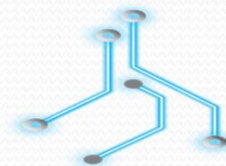


# KEY ELECTROCHEM LIMITED CO. (KEYEC)

CORE PRODUCTS & SERVICES



2/F Don Gesu Building, Don Jesus Blvd, Cupang, Muntinlupa, 1770 Metro Manila Philippines  
Email: [edmund@keyelectrochem.com](mailto:edmund@keyelectrochem.com) ; [albert@keyelectrochem.com](mailto:albert@keyelectrochem.com) ; [larome@keyelectrochem.com](mailto:larome@keyelectrochem.com)  
Contact No: +639178421717 / +639338255892 / +639178538290 / +639171368673



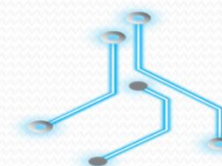
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Key Electrochem Limited Co



# KEY ELECTROCHEM LIMITED CO. PRODUCT INTRODUCTION

## ■ Product Line / Services

- PDLC Coating (PURE DIAMOND LIKE CARBON COATING)
- MPC Metal Polishing “Magic” Cloth
- Rubber Sheet And Mold Conditioner
- Precision Tooling





# KEY ELECTROCHEM LIMITED CO. PRODUCT INTRODUCTION

**KEY ELECTROCHEM LIMITED CO.** and partners with a BOI promoted credible institution in abroad serving major electronics manufacturing industrial parks and hard disk manufacturing MNCs would like to introduce our company's state of the art specialization in **VACUUM COATING of PDLC**.

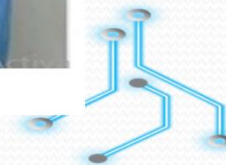
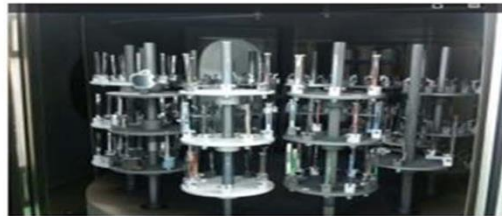
Pure DLC Coating (*Tetrahedral Amorphous Carbon Coating*) which is the *hardest and purest form of DLC (Diamond Like Carbon Coating)* in the world, noted to be the one of the best surface coating for wear and tear protection on precision tools.

## INTRODUCTION

The industry that we serves includes:

1. Hard Disk Drive Manufacturing
2. Semiconductor Assembly
3. Electronic Manufacturing Service Providers
4. Plastic Injection Molding
5. Precision Tools Fabrication

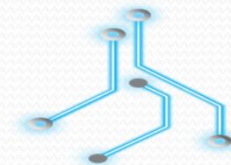
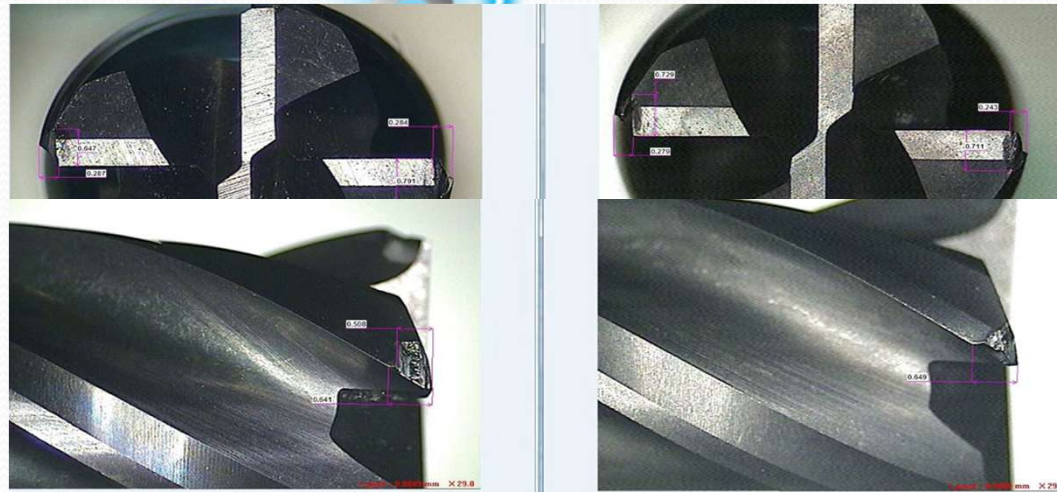
As a technology company, we strive to provide customers with state of the art thin film coating service  
And to be the best... meaning we do not compromise our quality and after sales service.



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# PDLC Coating (PURE DIAMOND LIKE CARBON COATING)



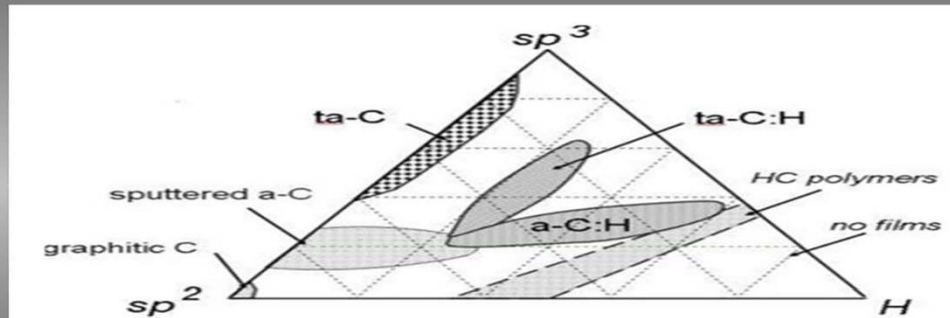
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## PDLC Coating (PURE DIAMOND LIKE CARBON COATING)

### What is PDLC Film?

Diamond Like Carbon, commonly known as DLC, consists of 7 sub-series. Each series has different tribology properties which is the hardest and purest form of DLC coating is the **ta-C** film, which we name ours **PDLC**.

