

Metkon Application Note

Metallographic preparation of electrical connection pin

- 1. INTRODUCTION**
- 2. APPLICATION REQUIREMENTS**
- 3. SAMPLE PREPARATION PROCESSES**
- 4. RESULT**

An electrical connector is an electro-mechanical device for joining electrical circuits as an interface using a mechanical assembly. Connectors consist of plugs (male-ended) and jacks (female-ended). The connection may be temporary, as for portable equipment, require a tool for assembly and removal, or serve as a permanent electrical joint between two wires or devices. An adapter can be used to effectively bring together dissimilar connectors. There are hundreds of types of electrical connectors. Connectors may join two lengths of flexible copper wire or cable, or connect a wire or cable to an electrical terminal.

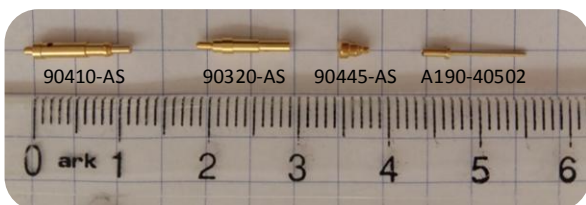
In computing, an electrical connector can also be known as a physical interface (compare physical layer in OSI model of networking). Cable glands, known as *cable connectors* in the US, connect wires to devices mechanically rather than electrically and are distinct from quick-disconnects performing the latter.



Samples for applications:



Material of samples: *body*: brass, *piston*: bronze, *spring*: stainless steel

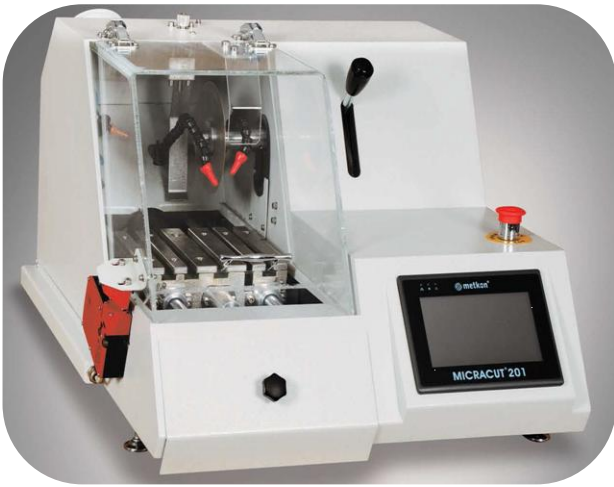


For grinding



For cutting

SECTIONING



MICRACUT 201

Automatic High Speed Precision Cut-off Machine, Programmable with 5,7" HMI touch screen control, with Siemens PLC control unit, coloured LCD display of cutting parameter. Moving table feed system, compact cutting motor, with variable cut-off wheel speed from 500 to 5000 rpm, automatic feeding with adjustable feed speed, motorised positioning system with digital readout on the LCD, library of cutting programs for different materials, Ability to mount diamond cup grinding wheel for thin section applications with built-in recirculation cooling unit, complete and ready for operation. Without clamping tools and specimen vises. 230 V, 50 Hz, AC. Includes a standard set of cutting consumables composed of;

- *1 pc. Diamond cutting Disc 200 mm dia.
- *10 abrasive thin cut-off wheels 200 mm dia.
- *1 lt of Metcool II cooling fluid.

	Order Code	Description
Equipment Used	17 06	MICRACUT 201
Clamping Device	GR 0548	Quick acting clamping vise assembly
	GR 0430	Specimen vise
Cooling Fluid	19 905	METCOOL II Cooling Fluid, 1 lt.
Cutting Disc	19-200	DIMOS Ø200
Accesories	GR 0410	Flange set Ø 75mm

HOT MOUNTING



ECOPRESS 100

Programmable Automatic Mounting Press with one cylinder, 5,7" HMI touch screen control, with Siemens PLC control unit, programmable with coloured LCD display, program based mounting sequences, electro hydraulic pressure (requires no air), pressure upto 300 bar, temperature upto 200 0C, operation time upto 59:99 minutes, short cycle time, thermostatically controlled heating power of 1250W, automatic cooling cycle with two three modes of cooling rates(fast standard cooling,slow cooling and based on time), programmable preheating and preloading, selectable mould sizes from 25 mm to 50 mm, audible warning signal, ready for operation. 230 V, 1-phase, 50 Hz. Mould assemblies are ordered seperately. Includes a standard set of mounting consumables composed of 3 different hot mounting compounds; 1 kg of each and a total of 3 kg.

