

*create your future*



Linear Motor Drive High Precision Wire-Cut EDM

# AP250L

# Oil Cutting Technology Since 1981



**330W**

1981 START

Tie bar cutting of  
cemented carbide

- IC lead frames
- Micro gears & molded gears
- Semiconductor metal mold components

Metal molds  
for optical fiber ferrules

1993

1998

2002

**150W**

**EXC100**

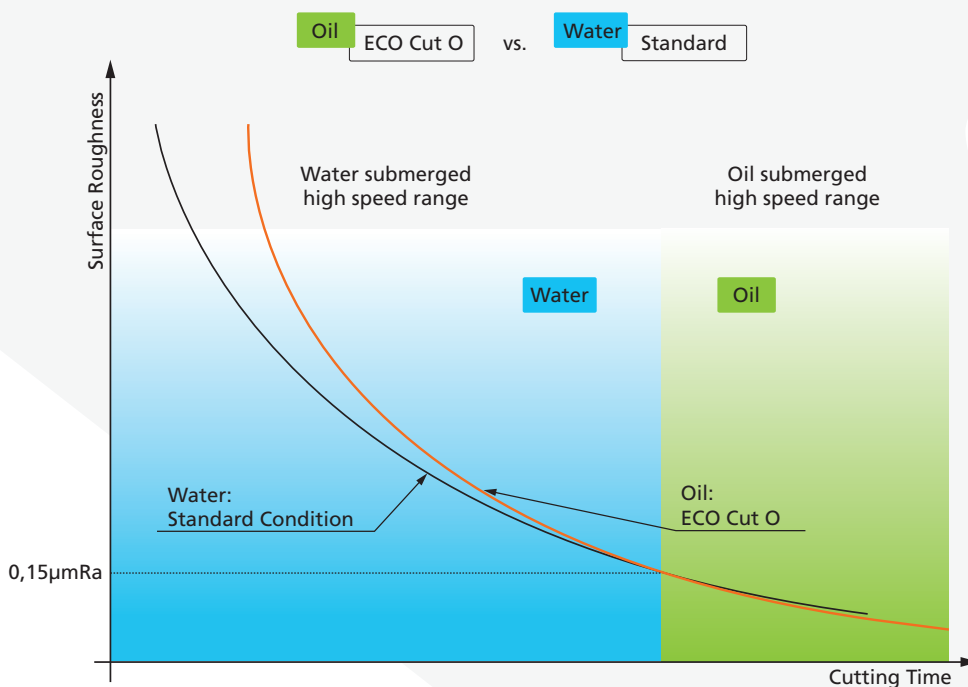


**AP200  
AP450  
AP150**

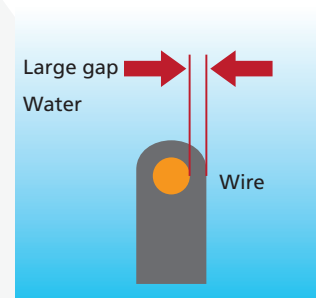
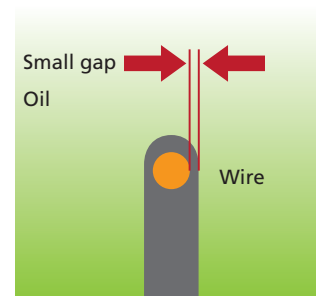
**AP200L**

*Eco Cut O: The Revolution – Oil Cutting Speed = Water Cutting Speed*

Sodick's latest innovation ECO Cut O makes it possible for Oil Dielectric to realize the same cutting speeds as Water Dielectric in achieving a surface finish of  $0.15\mu\text{mRa}$  and beyond.



Advantages of Cutting in Oil



Sodick has developed the cutting technology in oil dielectric since 1981. Wire EDM with Oil dielectric has always been the best solution for high-accuracy and high quality surface finish because of the smaller discharge (spark) gap. On the other hand, the smaller gap always had resulted in slower cutting speed. Thanks to Sodick's know-how and experience through years, Sodick has now developed a new generator "ECO Cut O". ECO Cut O realizes further improvement on cutting speed and number of cuts with oil dielectric. To achieve the surface finish of less than  $0.15\mu\text{mRa}$ , it requires the same cutting time as water dielectric.

