

# TargetSystem

## Dual Laser



TargetMaster micropolisher with TargetDoser dosing system

- Use for any visible or hidden target e.g. microcracks, inclusions and porosities, oxidation layers, coatings
- Automatic preparation, cleaning and measuring
- Cross-sectioning and parallel polishing of both mounted and unmounted samples
- Real-time alignment of visible (external) and hidden (internal) targets
- On-board dual laser measuring system\* provides  $\pm 5 \mu\text{m}$  system accuracy
- IPS, Intelligent Preparation System  
IPS database with removal rates for grinding and polishing surfaces  
Automatic re-calculation of removal rate and time
- Low operating costs  
Use with any SiC paper, or any other consumable.

### ***Your benefits:***

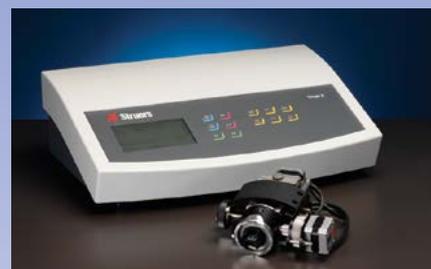
- No samples lost
- Drastically reduced preparation time (< 30 minutes)
- No dependency on operator skills
- Full reproducibility
- No need for costly abrasive films

\*) International patent application pending. US patent 7,014,531



**Automatic target preparation to both visible and hidden targets - without losing samples**

**Modular, upgradable system**



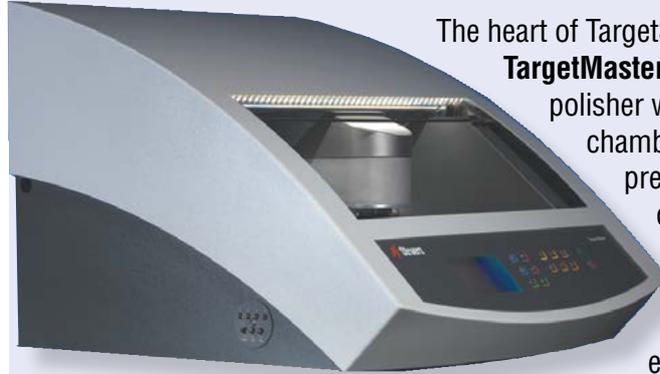
TargetX option for hidden targets



TargetZ option for visible targets

# System components

With a system accuracy of  $\pm 5 \mu\text{m}$ , TargetSystem is for target and other high accuracy preparation in R&D or failure analysis (FA) labs. Typical application areas are microelectronics, delayering and FA where specific areas are to be inspected. The individual components of the system can be combined in several ways, according to requirements.



The heart of TargetSystem is the **TargetMaster**, a 200 mm micro-polisher with a closed polishing chamber to safeguard both preparation quality and operator.

Removal at initial preparation step(s) is controlled by an electronic measuring system, for rapid approach

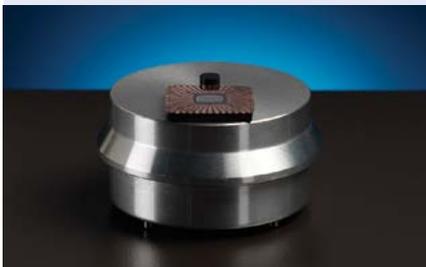
to target. A second, in-line laser measuring system handles the demanding polishing steps. TargetMaster can be used either stand-alone or with one of the two set-up stations, TargetZ or TargetX.

**TargetGrip** is a tiltable specimen holder dedicated to TargetMaster. Adapters are available for larger specimens (05756912), for cross-sectioning (05756908 and 05756914) and for parallel polishing (05756910).



TargetGrip with 40 mm (05756908) and 30 mm (05756914) sample chair

Parallel holder (05756920)



**TargetDoser** is an automatic dosing station, providing preparation methods and process liquids to TargetMaster. TargetDoser comes with 7 pumps and 13 pre-programmed methods, and accommodates 200 user-defined methods.



Sample chair - Adapter for cross-sectioning, available in 30 mm (05756914) and 40 mm dia. (05756908)



Resin barrier (05756907) for use with Sample chair



Mould insert 40 mm (05756912), fully mounted and partially mounted

# Preparation modes

TargetMaster offers three preparation modes, which can be used separately or in combination.