	Order Code	Description
Equipment Used	25 07	ECOPRESS 100
	26 06-02	Mould Assembly, 40mm
Mounting Powder	29-010	NET - Acrylc

COLD MOUNTING



	Order Code	Description
Hardener	29 506	EPOXY hardener
Resin	29 505	EPOXY Resin
Accessories	29-555	Embedding form Ø40

GRINDING



DIGIPREP 251

Programmable with coloured 5,7" HMI touch screen control, with Siemens PLC control unit. Base Unit with large 0,75HP Motor, Variable wheel speed 50-600 rpm, Quite belt drive, Complementary or Contra rotational direction, Soft Start and Stop function, Retractable water hose, with water supply and drain tubes. sample preparation parameters, central and/or individual force application, steel mounting column, with variable specimen holder speed 50-150 rpm, 100 Watt DC motor, LED lighting, quick-locking swing mounted design, audible warning signal, with holding chuck. Air supply tubes, Complete and ready for operation. Without Specimen Holders.

230 V, 1-phase, 50 Hz.

Includes working kit "250 mm Aluminium wheel and splash guard",

Includes the following standard set of consumables;

*Special Magnetic Foil, Ø 250 mm.

*Thin Metal Plate(1 pcs), Ø 250 mm

*Magneto grinding disc 18 mic., 250 mm dia.

*An assortment of 5 polishing cloths 250 mm dia.

*Diamond suspensions one of each of 6 mic. and 1 mic., plus lubricant

	Order Code	Description
Equipment Used	45 03	DIGIPREP 251
	45 60	LEVOMAT Specimen Loading Fixture, to level the specimens within the central force specimen holders, without specimen loading
Accessories	31 22	Aluminum Disc, 250 mm
	31 63	Splash Guard, 250 mm
	39-003-250	Ø 250 mm, Special Magnetic Foil
	39-093-250	Ø 250 mm, Thin Metal Plate(5 pcs)
	45 10	Specimen Loading Plate Ø 130 mm (for LEVOMAT)
Sample Holder	45 13	Clamp type specimen holder, Ø130mm, 4 specimens with Ø40 mm.

SAMPLE PREPARATION PROCESSES

First, Samples that in the “mounting” category mounted with hot mounting and cold mounting method.

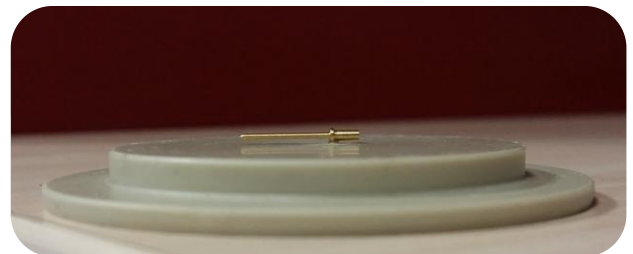
** Some samples were molded by cold mounthing method because they are very sensitive to pressure.



Hot mounting parameters;

Heating Temperature : 190°C
Pressure : 260 bar
Heating Time : 3 mins.
Cooling Type : Slow cooling for acrylyc (Open:5 sec., Close:30 sec.)
Cooling Temperature :35°C

At the cold mounting method, the samples arranged to embedding form and prepared mixture poured into.



Cold mounting parameters;

5 part resin and 1 part hardener mix for 3 min. Curing time is 8 hours.

Samples of “cutting” category, they were mounted as the others also. Some of them supported with higher parts for decrease the pressure.