## Core components for LED metal molds

Minute & fine component  
machining for watches

2009

2011

2012

2014

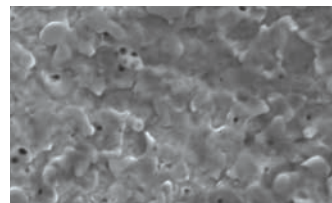
2017

# LINEAR MOTOR

**AP250L**  
with LP2W Controller

**AP250L**  
with SPW Controller

*Minimised Cracks*



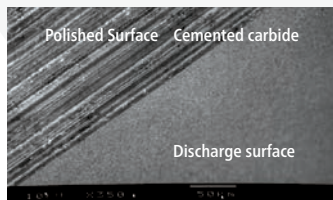
Minimised micro-cracks

The electric discharge energy control which Sodick has cultivated over the years minimizes cracks in cemented carbide.

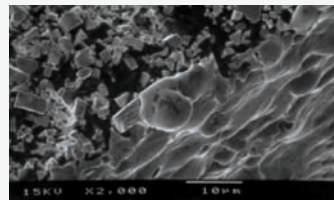
## Oil Machining Ideal for Cemented Carbide Machining

Oil machining prevents the depletion of cobalt which is the binder (binding material) included in the material of cemented carbide. Since a heat quenched layer is created by machining, the hardness increases and improves the life span of molds. Particularly, in final finishing, micro machining can be performed for cemented carbide with ultrafine particles in which micro cracks tend to occur.

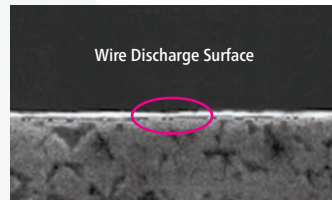
Oil Machined Surface



In water machining, decarbonization of the cobalt can be observed in cemented carbide.



Wire Discharge Surface

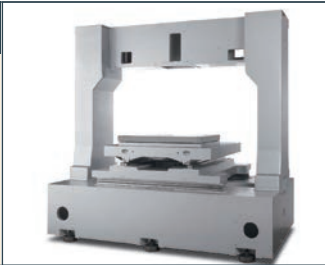


Accordingly, this is effective in increasing the number of shots of a press mold. The decomposed layer on an oil machined surface could be suppressed to  $1\mu\text{m}$  or less, which extends the life span of metal molds. Accordingly, this is effective in increasing the number of shots of a press mold.

*AP250L is ideal for high-precision parts manufacturing such as watch parts.*

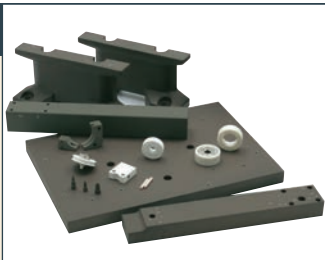


# Pursuit of the Highest Accuracy and Quality



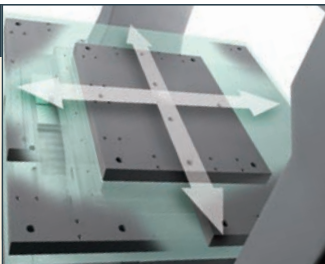
## *Thermally Stable Machine Construction*

The AP250L benefits from a symmetrical gantry design made from high quality Meehanite casting to create a highly rigid and thermally stable structure. The power supply has been separated from the work tank so that the heat generated does not adversely effect the machine's accuracy. Furthermore, the air and dielectric are circulated through machine construction to control the thermal influences.



## *Ceramic Components*

The AP250L is built using in-house made ceramic components for workstand, worktable, upper/lower arms etc. Ceramics has a low co-efficient of thermal expansion, light in weight, high rigidity, resistant to ageing and high electrical insulation properties, therefore an ideal material for accuracy, stability, efficiency and quality. These are the fundamentals of a class leading Wire EDM machine.



## *Fully Supported Table Design*

The machine table has been configured so the table is fully supported over the full stroke of the axis movements, thus ensuring high accuracy and stability by the well-planned design.

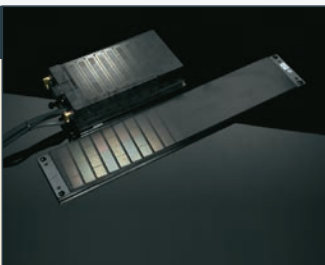


## *Cross Roller Guide*

To complement the linear motor drive performance, cross roller guides are employed on AP250L.