Removal

Target

Time

If e.g. consecutive layers of a specimen are inspected on a regular basis, **Removal mode** will take you to each of the layers with an accuracy of  $\pm 5$  microns – and automatically stop when it is there.

Using TargetX with an x-ray device, the hidden (internal) target of your sample can be aligned in real-time and the target value (distance to target) measured.

TargetSystem does away with manual target polishing, which is particularly wasteful when microscopic targets of e.g. microelectronic components are subjects of a preparation. Here TargetMaster and its **Target mode** is used in combination with a set-up station, TargetX or TargetZ. The type of set-up station is selected depending on whether hidden (internal) or visible (external) targets on a specimen are to be inspected.

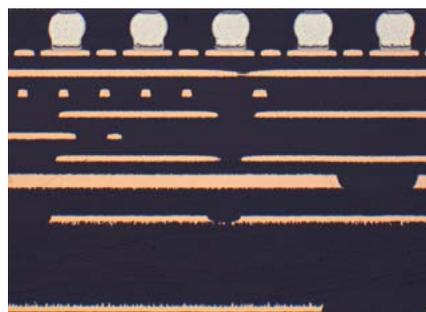
If, instead, visible (external) targets are the typical subject of inspection, TargetZ is the choice. With its powerful vision system even minute targets are precisely aligned and measured.

**Time mode** is for timed preparation, used e.g. for oxide polishing, and for manually controlled removal.

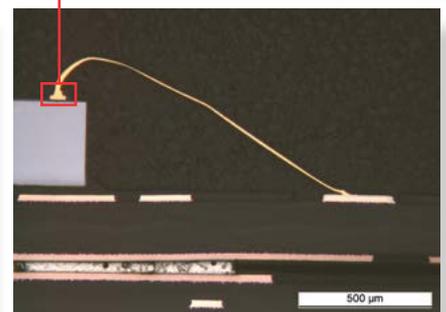
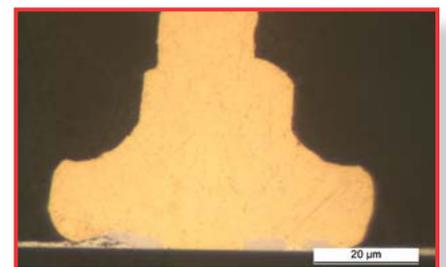
**TargetZ** is used for aligning and measuring specimens with visible (external) targets.

With a powerful vision system of up to 680x magnification and its 15" TFT monitor, TargetZ makes it a simple task to map and align even minute targets.

**TargetX** is for hidden (internal) targets, and comprises a set-up station and a console. The set-up station is placed in the users x-ray (not included) and is operated from the external console, permitting real-time alignment and measuring.



BGA solder ball, cross section, 100x



Overview and detail with 20 µm dia. Au-wirebond

# Two measuring systems

TargetMaster removal is controlled by two separate measuring systems. Grinding steps and removal until 175 µm from target (re diagram) are controlled by an electronic measuring system, which continuously measures distance to target. In this fashion, the major part of the target distance is covered as quickly as possible.

Polishing steps and removal below 175 µm (re diagram) are handled by a laser measuring system. The system uses a unique, relative measuring technique enabling a remarkable  $\pm 5 \mu\text{m}$  system accuracy.

TargetMaster features a system, IPS, which automatically adapts removal time and rate according to actual properties of specimen and grinding/polishing surface. In effect, fewer measurements are necessary, meaning shorter preparation times.

# IPS, Intelligent Preparation System



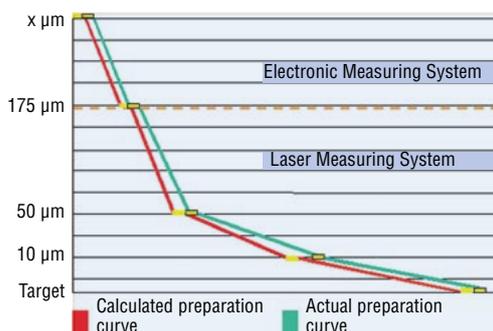
Before preparation starts, the sample height is measured and IPS calculates removal time for each of the steps (below diagram, in red). The removal times are based on the selected preparation method and base values (*Initial Removal Rates, IRR*). The base values are theoretical, conservative removal values for grinding and polishing surfaces, which are stored in the IPS database of TargetMaster.