Due to the superior hardness of **PDLC (ta-c)** and also its low coefficient of friction, **PDLC (ta-c)** is the best film to combat cold welding, abrasion wear, material diffusion. It is commonly applied on cutting tools, sliding parts, precision tool and die to help extend the tool service life.



### Commonly Available PVD Film.

- There are various types of PVD coating which is commonly applied on tools and parts to enhance tool life, corrosion resistance, wear and tear. However, each film has its own characteristics and they are very often selectively applied on different application.

Film Name	PDLC (ta-C)	CrN	TiN	AlTiN	TiCN	CrC	WCC
Film Type	Carbon Based	Metal Based (Chrome Nitride)	Metal Based (Titanium Nitride)	Metal Based (Aluminum Titanium Nitride)	Metal Based (Titanium Carbon Nitride)	Carbon Based (Chromium Carbon)	Carbon Based (Tungsten Carbide Carbon)
Typical Thickness	1-2um	2-3um	1.5-3.5um	>3um	1.5-2.5um	1.5-3um	1.5-3um
Hardness (Micro Vickers Hardness)	3500-5500HV	1700-2000HV	2300-3000HV	3000-4000	3000-4000	1000-1500	1500-2500
Coefficient of Friction	0.1	0.3	0.4	0.6	0.4	0.4	0.2
Coating Temperature (Degrees C)	<180	>400	>400	>500	>400	<200	<200
Max. Working Temperature (Degrees C)	350	700	600	800	400	350	300

### KEYEC PDLC Film specification

Film Properties	PDLC (ta-C)	Typical DLC (a-C:H)
Diamond bonding structure	Approx. 85%	Approx. 25%
Density (g/cubic cm)	3.9	2
Max Hardness (Gpa)	Approx. 37	Approx. 15
Coefficient of Friction	< 0.1	Approx. 0.14
Coating Temperature (°C)	< 180	Approx. 200
Working Temperature (°C)	350	350
Typical Thickness (nm)	1 to 2	1 to 2



# PDLC Coating (PURE DIAMOND LIKE CARBON COATING)

## PDLC Film Characteristics 1:

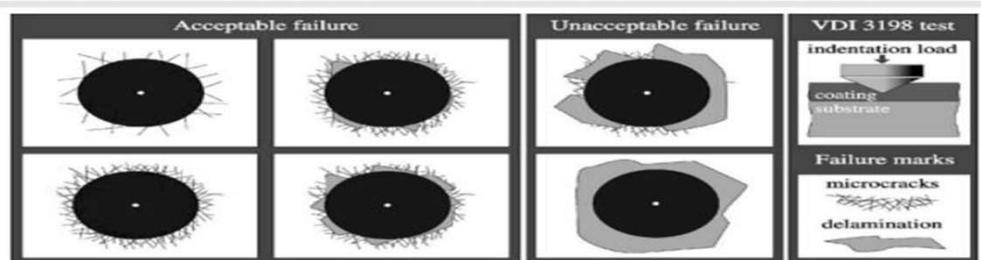
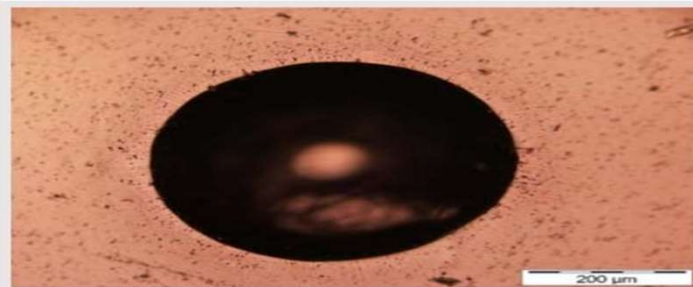
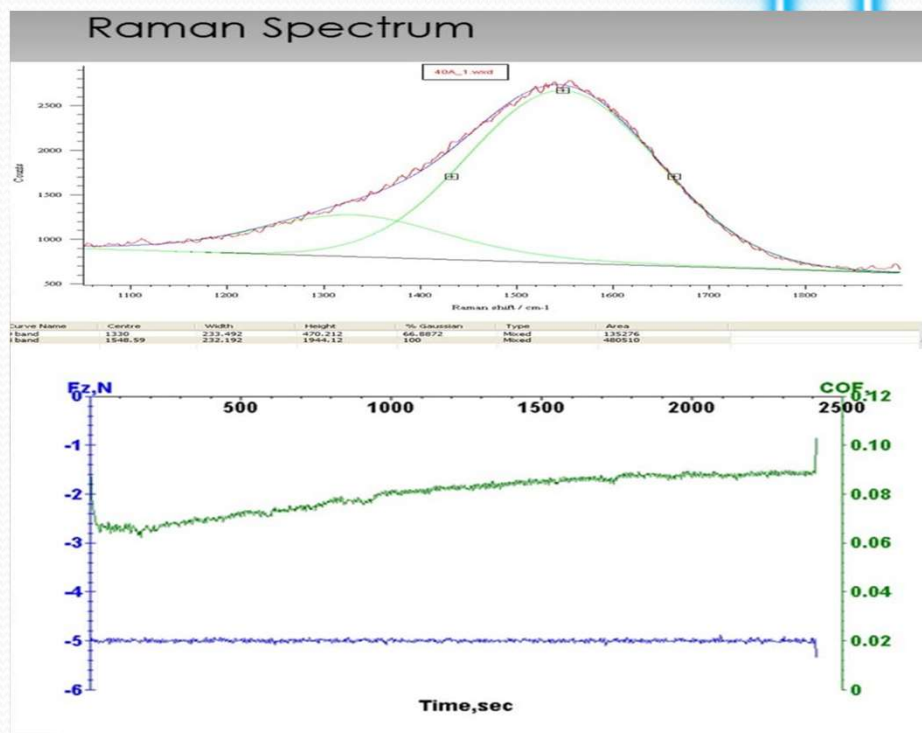


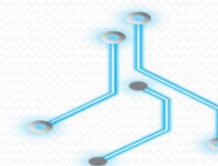
Fig. 1. The principle of the VDI 3198 indentation test.