Advantages of cross roller guides:

- Excellent weight bearing capability
- Minimal drag effect
- Pre-tensioned = Zero lost motion



## *Linear Motor Drive*

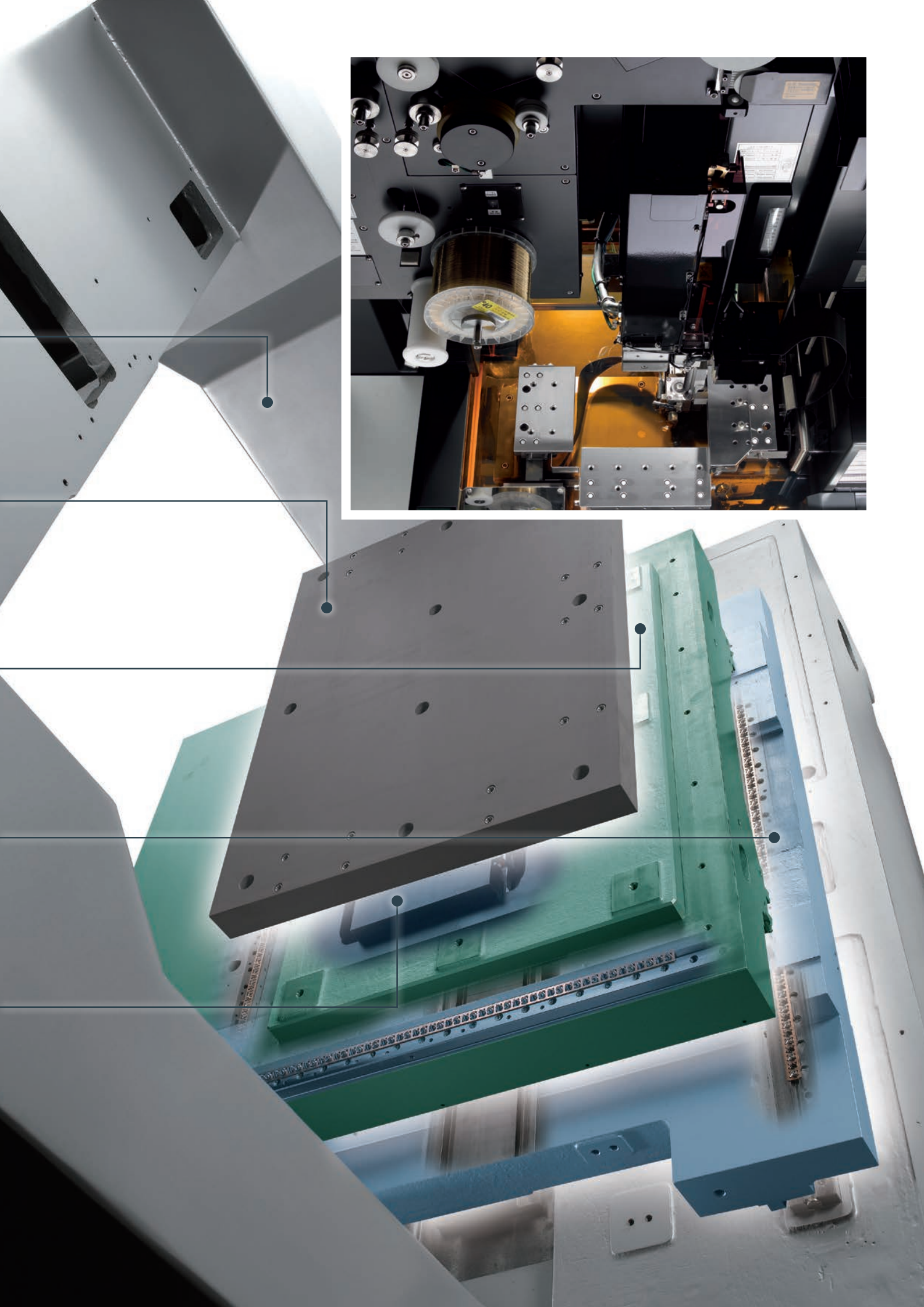
Linear motor is a direct, vibration free drive with unrivalled acceleration, positioning accuracy and no backlash which is an ideal device for high-precision applications. Its high dynamic responsiveness, stability for precision machining and performance do not diminish over time and remain maintenance free. The accuracy of linear motor is guaranteed for 10 years after the installation.



## *The new "SPW" Controller*

The new generation electrical discharge technology "SPW" with 19-inch operation panel has adopted the "Perfect Active Control," enabling simultaneous control of highspeed electrical discharge and axis-movements by using serial communication technology of 1 Gbit/sec.







