Mühlbauer
High Tech International

DIE SORTING

PRODUCT OVERVIEW

CONTENTS

OVERVIEW

MACHINE SPECIFICATIONS

		DS VARIATION ECO	DS VARIATION PRO	ALBATROSS	DS MERLIN
UPH (UP TO)		6.000	6.000/12.000 (soon)	8.000	45.000/55.000
FLEXIBILITY	Flip	√	√	√	√
	Non-Flip	√	√	√	√
INPUT	Wafer	√	√	√	√
	T&R	√	√	(√)	X
	JEDEC Tray / Custom Tray	√	√	√	(√)
	Hoop ring	√	√	√	√
OUTPUT	T&R	√	√	√	√
	Wafer	√ (12“)	√ (12“) optional 600 mm	√	√ (12“) optional 600 mm
	Waffle Pack / Gel-Pak®	√	X	√	√
	JEDEC Tray / Custom Tray	√	X	√	√
	Combination of 2 outputs in 1 machine	√	√	X	(√)
VISION / AOI	Front Side	√	√	√	√ + IR*
	Back Side	√	√ + IR*	√	√+ IR*+ LG**
	Sidewall	√ + IR*	√ + IR*	√	√ + IR*
	Place	√	√	√	√ + IR*
	After sealing	√	√ + IR*	√	√ + IR*
WAFER SIZE (6“/8“/12“)		√	√	√	√
DIE SIZE RANGE (in mm)	Minimum	0.25 x 0.25	0.2 x 0.2	0.7 x 0.7	0.2 x 0.4
	Maximum	Flip 15 x 15	50 x 50	15 x 15	Standard 4 x 4 7 x 7
		Non flip 25 x 25 50 x 50		Option 45 x 45	Option Flip Chip 9 x 9 Non flip 12 x 12
DIRECT FORCE CONTROL		√	√	√	X
AUTOMATIC TOOL CHANGER		X	√	√	X
ELECTRICAL DIE TEST		X	X	X	X
READY FOR LIGHTS OUT FACTORY		X	√	√	X

*IR – Infrared inspection, NIR or SWIR optional
**LG – Laser groove inspection

MÜHLBAUER GROUP AT A GLANCE

MÜHLBAUER'S BUSINESS UNITS AND SITES

The Muehlbauer Group is a **German high-tech company** that is known worldwide for its innovative solutions in the field of automated production. With over 40 years of experience, Muehlbauer develops customized technologies for the future of industry and everyday life. The company is the secret driving force behind many developments that make our modern lives safe and efficient.