PDLC Film Adhesion test result shows excellent bonding strength between film and base material, test result displays HF1 bonding strength.



Raman spectra with Gaussian peak fitting of ta-C coating. The spectrum consists of two peaks centered at 1330 cm<sup>-1</sup> (D band) and 1548 cm<sup>-1</sup> (G band) respectively. The Id/Ig ratio is approximately 0.25. The broadening of the lines is attributed to an amorphous structure of the films.

PDLC film exhibits low coefficient of friction at 0.09. Lower COF contributes to slower wear and tear.



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## PDLC Coating (PURE DIAMOND LIKE CARBON COATING)

### Typical PDLC Application:

#### PDLC On Machining Tools for Cutting Non Ferrous Material

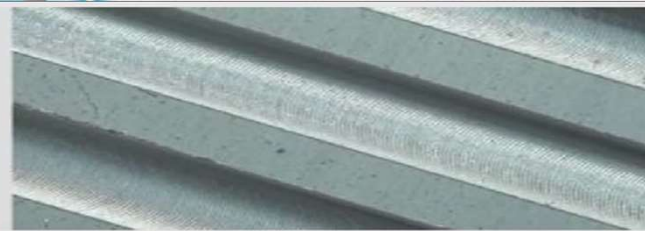
UNCOATED



COATED



- Better chip evacuation



Smoother machined surface on product

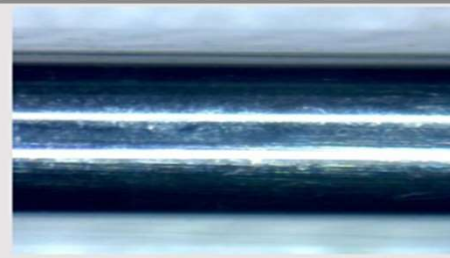
Dry Cutting (Aluminum 2000 series), Spindle Speed 10,000 Rpm, 6mm End Mill, Feed rate 280m/min, Depth 4mm

**PDLC can be coated on Taps, End Mills, Form Tools, Drills to enhance tool life, lowers manufacturing cost and reduce machine down time**

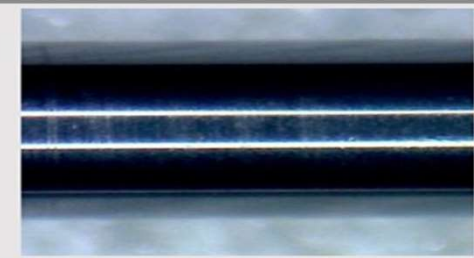
### Moving Components for Precision Fixtures



Pilot pins and locating pins with PDLC



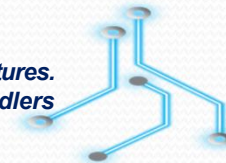
Typical DLC Surface after 100K strokes



PDLC surface After 350K strokes

- CD 650 Carbide Pins, no lubrication allowed

**Low deposition temperature, low COF and high hardness makes PDLC ideal for small and precise sliding parts in precision fixtures. Especially in cleanroom manufacturing environment, metal particles contamination are greatly reduced when endeffectors, handlers and moving are coated with PDLC.**



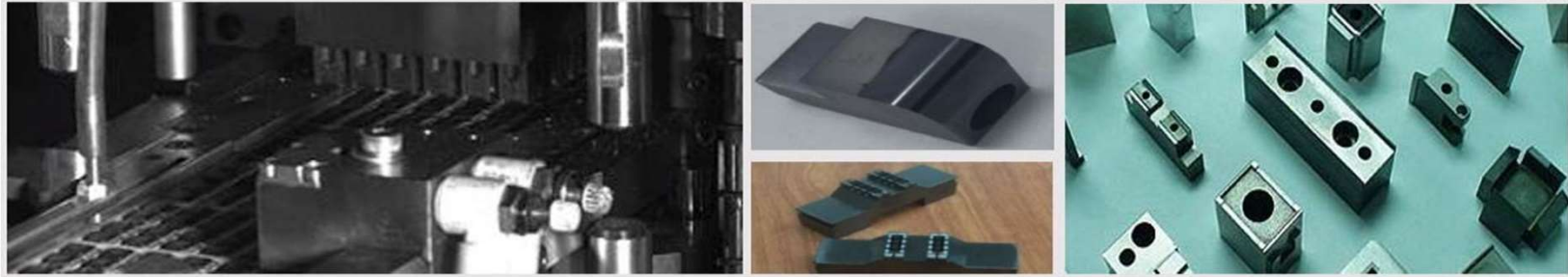
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## PDLC Coating (PURE DIAMOND LIKE CARBON COATING)

### Typical PDLC Application:

#### Semiconductor Packaging ( Trim & Form )



*Due to PDLC's low coefficient of friction, chemical inertness and high hardness, the coated surface is highly resistance to metal diffusion. Punches and dies will have lesser sticking which results in lesser functional rejects, high productivity and production yield.*

#### PDLC for Plastic Injection Molding



*PDLC promotes mold flow, high resistance to gas corrosion, wear and tear caused by high Glass Filler enhanced res ins, it also promotes mold release in many dry molding application. DLC is widely recognized as FDA friendly and being commonly found in food drug packaging application.*

Features of Pure DLC: High Hardness, Low Stress, Low Coefficient of Friction, Biocompatibility, Chemical Inertness, Anti Corrosion

Benefits Pure DLC: Reduce Cost for Cutting of Non Ferrous Metals, Enhance Tool Life Sheet Metal Forming, Anti Corrosion and Improves Mold Filling for Plastic Injection Molding, Reduce Wear for Sliding components

Serving Industries: Hard Disc Drive Industry, Semiconductor Packaging, Plastic Injection Molding, Sheet Metal Forming & Stamping PCB Manufacturing



# PDLC Coating (PURE DIAMOND LIKE CARBON COATING)

## Typical PDLC Application:

### Automotive Engine Components



Low COF and high hardness provides good wear resistance for sliding wear application

### Trim and Form tools



High resistance to material diffusion makes ta-C ideal for semicon trim and form punches.