Using the base values, preparation starts. After gaining experience with the properties of sample and surface, preparation stops and the actual amount of removed material is determined. On this basis, the actual removal rate for the first part of the step is calculated. The new, actual removal rate is then used for the remaining part of the step and so on (re diagram, in green). For less demanding jobs, it may be desirable to lower the accuracy

to make the preparation times as short as possible. Time/Accuracy factor is a tool for fine tuning the algorithm on which TargetMaster measuring is based. The default Time/Accuracy factor corresponds to setting '3', which can be lowered to '2', or '1'. Preparation times may get longer when increasing the Time/Accuracy factor, but overall depend on the preset IRR values.

*For the easiest possible use of TargetSystem, we recommend the use of an inverted microscope, permitting inspection of the specimen while clamped into the sample holder (TargetGrip)*

*When using an upright microscope, it may become necessary to remove the specimen from the sample holder since the total height of holder + specimen exceeds the capacity of the microscope. Thus, if the specimen is to receive additional polishing, the original registration is likely to be lost.*



## IPS, How it Works

- Accuracy is secured by using relative laser measuring
- Removal rate at first part of any step originates from built-in database (base values)
- Process is interrupted, laser measurement made, and removal rate + time re-calculated
- Remaining step at new removal rate

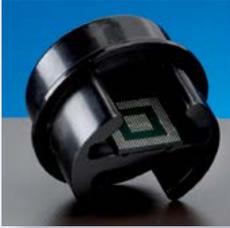


*On-board dual laser measuring system provides  $\pm 5 \mu\text{m}$  system accuracy*

# Using the TargetSystem

## Automatic target preparation in few, simple steps

1



### Attach Sample

In seconds, the sample is glued directly into a single-use cross-sectioning jig, sample chair. Mounting is not a requirement, but may be done

6



### Mount TargetGrip in TargetMaster

Lock TargetGrip into sample mover of TargetMaster

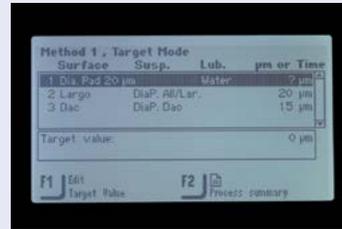
2



### Lock into holder

The sample chair is locked into TargetGrip, a precision sample holder

7



### Select method

Select a suitable method on the automatic dosing system, and transmit to TargetMaster

3



### Place in set-up station

TargetGrip is locked into either TargetZ (for visible targets) or TargetX (for hidden targets)

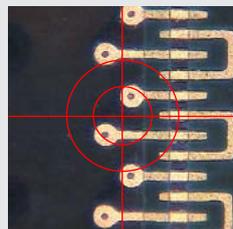
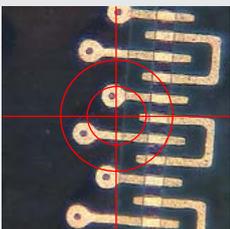
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### Grind/polish

Automatic preparation to pre-selected target

4



### Align

Real-time alignment of target

9



### Inspect

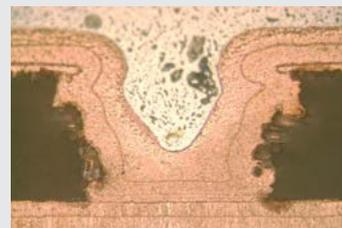
Inspect the sample holder under microscope

5



### Measure

Measurement of distance to target. Measured data is transferred to TargetMaster



**TECHNICAL DATA****TargetSystem**

System accuracy ± 5 µm at 20°C / 68°F ± 2°C / 4°F.