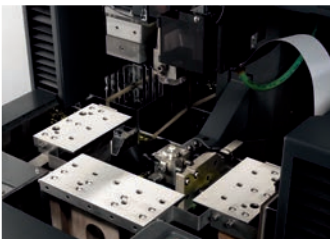
### *Automatic Wire Threader*

Sodick's high speed automatic wire threader "FJ AWT" with thermal cut is compatible with wire diameters from 0.05 to 0.20 mm. The used wire is ejected to the rear of the machine, which permits the lower arm to be shorter in design, further enhancing the machine's accuracy.

The machine can be further tailored to meet exacting requirements with the 0.03 mm diameter wire option (Factory Option Only).

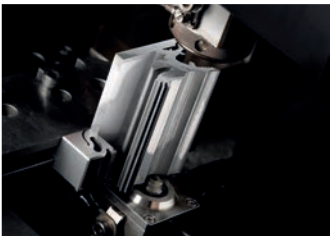
### *Wire Tension Control*

An important mechanism in the efficient and trouble-free operation of the AP250L is the Advanced Wire Tension System which delivers smooth, reliable spooling and versatility in operation, covering a wide range of wire diameters from 0.05 to 0.20 mm. The machine can be further tailored to meet exacting requirements with the 0.03 mm diameter wire option (Factory Option Only).



### *3-sided Automatic Tank Door*

3-sided automatic drop tank enables easier access to work-tank from both sides of the machine, ensuring ergonomically user-friendly operation. A further benefit of the 3-Sided work-tank door is the simplified installation of a Robot (Option) which can be positioned on the left hand side of work-tank.

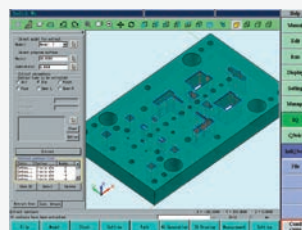


### *Super PIKA-O*

"Super Pika-O" is the super finish circuit which Sodick has developed for Wire-cut EDM with oil dielectric. It minimises machining energy, resulting in an excellent surface finish which significantly reduces and in some cases eliminates the need for subsequent polishing and other finishing operations.

### *Intelligent Q3vic EDW*

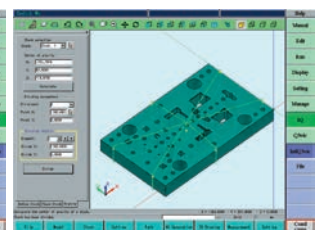
Intelligent Q3vic EDW directly imports 3D models and extracts automatically cutting contour to be machined by the Wire EDM within seconds. Even work pieces with a complicated shapes and different cutting heights can be programmed using only a single command. After the surfaces to be machined have been recognized, a NC programme is generated including all cutting parameters. A full on screen simulation is possible prior to machining. Intelligent Q3vic can also advise the operator of the best clamping positions to minimize the distortion of workpiece.