### Cutting Tools (Ideal for machining non ferrous material)



At only 0.001mm thickness, PDLC provides a super hard and smooth layer on precision cutting tools to prolong tool life.

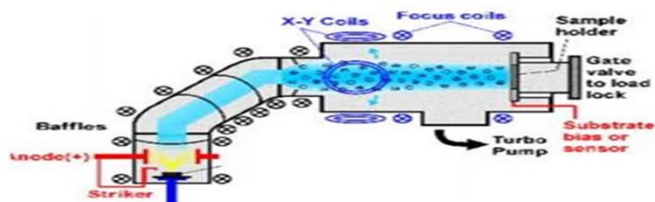
### Plastic Injection Molding



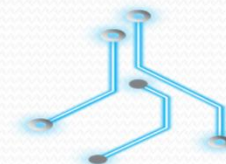
PDLC provides self lubrication for mold release due to its low COF and good sliding properties. Minimize distortion and improves mold flow.

## Products and Services

- Our core business activity is to provide a super hard carbon vacuum coating services Cathodic Vacuum Arc process in Thailand. Currently such technology is only available in Japan, USA and Singapore.
- Our deposition process is a "GREEN" process that will not cause any contamination, will not emit any harmful substances or radiation which is harmful to our employees' health and it is non hazardous to the environment.
- Our film deposition method, DCFVA Coating:



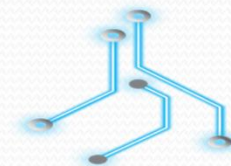
- DCFVA stands for Direct Current Filtered Vacuum Arc
- It is a simpler process of depositing hard carbon coating using hybrid process of Arc and Sputtering
- Energy of ions can be tuned and adjusted by an integrated Ion Beam to produce different hardness and multilayer PDLC (ta-C) coating.



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# Metal Polishing “Magic” Cloth MPC



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# MPC Metal Polishing “Magic” Cloth

## Introduction:

" MPC Metal Polishing “Magic” Cloth is a revolutionary new polishing cloth that replaces a full shelf of liquid paste and power cleaners. It not only cleans and polishes metals surfaces but at the same time removes rust, stains, starch built up, scuff and bum marks. Even bad corrosion on metal surfaces. MPC can do the job and yet maintaining shines and smoothness surfaces.

## Cleaning Procedures:

MPC" is ready for immediate use. Simply follow the following instructions for best results.

- NEVER USE ON WET SURFACES.
- Clean metal surfaces with dry cloth to remove dirt prior applying "MPC".
- Cut a small piece (depending on your needs) of MPC from the sheet.
- Apply a small section of "MPC" to the metal surfaces to be cleaned and wipe with clean dry soft cloth.
- Repeat until the entire area is polished.

## Note:

- MPC contains protective chemicals and wax and penetrate into the pores of metal, leaving a wax coating. The polished metal surfaces refrains from being rust again for much longer period.
- NEVER wash "MPC" with water and any other solution! By doing that, it will lose all it's chemical contents and caused it to be UNUSEABLE !
- "MPC" gets DARKER as it rubs on metal surfaces but discolouration doesn't affect it's effectiveness. Use till it wears prior replacement.



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# MPC Metal Polishing “Magic” Cloth

## 1.0 Composition/Information on Ingredients:

- > SYNTHETIC WAX : 12 ~ 17
- > ACETONE : <5%
- > ETHANOL : <5%
- > PROPELLANT : 20 ~ 30
- > SILICA POWDER : 35 ~ 45

## 2.0 Physical & Chemical Data

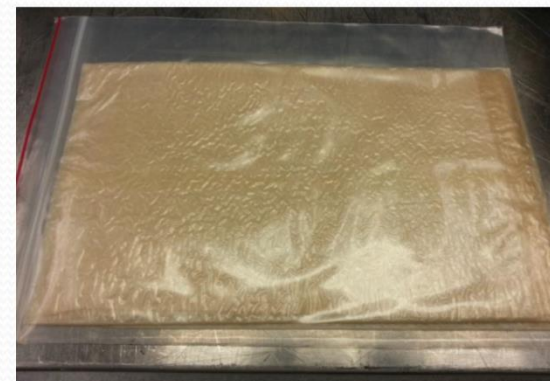
- > Appearance : Yellow Colour
- > Smell : Vanilla Smell
- > Flash point : Not Applicable
- > Solubility in water : Not soluble in water.
- > Melting(Softening) point : Not relevant

## 3.0 Hazards Identification

- > Irritative with contact on eyes.
- > Harmful if swallowed.

## 4.0 Stability & Reactivity Information

- > Stability : Stable under normal condition.
- > Condition to avoid : Heat, spark, or other ignition source.
- > Materials to avoid : Strong acids, alkali, oxidizing agent at high temp.
- > Hazardous decomposition products : A toxic oxide of carbon and nitrogen.
- > Hazardous polymerization : Will not occur at room temperature and pressure.



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# MPC Metal Polishing “Magic” Cloth

## STORAGE:

- MPC" must always be kept in a cool place for storage.
- Each piece of "MPC" comes with it's own poly bag and should be kept inside when not in use.
- Room cure : No Thawing / Curing Required.
- Self lifetime : Always keep and seal in Zipper bag provided.
- Self lifetime : 6 Months from the date of manufacture.
- Always keep in room temperature.

