

# Ultrasonic Heavy Wire Bonder M17

F & K DELVOTEC – The Heavy Wire Bonder specialist – delivers the perfect solution for any bonding challenge in the IGBT, smart power module and hybrid assemblies industries.

The innovative platform strategy, whereby the differing wirebond technologies and transducer frequencies can be deployed on the same machine base is continued on the F & K Model 2017. The number of different sized work areas ensure the highest flexibility in the packaging technology of the complete package spectrum.

#### Advantages

- Integrated heavy wire and heavy ribbon in one machine platform using fast system change-over
- Ensures repeatable bond quality through patented BPC for real-time adjustment of the bond parameters with varying material surfaces
- Ensures process transparency through seamless integration in industry 4.0/IOT procedures
- Offers process stability through a large choice of ultrasonic frequencies for optimum material matching
- Integrated process technology and automation from a single source



NOT JUST MACHINES.  
BUT BONDING SOLUTIONS.

**F & K**  
**DELVOTEC**

# MADE FOR YOU - YOUR ADVANTAGES AT A GLANCE

## M17 S

- Smallest footprint on the market with maximum productivity
- Optimised scaling of your investment
- Sustainable technology through proven, exchangeable bond head principle
- Manual or automatic parts handling

## M17 D

- Smallest footprint on the market with double the output
- Perfect for high-volume production
- Best TCO through combination of fine wire and heavy wirebond technologies
- Pin or belt indexer with in-line pulltester

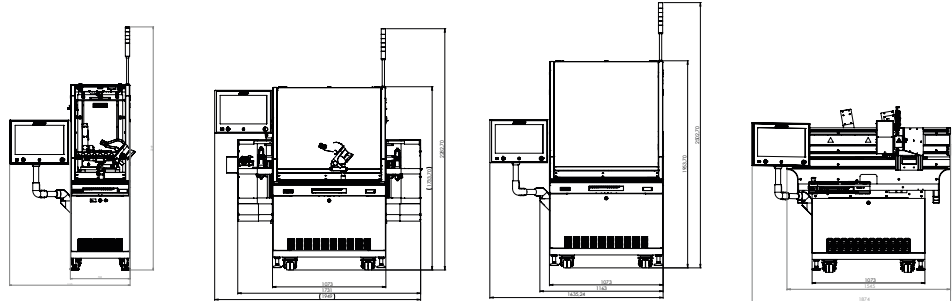
## M17 L

- Flexible parts handling height, up to 500 mm
- Highest flexibility with the combination of manual and automatic parts handling:
  - Two manual work holders
  - Single track indexer with manual work holder
  - Dual track indexer with bond-off station

## M17 XL

- Largest work area on the market
- No interference from mainframe components as with gantries
- Flexible parts handling height, up to 500 mm
- Perfect for BMS and battery connections

# HEAVY WIRE MACHINE MODELS



M17	S	D	L	XL
X-axis	254 mm (10")	254 mm (10")	652 mm (25")	1,133 mm (44.61")
Y-axis	152.4 mm (6")	152.4 mm (6")	350 mm (14")	702 mm (27.64")
Z-axis	40 mm (1.57"), optional 60 mm (2.36")	40 mm (1.57"), optional 60 mm (2.36")	100 mm (4")	40 mm (1.57")
Width	553 mm	1,073 mm	1,073 mm	1,545 mm
Height with/without signal lamp	2,249 / 1,721 mm	2,283 / 1,734 mm	2,503 / 1,954 mm	1,850 mm / -
Depth	1,135 mm	1,135 mm	1,237 mm	1,606 mm
Weight	780 kg	1,165 kg	1,100 kg	1,400 kg
Working height	SMEMA compliant 850-1,050 mm			
Power supply	120 V +/- 10 %, 230 V +/- 10 %, single phase, 50-60 Hz			
Power	0.5 kW			
Compressed air	4-8 bar			
Vacuum connection	< -0.8 bar			