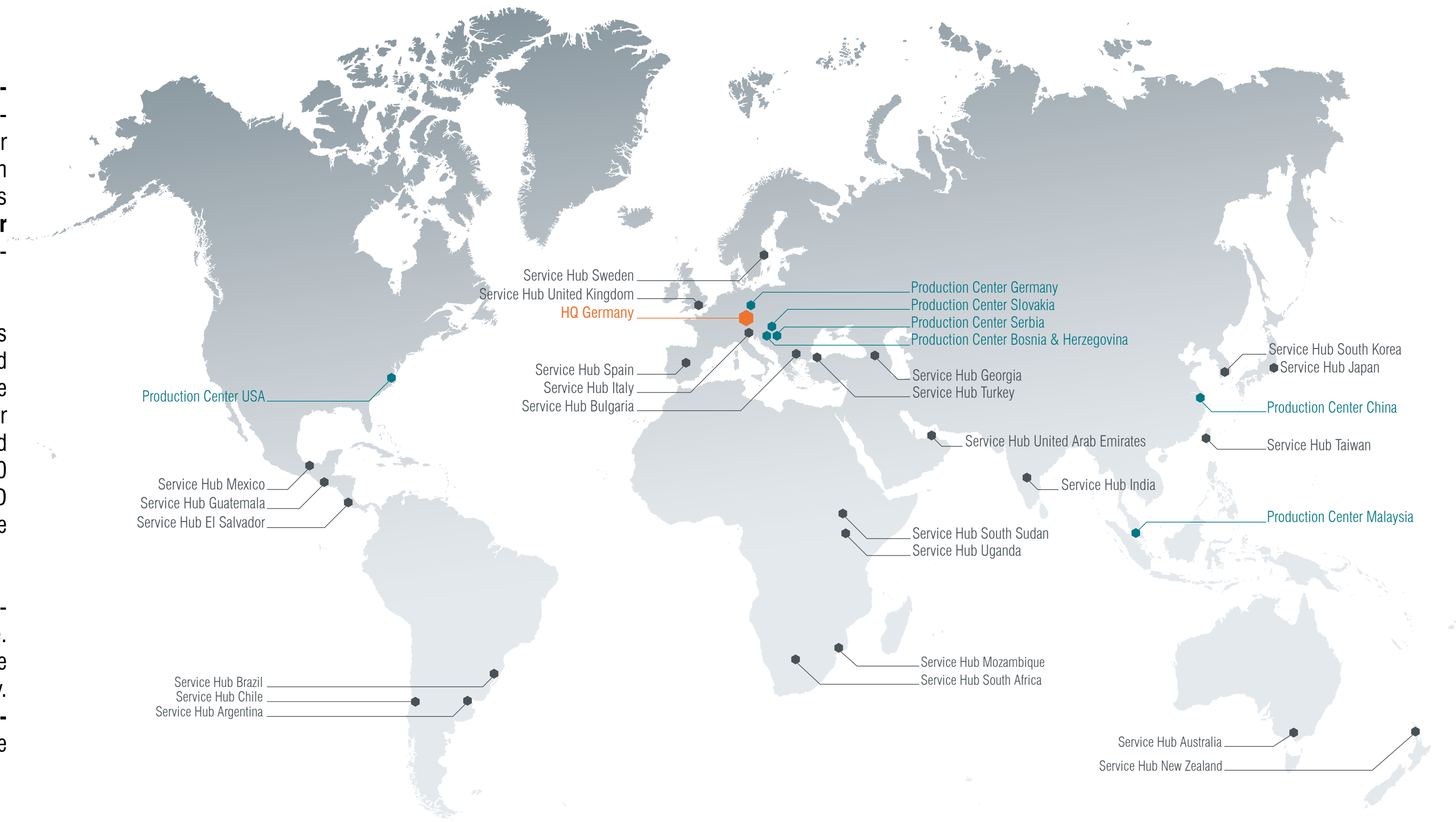
Since its foundation in 1981 in Roding, Bavaria, Muehlbauer has stood for maximum precision. The **Muehlbauer Parts & Systems** business unit consists of the company's own precision parts production with a state-of-the-art electroplating facility. All components for machines and other products are manufactured here in-house – individually and, if necessary, overnight! Our **MPS** makes us extremely agile and independent.

Our **AUTOMATION** division goes far beyond the assembly of customized production systems! We provide intelligent software solutions for the automation of different production steps and drive Industry 4.0 forward. We are passionate about serving 90% of the global RFID market with our high-speed bonders, and have achieved market leadership in the semiconductor industry with our unique die sorting technology.

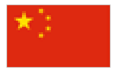
Our newest and currently most dynamic division **ATECH – Advanced Energy Technologies** – brings unique machine requirements to series production. In the field of e-mobility, we offer highly efficient production lines for the manufacture of pouch cells and prismatic cells for lithium-ion batteries, as well as MEAs & stacks for fuel cells. Our newly built **ATECH Giga Center** with dry room provides optimal conditions for gigascale manufacturing.

Our **TECURITY®** division is the leading specialist when it comes to implementing innovative security systems for identifying and verifying documents and people. For example, we manufacture systems for the production of chip cards, IDs and passports or supply eGates and self-registration kiosks and the associated software for airports and border crossings. With more than 30 years of experience and over 300 successfully implemented ID projects worldwide, we offer our customers absolute expertise and trust at the highest level.