## TECHNICAL CONSTITUENT:

- > WAX - R-45
- > CLEANER - AQUA AMMONIA SOLUTION 26BE (CONTAINING NOT LESS THAN 12% OR MORE THAN 44% AMMONIA).
- > ABRASIVE – PUMICE
- > OIL - MINERAL OIL
- > CLOTH - COTTON, 275-305 WEIGHT, UNBLEACHED, SOFT FILLED SHEETING
- > SCENT - REAL COCONUT OIL
- > CLEAR NO DYE OR COLORING AGENTS
- > DEGRADABLE AND ENVIRONMENTALLY SAFE



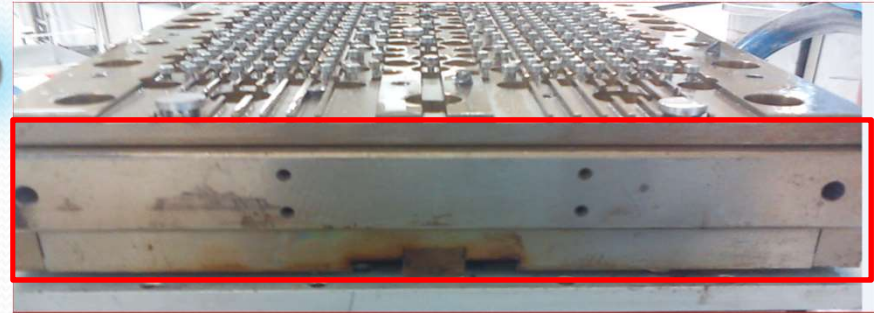
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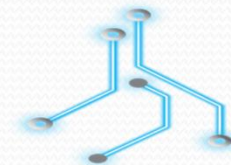
# MPC Metal Polishing “Magic” Cloth



BEFORE MPC



AFTER MPC



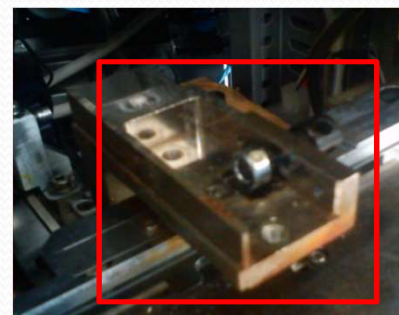
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## MPC Metal Polishing “Magic” Cloth



All Tooling Parts & Metal Parts Can Be Clean By MPC



AFTER



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# MPC Metal Polishing “Magic” Cloth

- **Application:**

- Cleaning /Polishing of Mold and DFTS parts for semicon /Electronics Equipment.
- Preventive maintenance of electric Motors /Compressor / Generator and greasy equipment and machine.
- Polishing of rusty precision tooling and die / stainless steel.
- No harmful chemical and environmental friendly , can be use inside production area.



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# MPC Metal Polishing “Magic” Cloth

Site Map Support

intel.com

## Intel® Web Suite

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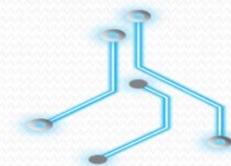
Welcome to your Intel® Web Suite User Profile - Edmund Yen

Below are your current profile settings.

To make changes to your current settings, click the "Edit Profile" button at the bottom of the page. This will allow you to add new vendors to your existing profile.

Supplier/Vendor Name Vendor ID	Supplier/Vendor Address
Company Name - Company Code	Region
<b>INVENIC INC</b> <b>1000086762</b>	<b>1201B Richville Corporate Tower, Metro Manila,Metro Manila PH 1771 PHILIPPINES</b>
Intel IP Corporation - 023	UNITED STATES
Intel Corporation - 100	UNITED STATES
Intel Media, Inc. - 101	UNITED STATES
Intel Massachusetts, Inc - 113	UNITED STATES
Intel Europe, Inc. - 116	UNITED STATES
Intel Americas,Inc - 150	UNITED STATES
IMC North America Inc. - 160	UNITED STATES
Intel MSC Sdn Bhd - 735	MALAYSIA
Intel Products (M) Sdn. B - 745	MALAYSIA
Intel Technology SDN BHD - 750	MALAYSIA
Intel Microelectronics - 755	MALAYSIA
Intel Products Vietnam Co - 763	Vietnam
Intel Elec. Sdn. Bhd - MY - 870	MALAYSIA

# INTEL WorldWide Qualified

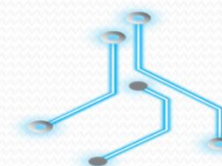
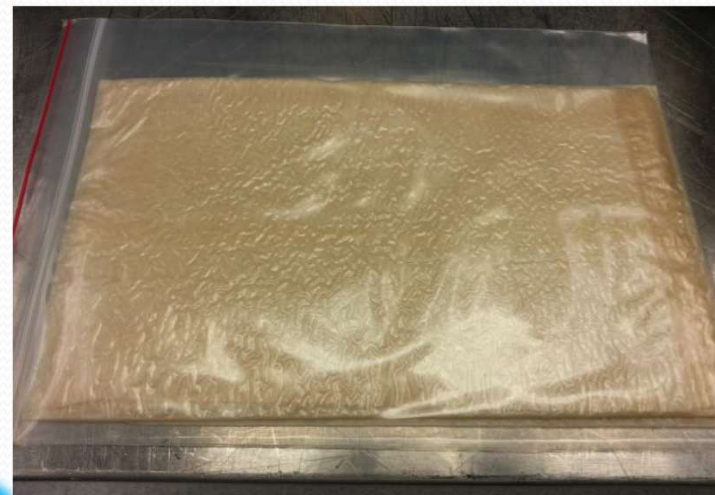


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## MPC Metal Polishing “Magic” Cloth

- Existing Clients Using MPC
- PHILIPPINES
- INTEL WorldWide
- SAMSUNG
- SHINDENGEN
- ONSEMI TARLAC
- AMKOR
- AMERTRON