**TargetMaster micropolisher**

Diameter 200 mm / 8"  
 Speed, turntable 40 - 300 rpm in steps of 10 rpm  
 Speed, specimen holder 20 - 150 rpm in steps of 10 rpm  
 Force 10 - 75 N in steps of 5 N  
 Rotational direction CW / CCW  
 Motor power 250 W / 0.33 HP

*Software and electronics*

Controls Touch pads  
 Memory FLASH-ROM / RAM / NV-RAM  
 LC display 240 x 128 dots with back light

*Noise levels*

During preparation 54 dB (A)  
 During cleaning 72 dB (A)

*Working environment*

Temperature 5-40°C / 41-104°F.  
 Humidity 35-50% RH

*Supply*

Voltage / frequency 200-240 V / 50-60 Hz  
 Power inlet 1-phase (N+L1+PE) or 2-phase (L1+L2+PE)  
 The electrical installation must comply with "Installation Category II".

Power, nominal load 700 W  
 Power, idle 16 W  
 Current, nom. 3.5 A  
 Current, max. 6.9 A  
 Pressure for tap water 1-10 bar / 14.5-145 psi  
 Water inlet 1/2" or 3/4"  
 Water outlet 32 mm / 1 1/4" dia.  
 Compressed air supply 6 mm / 1/4" dia.  
 Compressed air pressure 6-10 bar / 87-145 psi  
 Compressed air quality In compliance with ISO 8573-1, 5.6.4  
 Air extraction 32 mm / 1 1/4" dia.  
 Air extraction, min. airflow 30 m<sup>3</sup> / 1059 ft<sup>3</sup> per hour

*Dimensions and weight*

Width 820 mm / 32.3"  
 Depth 860 mm / 33.9"  
 Height 595 mm / 23.4"  
 Weight 115 kg / 253.5 lbs

**TargetGrip tiltable specimen holder**

Specimen sizes 40 mm dia. (05756901) or 30 mm dia. (05756916)  
 Cross-sectioning 40 mm dia. Sample chair, adapter for cross-sectioning (05756908), max sample size 29 x 20.5 mm  
 30 mm dia. Sample chair, adapter for cross-sectioning (05756914), max sample size 23 x 20.5 mm  
 Parallel polishing Parallel Holder 40 mm dia, adapter for parallel polishing (05756910), max sample size 19 x 18 mm  
 Parallel Holder 30 mm dia, adapter for parallel polishing (05756920), max sample size 15 x 9 mm  
 Tilt range ± 5 degrees  
 Specimen holder dia. 58 mm  
 Weight 0.58 kg / 1.27 lb

**TargetDoser automatic dosing station**

Capacity 4 pumps for suspension/lubricant,  
 1 pump for OP-suspension,  
 1 pump for soap,  
 1 pump for alcohol

*Dosing Levels*

Suspensions 0.2-4.0 ml in 20 steps  
 All-in-one suspensions 0.2-12.0 ml in 20 steps  
 Lubricants 0.2-12.0 ml in 20 steps  
 OP-Suspensions 20.0-90.0 ml in 20 steps

*Software and electronics*

Controls Touch pads  
 Memory FLASH-ROM / RAM / NV-RAM  
 LC display 240x128 dots with back light

*Working environment*

Temperature 5-40°C / 41-104°F.  
 Humidity 35-50% RH

*Supply*

Voltage 24 V DC, 1 A supplied from TargetMaster

*Dimensions and weight*

Width 200 mm / 8"  
 Depth excl. bottle tray 210 mm / 8.3"  
 Depth incl. bottle tray 550 mm / 21.7"  
 Height 380 mm / 15"  
 Weight excl. bottle tray 8.5 kg / 18.7 lbs  
 Weight incl. bottle tray 10.0 kg / 22.0 lbs

**TargetX set-up station for hidden (internal) targets***Software and electronics*

Controls Touch pads  
 Memory FLASH-ROM / RAM / NV-RAM

*Working environment*

Temperature 5-40°C / 41-104°F.  
 Humidity 35-50% RH

*Supply*

Voltage / frequency 200-240V / 50-60 Hz  
 Power inlet 1-phase (N+L1+PE) or 2-phase (L1+L2+PE)  
 The electrical installation must comply with "Installation Category II".