# HEAVY WIRE AND HEAVY RIBBON BOND HEAD

- **Wire diameter**
  - Standard 100-600  $\mu\text{m}$  (4-24 mil)
  - Ribbon 2,000  $\mu\text{m}$  x 300  $\mu\text{m}$  (80 mil x 12 mil); optionally laserbonding for conductors of larger cross sections
- **Wire material**
  - Al, Cu, AlCu
- **Wire spool**
  - Spool diameter 3", 3.5", 4" automatic wire feed
  - Wire end recognition using CCD sensor
  - 90° wire feed angle
- **Cutting process**
  - Active, cut depth for front and back cut
- **Bond tool**
  - F & K standard 2", optionally 2.8", 4"
  - Development of customer specific wedges by F & K possible
- **Transducer frequencies**
  - 40, 60, 90, 120 kHz standard
  - Development of customer specific transducers by the F & K laboratory possible
- **Ultrasonic generator**
  - F & K, digital 30-250 kHz
  - Resolution < 1 Hz
  - Power max. 100 W, programmable
- **Bond force**
  - Up to 5,000 cN
- **In-head pulltest**
  - NEW High-speed in-head pulltester, programmable for each bond, up to 40 % speed improvement compared to conventional in-head pulltests
- **Consumables**
  - Patented F & K clip-on system for optimum wire feed and control
  - NEW Cutter with hardened surface for extra-long life
- **Speed**
  - 2.5 wires per second, application dependent
- **Bond head fast-change system**
  - Proven, fast-change system with intelligent bond head recognition, enables exchange of bond heads in less than 15 minutes

# HEAVY WIRE MACHINE MODELS

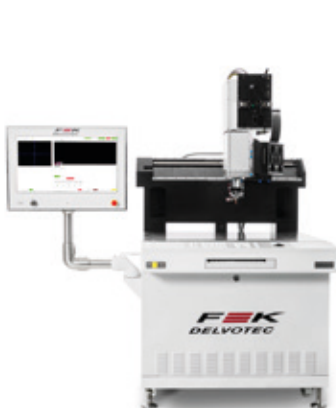
M17<sup>S</sup>



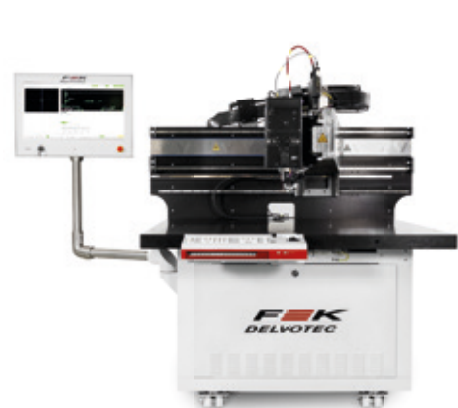
M17<sup>D</sup>



M17<sup>L</sup>



M17<sup>XL</sup>



# MACHINE SPECIFICATION

## MACHINE SPECIFICATION

X-Y-axes	Linear encoder resolution better than 0.1 $\mu\text{m}$
P-axis	+/- 200° AC servomotor with absolute encoder, resolution 0.0035°
Z-axis	Optionally 60 mm (2.36"), AC servomotor with absolute encoder, resolution 0.5 $\mu\text{m}$
Positional accuracy	< +/- 5 $\mu\text{m}$ @ 3 sigma, incl. PRU/Wire/Tool/Application
Repeatability on the product	< +/- 3 $\mu\text{m}$ @ 3 sigma, incl. PRU/Wire/Tool/Application
Monitor	21" flat screen
Microscope	Stereo zoom microscope, adjustable lighting
Connections	SMEMA, USB, RJ 45, Digital I/O
Operating system	Real-time, Unix®-based multi-tasking OS
Certification	SEMI S2, CE

## NETWORK CONNECTIVITY

TCP/IP/FTP data exchange
SMEMA for in-line connections to other machines
SEMI communication standard SECS/GEM

## PATTERN RECOGNITION

Pattern recognition unit	Cognex® 8000 Pat Max® System
Recognition time	Up to 2 ms per pattern recognition
Alignment correction	Flexsearch, single point recognition incl. phase angle, two point recognition, phase angle correction +/- 5 %
Camera	Moving CCD-camera, 640 x 480 pixel
Resolution	2-30 $\mu\text{m}$ per pixel, adjustable using different optics
Image size	Standard 1.2 mm x 1 mm bis 20 mm x 18 mm