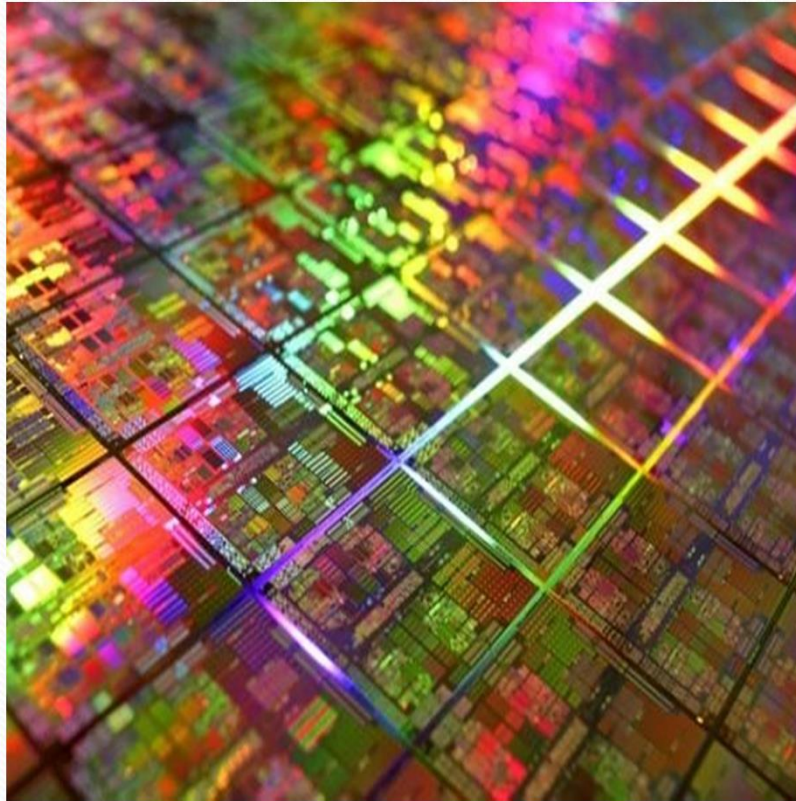


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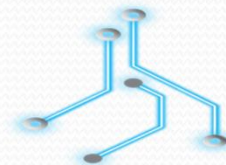


# Rubber Sheet & Mold Conditioner

WHEN EXCELLENCE MATTERS



Competitive Pricing Prompt  
Response On-time Delivery  
Excellent Service and Quality Product



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# KEYEC

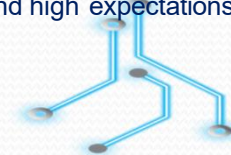
is a trade organization established by the same group of dynamic individuals who had set up INVENIC INC in 2009 serving the global semiconductor industries. Now as an arm of INVENIC INC, who is now more focused in the global trend for its SOLAR projects, KEYEC strive to foster significant growth opportunities, sustainable development and synergistic benefits with our strategic business partners.

Our mission is to achieve and enhance clear leadership, in the existing or new core industrial product categories in which we choose to compete.

Our current TOPCORE products includes:

1. MOLD CLEANING RUBBER SHEET
2. MOLD CONDITIONER

Our sales and technical service colleagues and our regional agent partners are highly motivated, well trained and strongly committed in providing total customer satisfaction. With the Customer-First priority, we have achieved a strong record of proven sales and services and satisfied customers stringent requirements and high expectations.



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# Rubber Sheet and Mold Conditioner

## MOLD CLEANING IN SEMICONDUCTOR

Mold cleaning process was a mandatory process for Semiconductor to clean away the epoxy deposits formed during the molding process for Integrated Circuit, Diodes, transistor etc. Cleaning method includes the Melamine Based Cleaner and Rubber Base mold cleaner.

End users shall apply different combination of cleaning methodology depend on cost factors, internal requirement, customers requirement as well as productivity aspect. Rubber Sheet cleaner is a fast cure material compare to Melamine base cleaner. It does not need any lead frame and preheating for performing the cleaning process. With the elimination of preheating and shorter cure time, customer can gain productivity improvement with Rubber Base Cleaner.



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# Rubber Sheet and Mold Conditioner

## RUBBER SHEET

Specially formulated compound for the cleaning of thermosetting transfer mold. It has its excellent elastic properties which easing the removal of the compound from the mold without leaving any unwanted debris and assist in the house keeping of the molding station. Besides, it was also formulated with high flow characteristic to achieve cleaning efficiency. It emits limited odor during the cleaning process

### ADVANTAGES & BENEFITS

- ✓ Air vents, cavities and mold surfaces cleaning & conditioning in single step.
- ✓ Cost saving in total cleaning materials.
- ✓ Shorter cleaning time & productivity gain.
- ✓ Cater for green compound requirements.
- ✓ Environmental friendly, using non hazardous ingredients and Halogen Free.
- ✓ No preheat, no thawing time is needed.
- ✓ Suitable for semiconductor, optoelectronics, rubber, plastic and metal molding industries.



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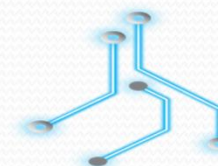
# Rubber Sheet and Mold Conditioner

## ELASTOWET

Specially formulated compound for wetting and conditioning of thermosetting transfer mold after mold cleaning. Elastowet has good compatibility with Rubclean. It also has excellent elastic properties to ease the removal of cured rubber after molding. It also has high flow characteristic to ensure rubber wax flow into all cavities to achieve waxing homogenous during the conditioning process.

### APPLICATION PROCEDURES

- Locate Elastowet on mold for the required number of strips. 1 to 2 Elastowet strips per mold chase depending on the frame and mold cavities dimensions.
- Clamp the mold to compress Elastowet to fully fill up all the mold cavities. Over clamping the compound may cause releasing difficulty from mold.
- Suggested compound cure time is depending on mold temperature. For normal molding temperature of  $175 \pm 5^\circ\text{C}$ , the compound cure time required can be from 180 to 240 seconds.
- Number of conditioning shots suggested is 1 to 2 shots after mold cleaning.
- Over curing Elastowet (more than 10 mins for  $180^\circ\text{C}$ ) might create sticking problem to the mold.