Power, nominal load 50 W  
 Power, idle 10 W  
 Current, nom. 0.25 A  
 Current, max. 1.0 A

*Dimensions and weight*

Width 705 mm / 27.7"  
 Depth 385 mm / 15.1"  
 Height 285 mm / 11.2"  
 Weight 13 kg / 28.6 lbs

**TECHNICAL DATA****TargetZ set-up station for visible (external) targets***Software and electronics*

Controls Touch pads  
 Video display 15" TFT monitor

*Working environment*

Temperature 5-40°C / 41-104°F.  
 Humidity 35-50% RH

*Supply*

Voltage 24 V DC, 1 A supplied from TargetMaster  
 Video monitor 200-240V / 50-60 Hz

*Dimensions and weight*

Width 235 mm / 9.3"  
 Depth 315 mm / 12.4"  
 Height 205 mm / 8.1"  
 Weight 15 kg / 33 lbs

*Struers' equipment is in conformity with the provisions of the applicable International Directives and their appurtenant Standards. (Please contact you local supplier for details)*



*Coated sheet metal,  
 zinc layer gas bubbles.  
 Diameter ca 20 µm*

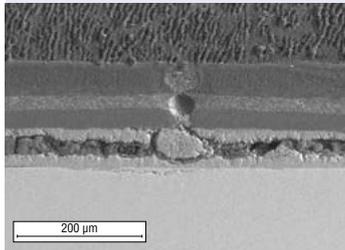
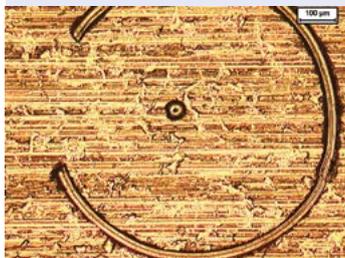
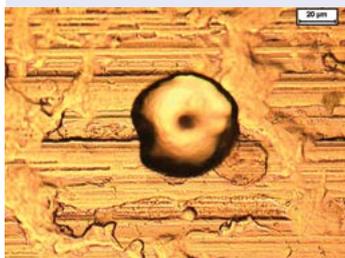


Photo courtesy: Volkswagen AG, Germany



*Chromium PVD layer on steel,  
 possible corrosion site, 50 x*



*Same as above, 500 x*

Photo courtesy: Corus Group, Netherlands

**SPECIFICATIONS****Cat.no.****TargetMaster**

200 mm micropolisher for automatic target preparation.  
 Tilttable holder for 30 mm specimens (05756916) and  
 200 mm MD-Disc (02426920) included.  
 Dosing system (05756904) is ordered separately.

05756128

**TargetGrip**

Tilttable specimen holder for 40 mm dia. specimens.  
 Tilttable specimen holder for 30 mm dia. specimens.

05756901  
05756916**TargetDoser**

Automatic dosing system for supply and storage of  
 process liquids and preparation methods.  
 With 6 pumps for suspension/lubricant, 1 pump for  
 OP-suspension.

05756904

**TargetX**

Set-up station for internal (hidden) targets.  
 For use with x-ray not included with TargetX.

05756923

**TargetZ**

Set-up station for external (visible) targets.  
 With 15" TFT video monitor.

05756922

**Sample chair**

40 mm Adapter for cross-sectioning (disposable).  
 Max specimen size 29 x 20.5 mm. 50 pcs.

05756908

30 mm Adapter for cross-sectioning (disposable).  
 Max specimen size 23 x 20.5 mm. 50 pcs.

05756914

**Sample Chair holder for CitoVac**

For easy handling of Sample Chairs.  
 For 6 x 30 mm and 5 x 40 mm Sample Chairs.

05926905

**Parallel holder**

40 mm dia. Adapter for parallel polishing (re-usable).  
 Max specimen size 19 x 18 mm.

05756910

30 mm dia. Adapter for parallel polishing (re-usable).  
 Max specimen size 15 x 9 mm.

05756920

**SEM Adapter**

Adapter ø40 mm to ø25 mm. Allows 25 mm/1" dia.  
 specimens to be mounted in ø40 mm TargetGrip.  
 Also used as removable SEM-fixture.

05756905

**Resin barrier**

Metal label for use with Sample chair (05756908 and  
 05756914). 50 pcs.

05756907

**Mould Insert 40 mm dia.**

Mould insert for use with 40 mm dia. mounting cups.  
 Max specimen size 35 x 20 mm. 50 pcs.

05756912

**Measuring pin**

For use with Parallel Holder. 10 pcs. with O-ring.  
 Re-usable

05756915

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