detection down to 5µm with 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: Flip: 9.0 x 9.0 mm (other sizes available)
  - Non flip 12.0 x 12.0 mm (other die sizes upon request)

### FACILITIES

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

### ENVIRONMENTAL CONDITIONS

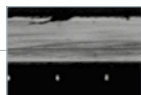
- Room temperature: 23°C  $\pm$  3°C
- Humidity: 50%  $\pm$  10%
- Clean room class: ISO 7

### THROUGHPUT

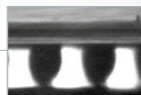
- Flip: up to 45,000 dies/hour with flip and sidewall
- None-flip: Up to 30,000 dies/hour

### MACHINE DIMENSIONS

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



Visible light:  
only surface  
visible



Infra red light:  
inner defects  
visible



Carrier Tape



Surf Tape



Punched Tape



Paper Tape

E-SIM PERSO

DS VARIATION  
ECO-LINE

DS MERLIN T&R

DS MERLIN  
W2W / PANEL

DS LASER

SYNERGIES WITH  
CARRIER TAPE

# 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 up to 30,000 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 complete-

ly 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 9µm defects and 5µm on sidewall
  - » Infrared: sidewall and backside IR inspection (down to 5 µm)
- High placement accuracy  $\pm 20 \mu\text{m}$  -  $\pm 15 \mu\text{m}$  (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:  $\pm 20 \mu\text{m}$   $\pm 15 \mu\text{m}$  with high accuracy mode
- Rotation:  $\pm 1^\circ$  rotation tolerance

### QUALITY INSPECTION (AOI)

- Die front-side inspection (9µm 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 (9µm 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
  - » Visible light: sidewall defect detection down to 10µm
  - » Visible light and infrared light: sidewall defect detection down to 5µm with IR capability
- Place inspection
- Tilted die inspection
- Post-place inspection (IR (optional)- 8 µm defects)
- After sealing inspection

UPH

10000 20000 30000 40000 50000

### AVAILABLE OPTIONS

- Global alignment
- NEW: Laser groove IR
- 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  $\pm 3^\circ\text{C}$
- Humidity: 50%  $\pm 10\%$
- Clean room class: ISO 7

### THROUGHPUT

- Flip: up to 30.000 dies/hour with flip and sidewall (depending on configuration)
- Non Flip: up to 30.000 dies/hour with sidewall (depending on configuration)

### MACHINE DIMENSIONS

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



E-SIM PERSO

DS VARIATION ECO-LINE

DS MERLIN T&R

DS MERLIN W2W / PANEL

DS LASER

SYNERGIES WITH CARRIER TAPE



# 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 au-

tomatic 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 9µm defects and 5µm on sidewall
  - » Infrared: sidewall and backside IR inspection.
- Easy parameter set: adjustable beam diameter range (1.25-10 mm) and changeable laser mask

## 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 30µm
- 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: ±30 µm

### QUALITY INSPECTION

- Die frontside inspection (9µm 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 (9µm 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



Carrier Tape



Surf Tape



Punched Tape



Paper Tape



E-SIM PERSO

DS VARIATION  
ECO-LINE

DS MERLIN T&R

DS MERLIN  
W2W / PANEL

DS LASER

SYNERGIES WITH  
CARRIER TAPE

# 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 supply you with Carrier Tape machines as well as Carrier Tapes
- offering CTML as an inline machine with Die sorting system or Carrier Tape system as well as standalone machine
- Barcode in Carrier tapes available for smart and unique data handling

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!

ARE YOU READY FOR NEXT GENERATION OF DIE SORTING EQUIPMENT?



## DS ALBATROSS

### YOUR ADVANTAGES & BENEFITS

- Double flexibility and speed
- Wafer / Hoop ring
- Jedec Tray \*2, Tape & Reel\*6 / deTaping
- Multi bin output station
- 0.3-35/45 mm Die handling

COMING SOON ... Q1/2021



# 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
- E-SIM 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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### MÜHLBAUER GERMANY

Mühlbauer Group Headquarters  
Josef-Mühlbauer-Platz 1, 93426 Roding, Germany  
Phone: +49 9461 952 0, Fax: +49 9461 952 1101  
info@muehlbauer.de, www.muehlbauer.de

### MÜHLBAUER USA

Mühlbauer Inc.  
226 Pickett's Line  
Newport News, VA 23603-1366, USA  
Phone: +1 757 947 2820, Fax: +1 757 947 2930  
info@muhlbauer.com, www.muhlbauer.com

### MÜHLBAUER MALAYSIA

Muehlbauer Technologies Sdn. Bhd.  
No. 3 Jalan TU 62, Taman Tasik Utama,  
75450 Melaka, Malaysia  
Phone: +60 6 2517 100, Fax: +60 6 2517 101  
info@muehlbauer.com.my, www.muehlbauer.com.my

### MÜHLBAUER SERBIA

Mühlbauer Technologies d.o.o.  
Evropska 17, 22300 Stara Pazova, Serbia  
Phone: +381 22 215 5100, Fax: +381 22 215 5130  
serbia@muehlbauer.de, www.muehlbauer.com

### MÜHLBAUER CHINA

Muehlbauer Technologies (Wuxi) Co., Ltd.  
No 23. Huayi Road, Wuxi New District  
214135 Wuxi, Jiangsu, China  
Phone: +86 510 8190 0100, Fax: +86 510 8190 0101  
info@muehlbauer.cn, www.muehlbauer.cn

### MÜHLBAUER SLOVAKIA

Muehlbauer Technologies s.r.o.  
Novozámocká 233, 94905 Nitra, Slovakia  
Phone: +421 37 6946 000, Fax: +421 37 6946 501  
info@muhlbauer.sk, www.muhlbauer.com



**MÜHLBAUER GmbH & Co. KG**

Josef-Mühlbauer-Platz 1 | 93426 Roding | Germany  
Tel.: +49 9461 952 0 | Fax: +49 9461 952 1101  
Mail: info@muehlbauer.de | Web: www.muehlbauer.de