Automatic recognition of machining profile



Automatic programming of machining profile

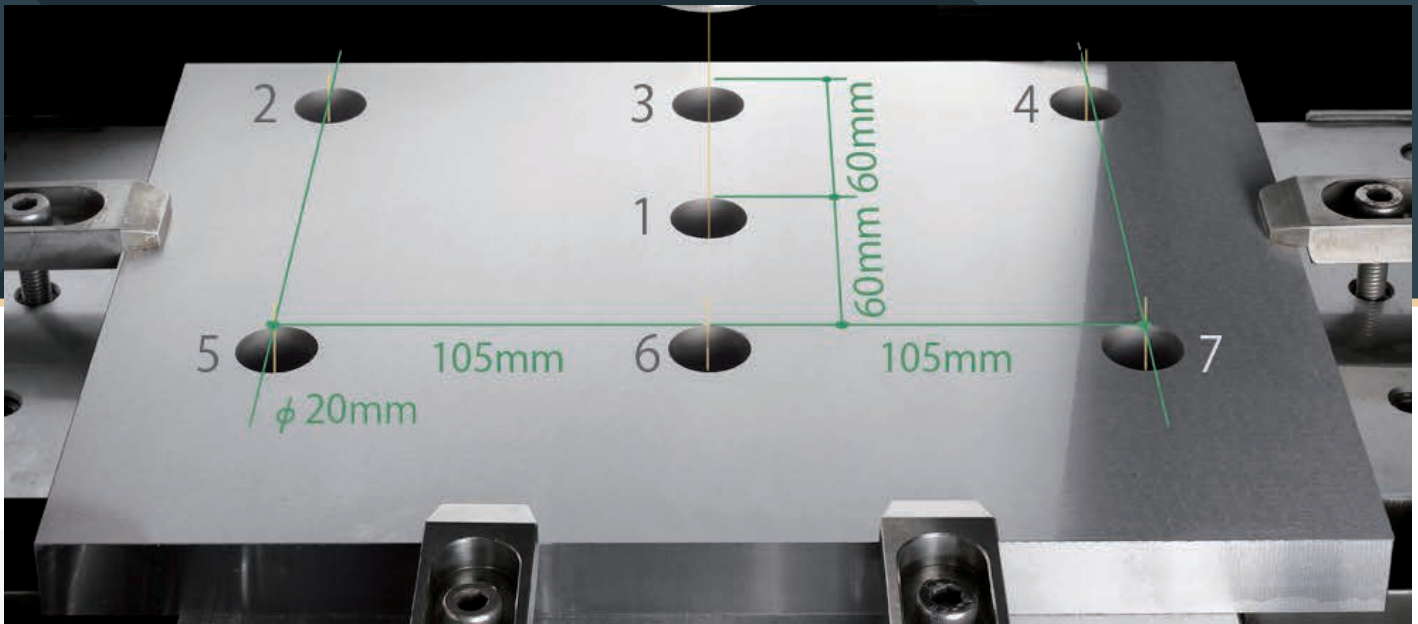


Automatic calculation of the center of gravity to display the optimum clamping position

### *Additional Z-axis Stroke*

Additional Z-axis stroke of 100 mm is available for the AP250L as a factory option. (Total Z-axis travel = 220mm)

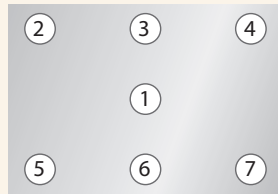




### High accuracy plate machining

### Superiority of oil machining

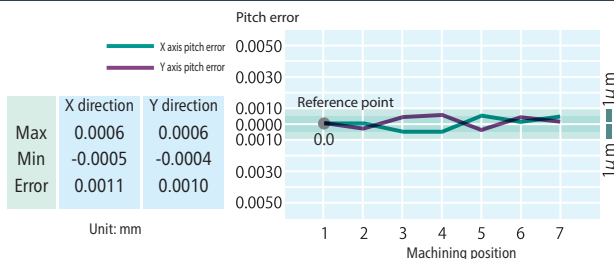
Material	Steel
Workpiece dimensions	300 × 220 × 20mm
Surface roughness	Ra 0.09 μm, Rz 0.93 μm
Wire diameter	0.2 mm
Machine	AP250L



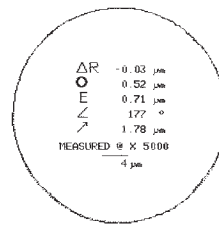
Oil machining is excellent for micro machining, and improves the surface roughness and shape accuracy.

Since there is no electrolytic solution used, no electrolytic corrosion occurs in cemented carbide machining which improves the life span of metal molds, and is effective at greatly increasing the number of shots.

### Pitch accuracy: ±1 μm or less



### Roundness



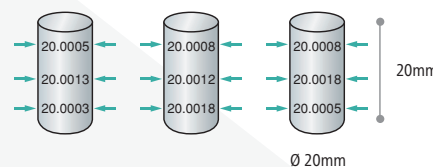
Roundness	0.52μm
Measuring device	Roundness measuring instrument (Taylor Hobson)

### Shape accuracy

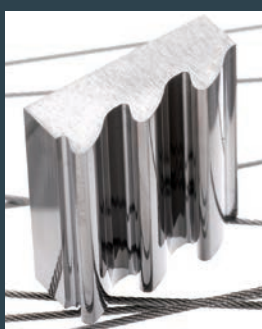
Points	Measured Size	Error	Measuring device	3D measuring device (Zeiss)
1	Ø 20.0006	+0.0006	Target size	Ø 20 mm
2	Ø 20.0002	+0.0002		
3	Ø 20.0004	+0.0004	Shape accuracy of each hole	±1 μm
4	Ø 20.0006	+0.0006		
5	Ø 20.0005	+0.0005		
6	Ø 20.0008	+0.0008		
7	Ø 20.0008	+0.0008		

Unit: mm

### Straightness: 1 μm or less



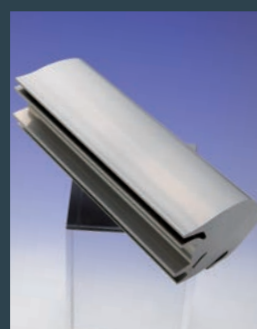
### High quality finish surface machining