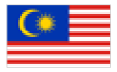
More than 4,000 employees at over 30 locations worldwide ensure that Muehlbauer's visions become reality around the globe. Sustainability, quality and unwavering trust in partnerships are the pillars on which our company has built its success story. Muehlbauer is not just a service provider, but a **creative problem solver** that shapes the future every day with innovative ideas and technological excellence.




Mühlbauer
Bosnia & Herzegovina

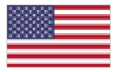

Mühlbauer
China


Mühlbauer
Germany


Mühlbauer
Malaysia


Mühlbauer
Serbia


Mühlbauer
Slovakia


Mühlbauer
USA


MPS
Precision Parts & Surface Engineering


AUTOMATION
Production Equipment & Systems


MB ATECH
Battery & Fuel Cell Technologies


WORLD OF TECURITY®
Government & Technology Solutions

DS VARIATION ECO-LINE

MB PALAMAX® ENABLED
100% AOI
IR INSPECTION CAPABLE

MOST FLEXIBLE AND COST-EFFICIENT HANDLING SYSTEM

Mühlbauer's overall goal with the DS VARIATION ECO-LINE is to significantly reduce the initial investment costs while guaranteeing maximum functionality on a single platform. Accordingly, the DS VARIATION ECO-LINE stands out for its cost-efficient design and highly accurate AOI vision inspection capability. With the integrated high-accuracy mode for chip placement, a value of 20µm can be achieved.

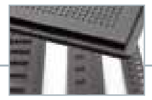
All standard inspection features, including top, backside and sidewall inspection, result in 100 % six-sided chip control. Our latest IR inspection for sidewall and backside detection helps to reach an even higher output quality. THE DS VARIATION ECO-LINE can process a wide range of niche applications, including T&R, De-Taping, Tray & Waffle packs, and reconstructed wafers up to 12".

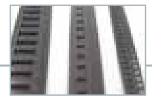
ADVANTAGES

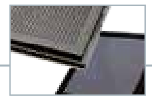
- Low investment cost for maximal flexibility
- Up to 12" (300 mm) reconstructed wafer
- Fast conversion time between different products
- Flexible output configuration with 2 indexer (2-in-1)
- Advanced high speed mode – run up to 6.000 UPH

BENEFITS

- Combined process capability 6-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


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") + 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®
- multi bin sorting

DIE SIZES

- Minimum: 0.25 x 0.25 mm
- Maximum:
  - » Flip
    Standard: 15.0 x 15.0 mm
    Optional: 25.0 x 25.0 mm
  - » Non flip
    Standard: 25.0 x 25.0 mm
    Optional: 50.0 x 50.0 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
- Length: ∼2550 mm
- Depth: ∼2000 mm
- Weight: ∼2300 kg

DS VARIATION ECO-LINE
DS VARIATION PRO
MB ALBATROSS
DS MERLIN 60000
DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

DS VARIATION PRO

NEW

MOST FLEXIBLE AND COST-EFFICIENT HANDLING SYSTEM

Mühlbauer’s next-level adaptive DS VARIATION PRO is as flexible as the DS VARIATION ECO, but with advanced packaging technology that meets the latest standards.
Its smart design and compact footprint accomodate a very small to super-large die range and include highly accurate AOI vision inspection capability. It provides precise die placement accuracy of up to +/-10 µm and guarantees a stable UPH with and without flip chip capability thanks to a new concept. An automatic tool changer, online force control, and clean room class 6 support, combined with a smart factory upgrade and load port integration, enable OHT and AGV support for future Lights-out-Factory installations.

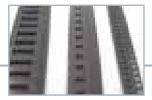
All standard inspection features, including 6-side inspection and 100 % data traceability, are combined with MB PALAMAX® to provide production data at the click of a button.
Our latest IR inspection technology for sidewall and backside detection, which can use either near- or shortwave IR, helps you achieve an even higher output quality than ever before. The DS VARIATION PRO can process a wide range of niche applications, such as Wafer-to-Wafer, T&R, De-Taping, Tray-to-Tray, and Waffle Pack support, guaranteeing the highest level of flexibility.