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## Rubber Sheet and Mold Conditioner



*KEYEC* provides genuine value to the company's stakeholder including our customer, dealer and employees. Aspires to be a profitable company with a maximum return of investment for both share holders and stake holders.

Achieve excellent performance that exceed customer expectations in terms of quality and value to create new opportunities with a win-win situation for both customers and vendors through fostering close working relationship and quality service



**KEYEC**  
Key Electrochem Limited Co



# Precision Tooling



- Customised Design and Manufacture of Complex High Tech Equipment
- Standard Equipment for Semiconductor Assembly And Test
- Precision Tooling and Spares
- Automation Solutions for Fibre Optics Electronics Assembly

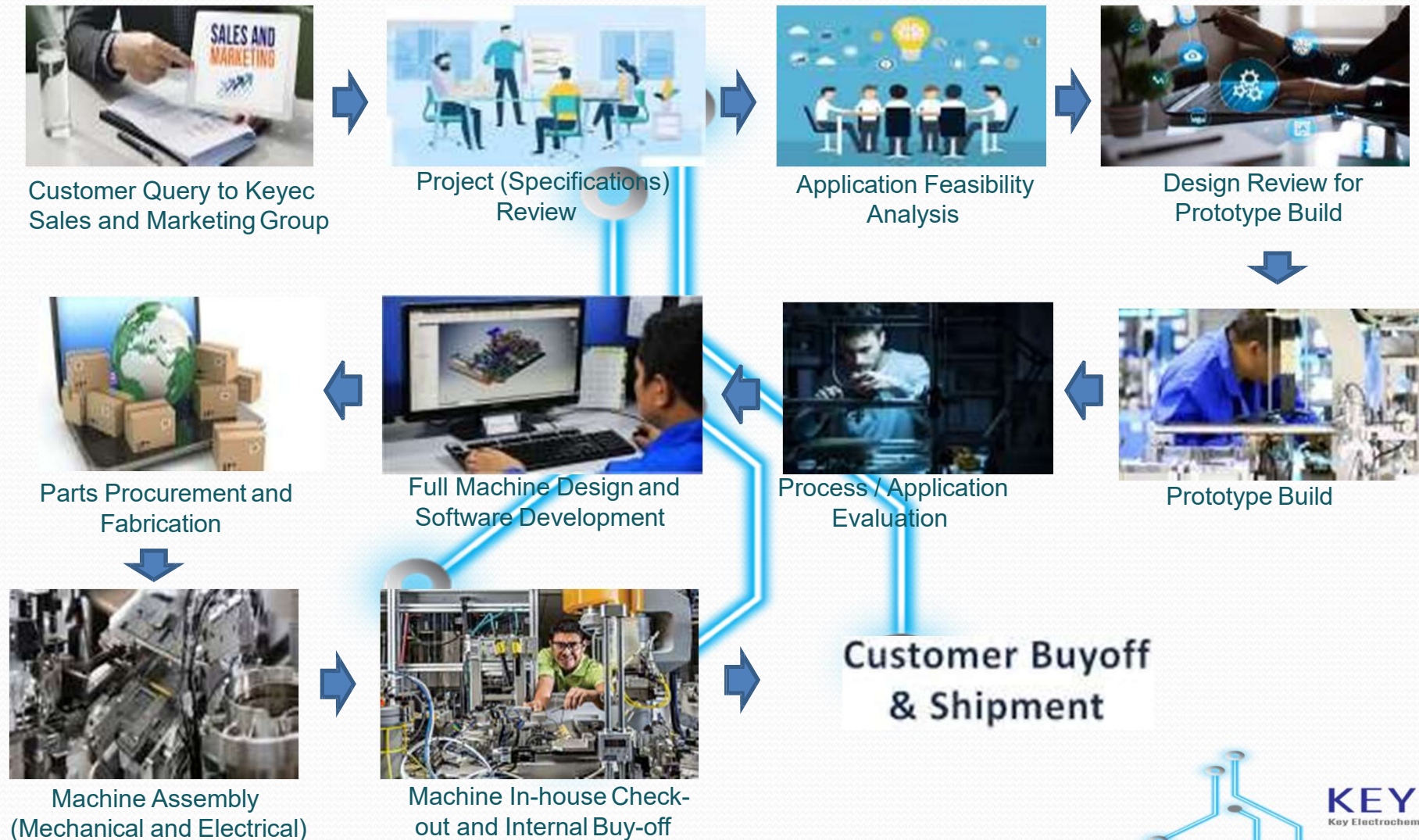


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# Precision Tooling

## OEM Projects Process Flow





# Precision Tooling

## OEM Products



**Scara Robot AFL**



**High Speed IC Trimform**



**Laser Mark Handlers**



**Dry Media Deflash**



**Current Sensor Assembly**



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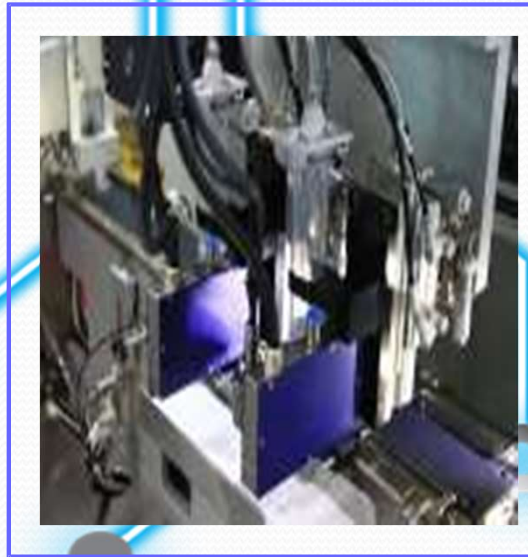