## MANUAL WORKSTATIONS

4" x 4", 6" x 6", 8" x 6", 10" x 6", up to 45" x 30"
Vacuum and / or mechanical clamping
Heated or unheated

## AUTOMATIC PARTS HANDLING

Pin indexer	Belt indexer
Leadframes, e. g. QFN, D-PAK, PDFN and other packages	Flat substrates, e. g. ceramic substrates, PCB or workpiece carriers
Leadframe length 152-324 mm, optionally < 152 mm	Variable product length, up to 1,133 mm without index steps
Leadframe width 18-105 mm	Product width up to 760 mm
Downset 3 mm	Parts handling height up to 15 mm
Repeatability +/- 15 $\mu\text{m}$ @ 3 sigma, linear motor accuracy 3 $\mu\text{m}$	Can be combined with manual work station, optionally heated with 2 pre-heat stations

## MAGAZINE LIFT SYSTEM

F & K leadframe lifts, dual axes	Magazine width 24-115 mm	Height 94-200 mm	Length 154-244 mm, optionally 234-324 mm
F & K Substrate / boat lifts, single axis	Magazine width max. 240 mm	Height max. 300 mm	Length max. 240 mm
	Substrate width max. 160 mm	Substrate length < 150 mm or > 300 mm, Substrate widths > 160 mm are treated individually as special requirements	

# NOT JUST MACHINES. BUT BONDING SOLUTIONS.

## QUALITY TOOLS

### BOND PROCESS CONTROL (BPC): What exactly are the advantages of the new BPC?

- Closed-loop-system for continuous monitoring and real-time control of the bonding parameters time, ultrasonic power and bond force
- Adjustment of the ultrasonic power to surface variations in the current process



LEVEL  
03

#### Guarantee Quality by Process Perfection

A sensor tracks the wire deformation continuously and the ultrasonic energy applied is controlled in real time according to previously defined reference values.

LEVEL  
02

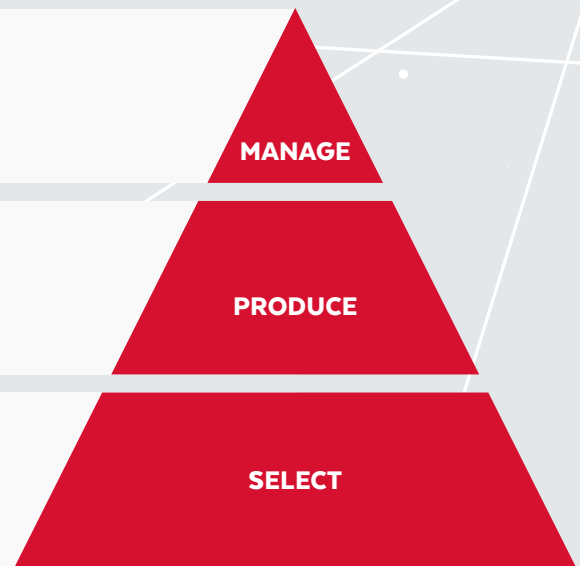
#### Produce Quality by Process Monitoring

The process runs reliably within defined tolerances. By means of a data base statistical evaluations from the analysis of up to 636 process parameters per wire can be made. Cpk values are determined continuously.

LEVEL  
01

#### Select Quality by Defect Detection

The basic principle of bond process control: faulty components will be identified and can be rejected. .



#### Tool inspection

- Graphical display of the expected positioning of wedge, cutter and wire guide using the pattern recognition unit
- Minimum set-up time with maximum traceability when changing wedge, cutter or wire guide

#### Traceability

- Link up to standard F & K or customer specific MES
- Link to an existing host
- For manual and automatic parts handling

#### Load cell

- Load cell and housing for fully automatic calibration of the bond weight

#### DRAG and BOND Panorama pattern recognition

- Innovative self-scanning-system for maximum overview
- Intuitive user interface for generation of bond programmes

#### Barcode & DMC-Reader

- Fully automatic part recognition, recipe and process data assignment
- Available as flexible hand-held DMC-reader or fixed-position integrated unit

#### Transducer

- Optimised, tuned system comprising transducer and ultrasonic generator
- Continuous in-house development for 25 years ensures constant and outstanding quality
- Measurement of every transducer using extensive test procedures properly documented by the transducer laboratory