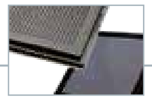
ADVANTAGES

- Wide die range 0,2 - 50 mm
- Same UPH with and without flip mode
- High placement accuracy of +/-10 µm
- Redy for Lights-out-Factory
- Automatic force control
- Automatic tool changer and self alignment

BENEFITS

- Ready for the next 10 years requirements
- Fast change over time, operator-independent
- ISO 6 clean room class
- High speed and High Accuracy Mode
- MB VISION with AI (Artificial Intelligence)
- Placement accuracy up to +/-10 µm in High Quality Mode


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

- Reconstructed Wafer 12”, optional 600 mm
- Tape & Reel / De-Taping
- Waffle Pack / Gel-Pak®
- JEDEC Tray / Custom Tray

WAFER

- Mapping: wafer mapping software incl. barcode scanner
- 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 or 25 Megapixel or higher resolution on demand

DIE HANDLING

- Flip chip
- Direct pick & place (Non Flip)
- Dual place head
- Multi pick head (coming soon)

QUALITY REQUIREMENTS

- Placement accuracy of +/-30 µm and in HQ Mode +/-10 µm
- Rotation: ±1.5° rotation tolerance

QUALITY INSPECTION (AOI) WITH AI ASSISTANCE

- 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
- Place inspection
- Tilted die inspection
- Post place inspection
- After sealing inspection

AVAILABLE OPTIONS

- IR inspection, NIR or SWIR technology
- Integration possible of MB PALAMAX®
- multi bin sorting

DIE SIZES

- Minimum: 0.2 x 0.2 mm
- Maximum 50 x 50 mm

FACILITIES

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

ENVIRONMENTAL CONDITIONS

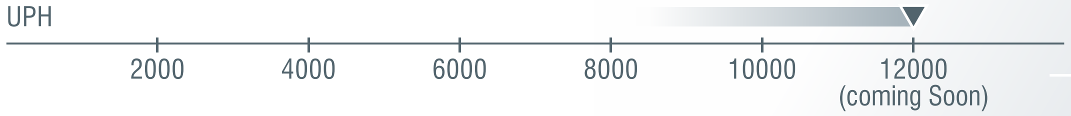
- Room temperature: 23 °C±3 °C
- Humidity: 50% ±10 %
- Clean room class: ISO 6

THROUGHPUT

- Flip/NonFlip Dual Bond head: Up to 6,000 dies/hour
- Flip/NonFlip Dual Bond head + Multi pick head: Up to 12,000 dies/hour

MACHINE DIMENSIONS

- Height: ~2000 mm
- Length: ~3100 mm
- Depth: ~1800 mm
- Weight: ~2700 kg



DS VARIATION ECO-LINE
DS VARIATION PRO
MB ALBATROSS
DS MERLIN 60000
DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

MB ALBATROSS

BIG DIE AND MULTI BIN SORTER

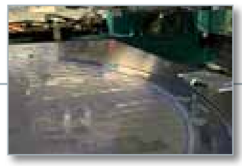
The new DS ALBATROSS is the flagship of big die and multi bin sorting in one system. It is equipped with latest Industry 4.0 standards including robotic systems for material handling, automatic tool changer, cleaning stations, multifold input and output load ports, being GEM300 compliant, which is the highest level of semiconductor Software Automation. The special die sorting system includes full AOI (Automatic Optical Inspection) capability, sidewall inspection and surface inspection to guarantee 100 % high-quality output.