# Precision Tooling

## OEM Products



**Auto Pellet Loader for  
IC MGP Molding**



**High Speed Jetting  
Dispensing**



**Semi Auto Deculler for  
IC MGP Molding**



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# Precision Tooling

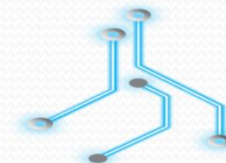
## Other OEM Products



In-line Handlers for magnets attach and cure



Vision alignment and inspection



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# Precision Tooling

## Other OEM Products



**Collaborative  
Assembly Robot**



**Rotary Trim & Forming**



**Transceivers Test Handlers**



**QFN Auto Buffing**



**QFN Auto Detaping**



# Precision Tooling

## Other OEM Products



**Test and inspection  
c/w Tape & Reel**



**Bowl feed to SMT  
pick and place Mc**



**SLOT Magazines loader, buffer,  
unloader**



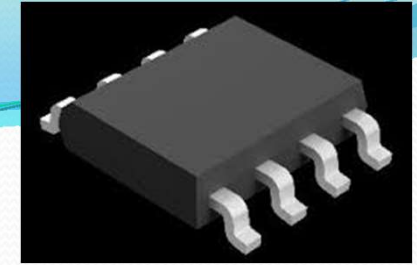
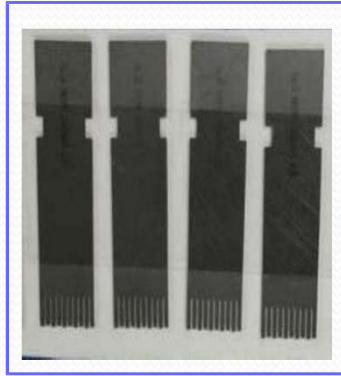
**KEYEC**  
Key Electrochem Limited Co



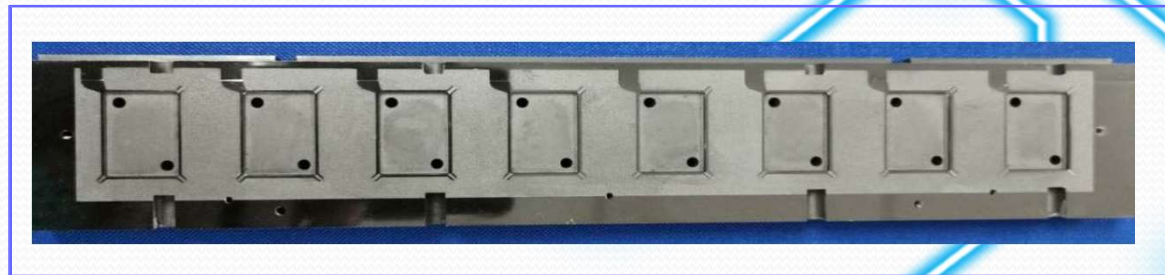
## Precision Tooling

### Spare Parts fabrication

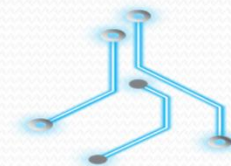
#### **\*\*Trim and Form Parts**



#### **\*\*Cavity Bars [PDLC Application ONLY]**



**\*\*PDLC Coating applicable**



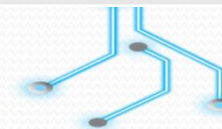
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## Precision Tooling

### Machines And Equipment

M/C	DESCRIPTION	MAKER / MODEL
EDM-Superdrill	EDM Machine - Superdrill	BAOMAI
EDM-Wirecut	Precision reciprocal wirecut machine	NOVICK – AR40MA
EDM-Wirecut	Sodick smart linear AL400P	SODICK – SPWA400T
EMD	CNC EDM Machine	TAIWAN – M50CA/P45
CNC MILL	Robofit compact machining center	FANUC – A04B012B-BAA2#EBMH
CNC MILL	Robofit compact machining center	FANUC – A04B012B-BAA2#EBMH
CNC MILL	CNC Vertical Machining Center VMC	EXPERT CNC – SB02017
Grinding	Grinding Machine	TAIWAN – FSG1224ADIV
Grinding	Precision Form Grinding Machine	OKOMOTO – ACC515DXAL
Grinding	High Precision CNC Forming Machine	AMADA
Grinding	Precision Form Grinding Machine	OKOMOTO – ACC515DXAL





# Precision Tooling

## Machines And Equipment



CNC



FANUC Robot-drill CNC



EDM Superdrill



EDM



Grinding M/C



Okamoto Grinding



# Precision Tooling

## Machines And Equipment



Charmilles Wirecut



Sodick Wirecut



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# Precision Toolings

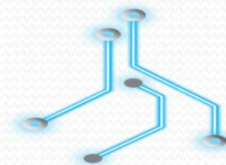
## QC Inspection



Shadow Graph



OGP Smart Scope



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## Precision Toolings

Support and After Sales Service

**\*\* *KEYEC*** support / AS group will always be available 24/7 to serve customer needs.

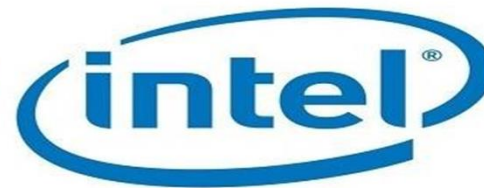


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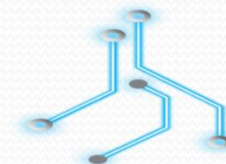


# KEY ELECTROCHEM LIMITED CO. (KEYEC)

## VALUED CUSTOMERS



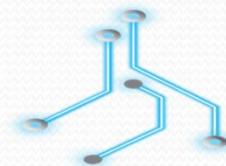
VIETNAM



**KEYEC**  
Key Electrochem Limited Co



***THANK YOU FOR  
CHOOSING KEYEC***



**KEYEC**  
Key Electrochem Limited Co