Material	Cemented carbide
Thickness	15 mm
Surface roughness	Ra 0.006 μm, Rz 0.057 μm
Wire diameter	Ø 0.1 mm
Machine	AP250L

### Very thick material: 100 mm

### High-accuracy high quality machining



Material	Cemented carbide
Thickness	100 mm
Surface roughness	Ra 0.02 μm, Rz 0.15 μm
Straightness	1.0 μm or less
Wire diameter	Ø 0.2 mm
Machine	AP250L

## Specifications

Machine	AP250L
Max. workpiece height (WxDxH)	400 x 270 x 100 mm
Max. workpiece weight	80 kg
X/Y/Z axis travel	250 x 150 x 120 mm
U x V axis travel	35 x 35 mm
Taper angle (Work. thickness 100mm)	$\pm 7^\circ$
Wire diameter	$\varnothing 0.05 - \varnothing 0.20$ mm ( $\varnothing 0.03$ mm optional)
Wire tension	3 ~ 18N
Max. wire speed	250 mm/sec.
Distance from floor to table top	1,080 mm
Machine tool dimensions (W x D x H)	1,875 x 2,690 x 2,105 mm (incl. power supply, dielectric tank, and wire bucket)
Machine weight	3,730 kg (Incl. CNC and Dielectric tank)
Total power input	3-phases 50/60Hz 10 KVA

### Dielectric tank

External dimensions (W x D x H)	1050 x 1310 x 1600 mm
Dielectric fluid	Oil
Dielectric fluid capacity	375 liter
Fluid filtration method (Oil)	Replaceable paper filter (Two inner pressure cylinder type)

### Standard Features

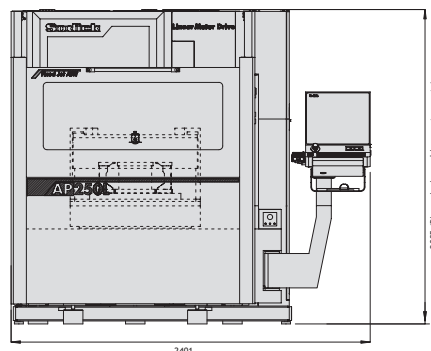
ECO Cut O	Super PIKA O
Thermally stable machine construction	Tension servo
1 Gbit/sec communication technology	FT II (Fine Pick-up Function)
Energy saving circuit	Linear Motor (X,Y,U,V axis)
Dielectric cooling unit	Linear scale (X,Y,U,V axis)
AWT (Automatic Wire Threader) (Air pressure 0.5 MPa is required)	Ceramic Components

The dielectric chillers on Sodick machines contain either fluorinated greenhouse gas R410A or R407C.

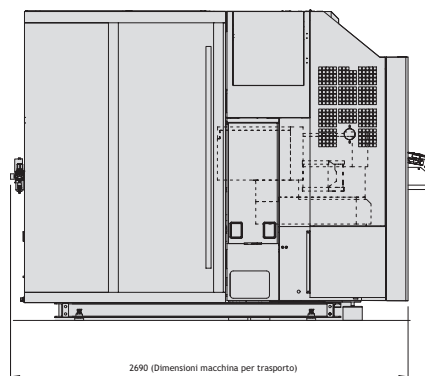
Machine specifications are subject to change without prior notice.

## Floor Layout

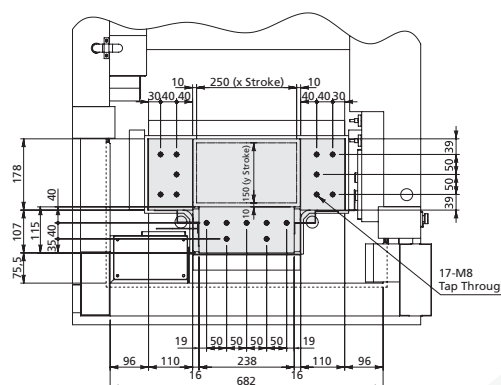
### Front View



### Side View



### Work Table



All the CE machines have external transformer with dimension of approx. 650 x 460 x 540 mm



Sodick Europe Ltd.

Agincourt Road  
Warwick, CV34 6XZ  
United Kingdom

create your future

Sodick Contact

Phone +44 (0) 19 2669 8888  
email [europe@sodick.eu.com](mailto:europe@sodick.eu.com)  
online [www.sodick.org](http://www.sodick.org)