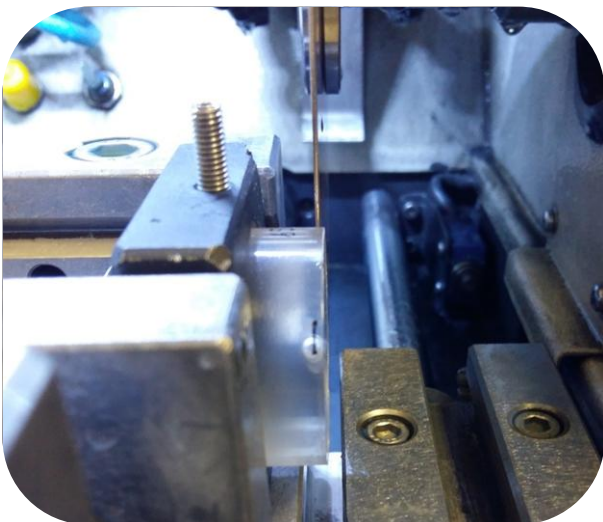
With the help of 0548 quick acting clamping vise and GR 0430 specimen vise samples clamped properly.



GR 0430



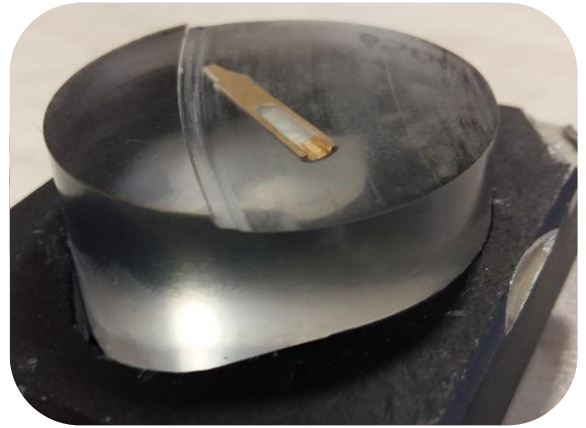
GR 0548 & GR 0430



Cutting parameters;

Feedrate; **50 μ / s**
RPM; **3000 d/min**

Result of the cutting, samples did not cut properly because cut-off part broke from the main sample when the pin cutting finished.



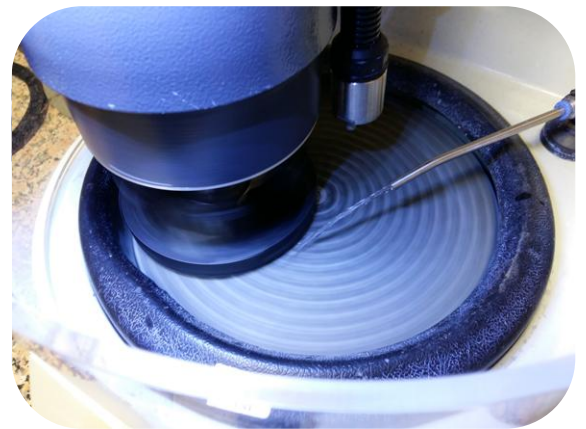
After the unsuitable cutting operation, all samples, grinded with DIGIPREP 251. In addition, the depth of the z-axis measuring system was chosen for this operation.

Firstly, samples diameters have measured with the micrometer. (e.g. 90410-AS: 2mm)

Secondly, the samples grinded step by step for up to middle point.

(e.g. middle point: 1 mm → 0,60mm with MAGNETO 125 μ
0,35mm with MAGNETO 54 μ
0,05mm with MAGNETO 18 μ)

Total grinding time is ~9min for per sample.

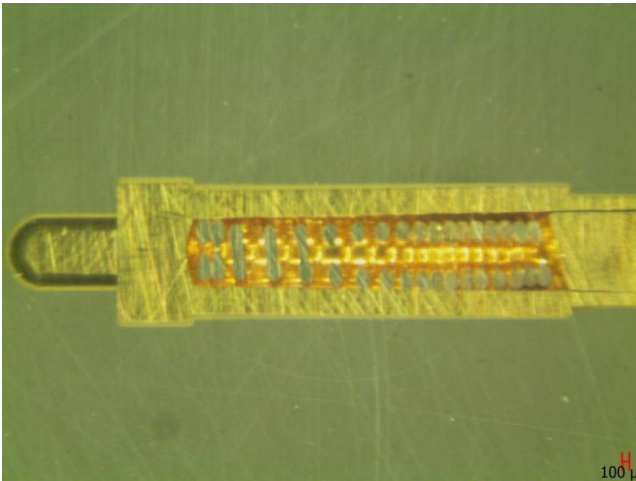


Samples have been prepared with the parameters below;