ADVANTAGES

- Handling of small dies of 0.7 mm to larger dies of 45 x 45mm
- can be placed from and into different media:
  - » Wafer or Tray to 2* Tray Output
  - » Wafer or Tray to 6* Tape and Reel
- Flip or non-flip Capability
- 30 µm placement accuracy
- Automatic Tool changer

BENEFITS

- Including flip chip and 100 % 6-side inspection
  - » Defect detection of 30 µm
- Gem300 compliant
- Loadport compliant + OHT/AGV » Smart factory compliant



FEATURES & ADVANTAGES

INPUT

- Wafer (up to 12”) / Hoop Ring
- JEDEC Tray

OUTPUT

- 6 x Tape & Reel
- 2 x JEDEC Tray
- 12 x Waffle Pack
- Reconstructed Wafer 12“

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 µm
- FOUP handling included (robotic transport to the wafer expander)
- No frame required

DIE HANDLING

- 100% flip or non-flip process
- Dual bonding head

QUALITY REQUIREMENTS

- Placement accuracy: ±30 µm

QUALITY INSPECTION

- Die frontside inspection (30 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 backside inspection (30 µm defects)
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark position & inspection
  - » Surface inspection
- Sidewall inspection (30 µm defects)
  - » 6 chip sides can be inspected with full speed
  - » G 2: sidewall defect detection down to 30 µm
- Place inspection
- Tilted die inspection (die height over the tape)
- Post-place inspection
- After sealing inspection

DIE SIZES

- Minimum: 0.7 x 0.7 mm
- Maximum:
  - » Standard: 15 x 15 mm
  - » Big die size range: 45 x 45 mm

FACILITIES

- Power: 400 V, 16 A, 50/60 Hz
- Air: 6 bar, oil- / water free
- 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 8,000 dies/hour

MACHINE DIMENSIONS

- Length: ~4340 mm
- Width: ~4990 mm
- Height: ~2550 mm
- Weight: ~6740 kg

AVAILABLE OPTIONS

- Integration possible of MB PALAMAX®
- Automatic tool changer
- Load port compliant + OHT/AGV

DS VARIATION ECO-LINE
DS VARIATION PRO
MB ALBATROSS
DS MERLIN 60000
DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

DS MERLIN 60000

THE WORLD'S BENCHMARK IN DIE SORTING

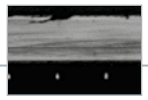
Mühlbauer has taken the next step in high speed die sorting, the DS MERLIN 60000, with a new record throughput of up to 55.000 UPH – and full 6 side inspection.
With this newest launch to the DS MERLIN family, the system is able to reach unknown speed with an additional 20 % in throughput compared to the previous MERLIN 50000.
The new MERLIN system has all the functions of its predecessor. It has been thoroughly tested and gained the trust of our customers with over 450 machines installed all over the world.
The machine includes the patented pick-and-place system using two rotary wheels in combination with a fully automatic self-alignment system.
The Vision inspection is updated to the latest state of the art with a resolution of at least 4MP and up to 5MP, guaranteeing highest quality for visible and IR defect detection with a detection capability up to 5-10 µm. Various IR wavelengths as well as laser groove IR inspection and short-wave IR inspection are now also possible.
The significant improvement in UPH is a result of the perfect alignment of the various hardware components to ensure the most efficient communication possible. This saves a lot of time, directly increases the UPH and supports the perfect handling of small chips.
The DS 60000 optionally comes with our MB PALAMAX® for equipment smartification and with our ARC to eliminate downtimes due to Carrier Tape changes. With these additions, operator effort is significantly reduced to maximize line efficiency.