### BOND ACADEMY: your advantages?

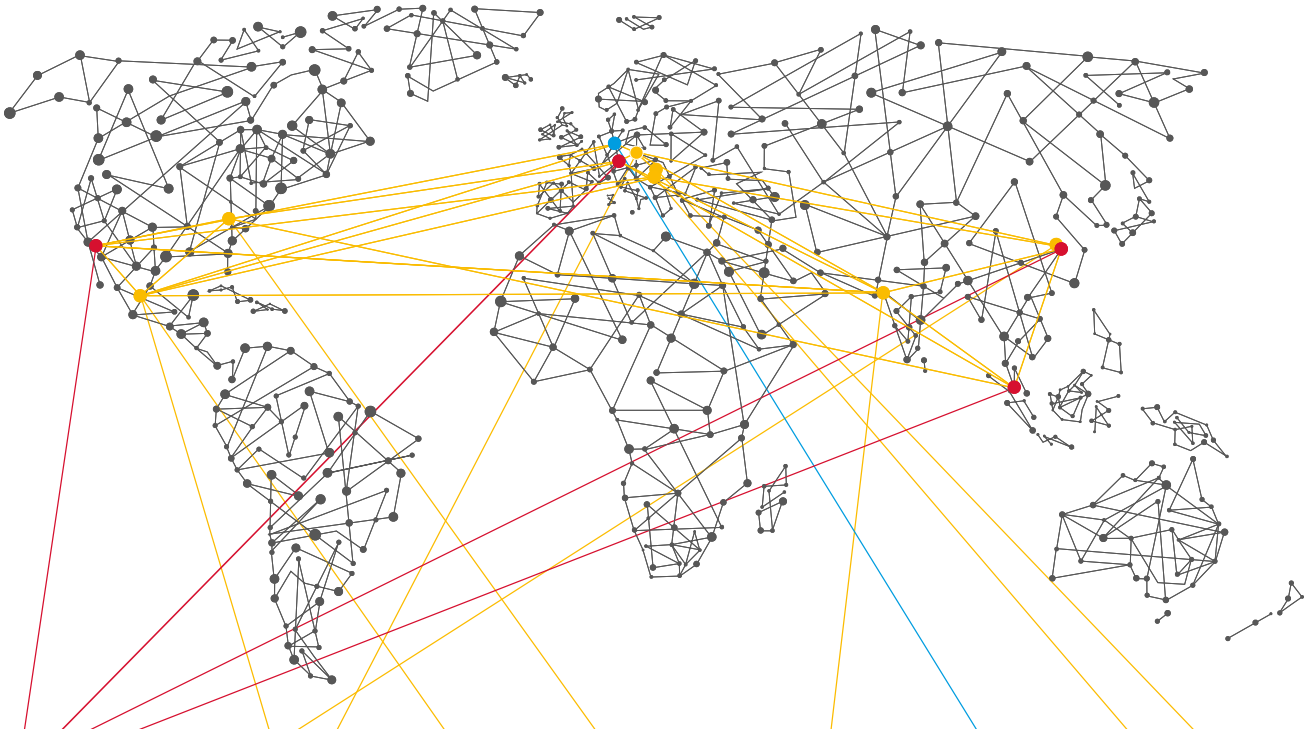
Our support for implementing your requirements and optimising your processes:

- Competent advice
- Determining the correct transducer frequency for the application
- Rapid prototyping
- Validation of product design
- Sample bond tests and pilot series manufacture
- Training your service technicians
- Ramp-up-support



# POWERFUL SYNERGIES AS „MEMBER OF STRAMA GROUP“

Together with our parent company, Strama-MPS, we integrate our wirebonders into complete assembly lines with other joining, assembling and testing stations. Our customers profit from the combination of our bonding and automotive expertise, „One-stop-shopping“, and the interface free quality of the complete package.



GERMANY,  
Ottobrunn  
USA, Foothill Ranch  
CHINA, Shanghai  
SINGAPORE



GERMANY,  
Straubing  
CHINA, Taicang  
MEXICO, Puebla



MEXICO, Puebla



USA, Greer



INDIA, Nashik



GERMANY,  
Kassel



CROATIA,  
Cerna  
BOSNIA, Orašje

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