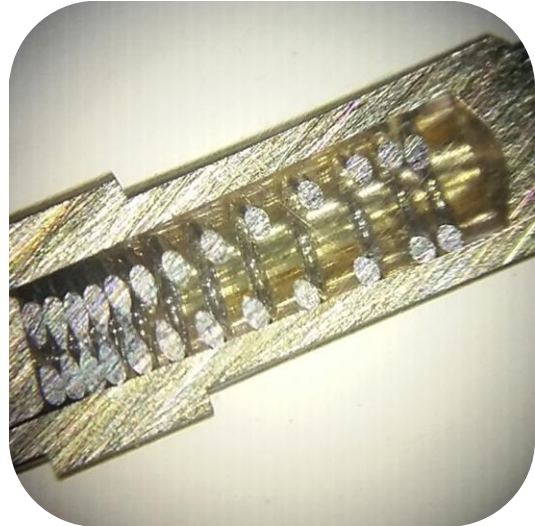
	<i>Surface</i>	<i>Abrasive</i>	<i>Lubricant</i>	<i>Force(N)</i>	<i>Time(min.)</i>	<i>Disc Speed(rpm)</i>	<i>Automatic Head Speed(rpm)</i>
Grinding Step 1	MAGNETO [-]	125μ Diamond	Water	50 N	1 min.	250 CW	100 CCW
Grinding Step 2	MAGNETO I [38-040-054]	54μ Diamond	Water	90 N	3 min.	250 CW	100 CCW
Final Grinding	MAGNETO II [38-040-018]	18μ Diamond	Water	120 N	5 min.	250 CW	100 CCW

As result, we have experienced that cutting operation is not feasible for that application, so all the samples have been grinded to the half and results can be seen at below.

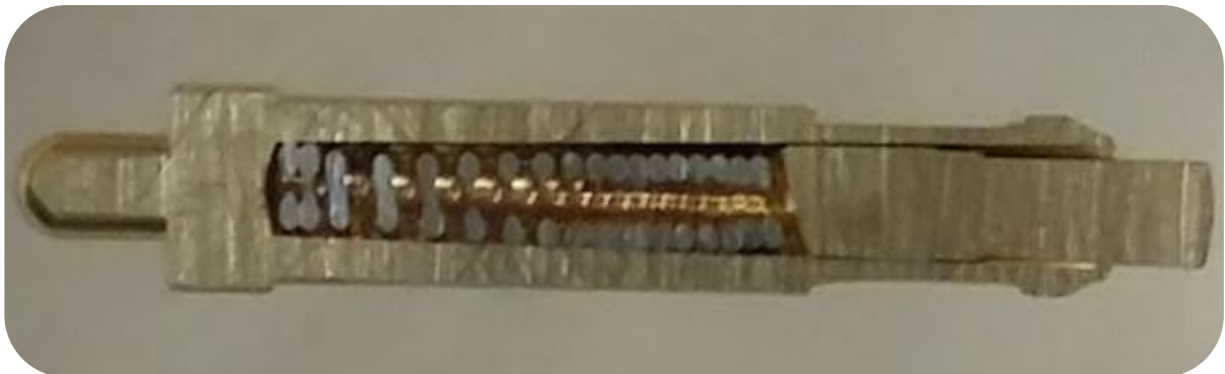
90410-AS:



6.5x stereo

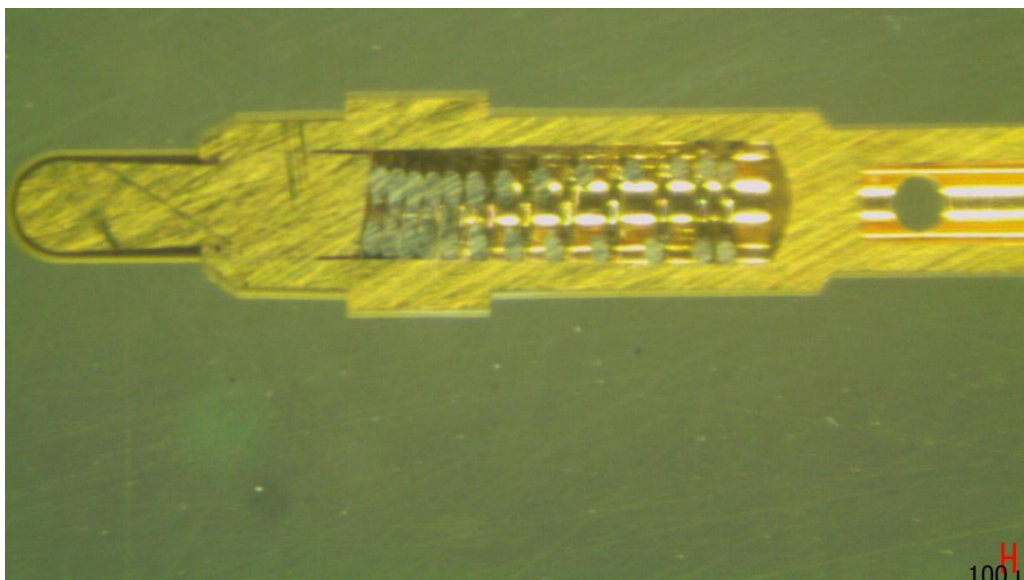


Macro



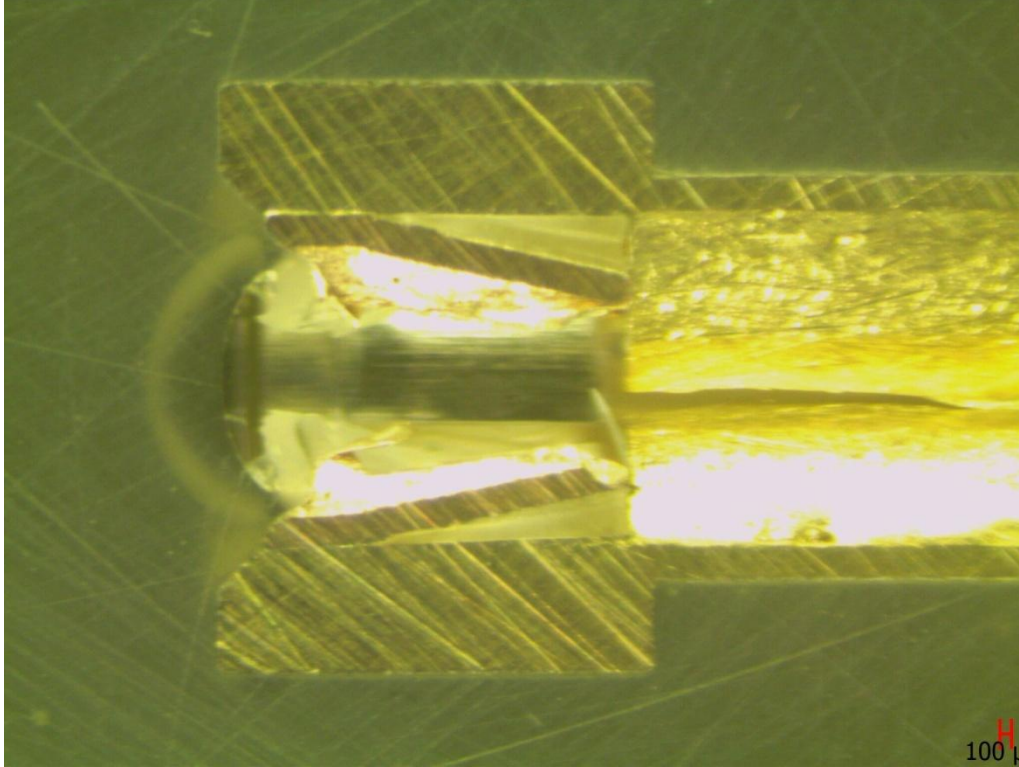
Macro

90320-AS:



6.5x

90421-AS:

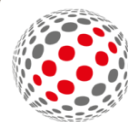


6.5x



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Technology behind Specimen