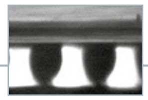
ADVANTAGES

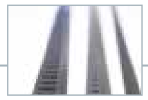
- 8th generation of Mühlbauer Flip Chip Tape & Reel Die Sorter
- Lower cost of ownership » no bond heads anymore
- Simple Process Tape & Reel
  - » Beating the 55.000 UPH incl. vision inspection
  - » Ready for ultra small die handling (0.2 mm)
- Integrated AOI 6-side inspection with AI assistant
- Automatic reel changer available
- Ready for super small die

BENEFITS

- Including flip chip and 100 % 6-side inspection
  - » 9 µm or even 3 µm defect detection
  - » Infrared: sidewall and backside IR Inspection
- Full speed and 100 % sidewall inspection + IR capability
- 100 % traceability with MB PALAMAX®


Visible light: only surface visible


Infrared light: inner defects visible


Carrier Tape


Surf Tape


Punched Tape


Paper Tape

AUTOMATIC SELF ALIGNMENT ENABLED
MB PALAMAX® ENABLED – MÜHLBAUER SMART FACTORY SOLUTION
100 % AOI – AUTOMATIC OPTICAL INSPECTION
IR INSPECTION CAPABLE – MÜHLBAUER INSPECTION SOLUTION
AI – AI SUPPORTED SYSTEM

FEATURES & ADVANTAGES

INPUT

- Standard: Wafer
- Non Flip option:: Tape & Reel 6", 8", 12" (De-Taping)

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 mm carrier tape cassettes

DIE HANDLING

- 100 % Flip Chip
- 100 % Non Flip
- Two pick-and-place wheels (no turret system) in a Flip Chip configuration or one pick-and-place wheel in Non Flip configuration
- Special die ejector, but standard wafer foil
- Automatic self-alignment

QUALITY REQUIREMENTS

- Placement accuracy: ±30 µm
- Rotation: ±20 µm with high accuracy and ±0.3° tolerance

QUALITY INSPECTION (AOI)

- Die front-side inspection (3 µm up to 9 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 backside inspection
  - » Die position using edge detection
  - » Chip out inspection
  - » Laser mark & position inspection
  - » Laser groove inspection
  - » Surface inspection
- Sidewall inspection (5-10 µm defects)
  - » All 6 chip sides can be inspected with full speed
  - » Visible light: sidewall defect detection up to 10 µm without speed loss
  - » Visible light and Infrared light: sidewall defect detection down to 5 µm 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, laser groove
- 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

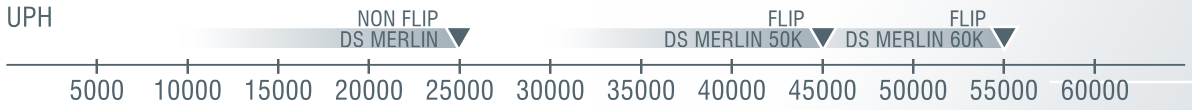
- Room temperature: 23 °C ± 3 °C
- Humidity: 50 % ±10 %
- Clean room class: ISO 7

THROUGHPUT

- Flip: up to 55,000 dies/hour
- Non Flip: up to 25,000 dies/hour

MACHINE DIMENSIONS

- Height: ~1990 mm
- Length: ~2500 mm
- Depth: ~1775 mm
- Weight: ~1800 kg



DS VARIATION ECO-LINE
DS VARIATION PRO
MB ALBATROSS
DS MERLIN 60000
DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

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 25,000 UPH up to 40,000 UPH – already including full vision and sidewall inspection. In addition to the significantly higher speed, the DS MERLIN offers 50 % lower operating costs compared to other wafer-to-wafer solutions. The completely new design of the DS MERLIN's core module features a special die ejector and a pick-and-place wheel instead of the conventional bonding technology. The machine and product setup has also been significantly simplified. Thanks to the fully automatic self-alignment system, complex and long-lasting operator-related changeover and set-up times are no longer necessary. New products can be introduced more quickly and easily than ever before.

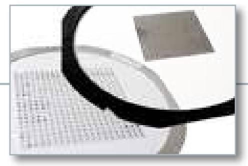
Thanky to the new design, the inspection system reaches an even higher output quality with the latest IR technology on sidewall and backside inspection. A more intuitive software interface and improved wafer handling round off this brandnew die sorting system.

ADVANTAGES

- High speed Wafer-to-Wafer machine (25.000 up to 40.000 UPH)
- 12" wafer reconstruction or panel size up to 24" (600 x 600 mm panel)
- 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 µm defects and 5 µm on sidewall
  - » Infrared: sidewall and backside IR inspection (down to 5 µm)
- High placement accuracy ±30 µm - ±15 µm (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

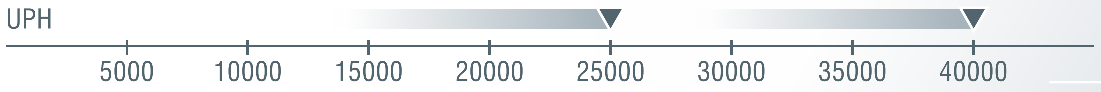
- Option A: 100 % flip chip
- Option B: 100 % non-flip chip

QUALITY REQUIREMENTS

- Placement accuracy: ±20 µm ±15 µm with high accuracy mode
- Rotation: ±1° rotation tolerance

QUALITY INSPECTION (AOI)

- Die front-side inspection (9 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 backside inspection (9 µm 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 5 µm with IR capability
- Place inspection
- Tilted die inspection
- Post-place inspection (IR (optional)- 8 µm defects)
- After sealing inspection



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 ± 3 °C
- Humidity: 50 % ± 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: ~1990 mm
- Length: ~2500 mm
- Depth: ~1775 mm
- Weight: ~1800 kg

DS VARIATION ECO-LINE
DS VARIATION PRO
MB ALBATROSS
DS MERLIN 60000
DS MERLIN WAFER-TO-WAFER / WAFER-TO-PANEL

SYNERGIES WITH CARRIER TAPE

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 & 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

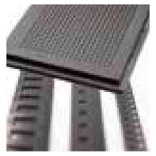
TRUST IN THE MOST EXPERIENCED SUPPLIER IN TERMS OF PRECISION, SPEED AND QUALITY!

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

SORTING INTO

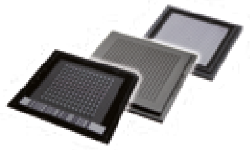
Carrier Tape

Reconstructed wafer



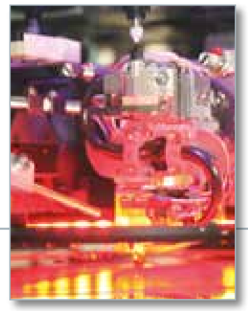
Combined solution

Jedec tray



Waffle Pack / Gel Pack

WE ALSO PROVIDE CUSTOMIZED SOLUTIONS. PLEASE FEEL FREE TO CONTACT OUR CARRIER TAPE EXPERTS.



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

MB PALAMAX®

TOTAL PROCESS TRANSPARENCY

MB PALAMAX® is Mühlbauer's Smart Factory solution for semiconductor backend shop floors. Consisting of a NOSQL database, it is designed to collect and analyze process data in order to monitor and improve production efficiency. This data is stored in large sets for later processing, visualization and statistical analysis.

KEY FEATURES

- Monitor your production in real time & generate real production statistics with your preferred KPIs (for specific chip types only)
- Increase your transparency
- Gain better data to investigate, understand & portray process flows & relationships
- Run your production with improved security & optimally employed staff
- Intuitive & easy-to-use web interface
- Responsive user interface design allows optimal presentation on any chosen device
- Data collection from the shop floor of Mühlbauer equipment & third-party equipment
- State-of-the-art big data software architecture ensures future reliability

FEATURES & ADVANTAGES

PALAMAX.MONITOR

Monitors the real-time performance of the production

PALAMAX.STATS

Statistical tool which analyzes collected data and delivers customized statistics on OEE

PALAMAX.REMOTE

Enables the remote operation of machines on the shop floor from a control center

PALAMAX.TRACE

Allows for the auditing of single manufacturing runs

PALAMAX.MAINTAIN

Enables the implementation of maintenance on demand

PALAMAX.COST

Increases effectiveness and efficiency so that production becomes more profitable

PALAMAX.RECIPE

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

Mühlbauer
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