



COMPANY PROFILE



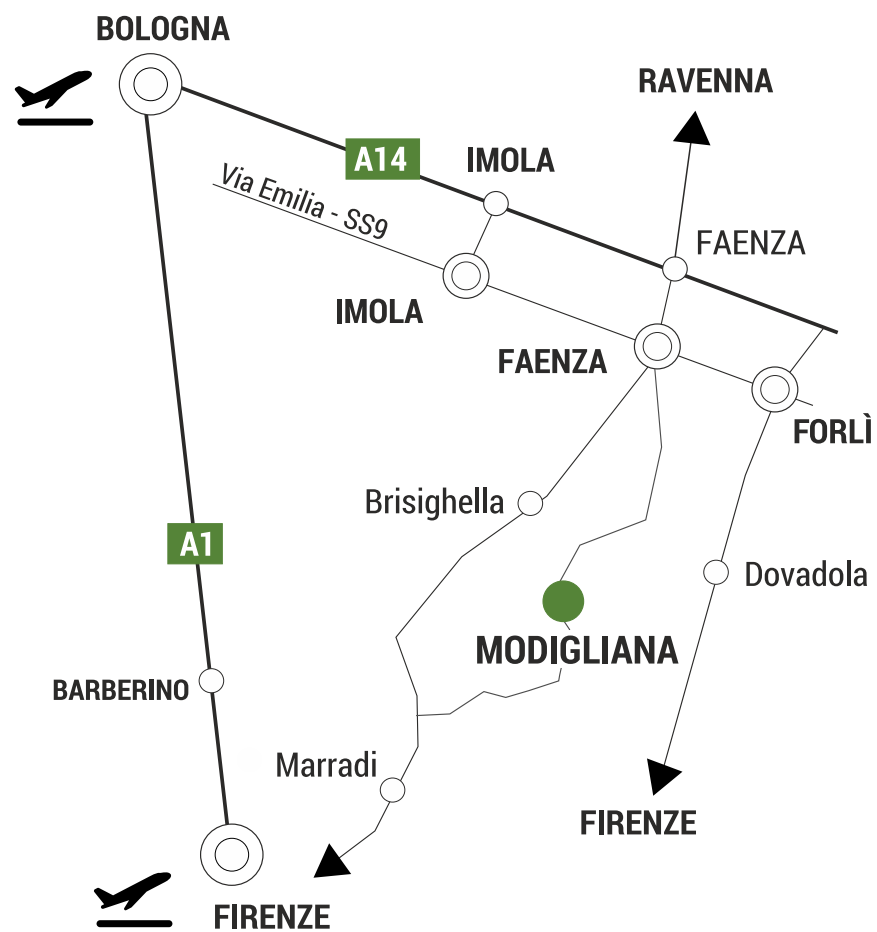


## MISSION

To realize robust and reliable circuits and automations in both standard and custom configurations in order to meet our customers requirements from the lab scale for R&D and prototyping to the massive production volumes for industry applications.

**Design and manufacturing is made 100% in Italy.**

## WHERE WE ARE





**WIRELESS**



**MICROELECTRONICS**



**AUTOMATION**

**1970** Year of foundation

**20** Engineers

**96** Employees

**16Mln€** Revenues (2017)

## WIRELESS

### STANDARD CATALOGUE



### CUSTOM LINE



## WIRELESS STANDARD CATALOGUE

SRD wireless radio solutions (Short Range Devices) on IMS free-license bands of 433 MHz, 868 MHz and 2,4 GHz according on the European normative.



### PRODUCTS

- AM & FM receivers
- AM & FM transmitters
- Keyfobs
- Transceivers
- Decodings
- Antennas
- LoRa™ modules

### NORMATIVE

- 2014/53/EU
- EN 301 489-3 V1.4.1 (2002-08)
- EN 300 220-2 V2.3.1 (2010-02)
- EN 60950 : 2006

### APPLICATIONS

- Home automation
- Remote controls (gates, roller shutter, lights)
- Street lighting
- Home alarm systems
- Heating system control
- Access controls





## WIRELESS CUSTOM LINE

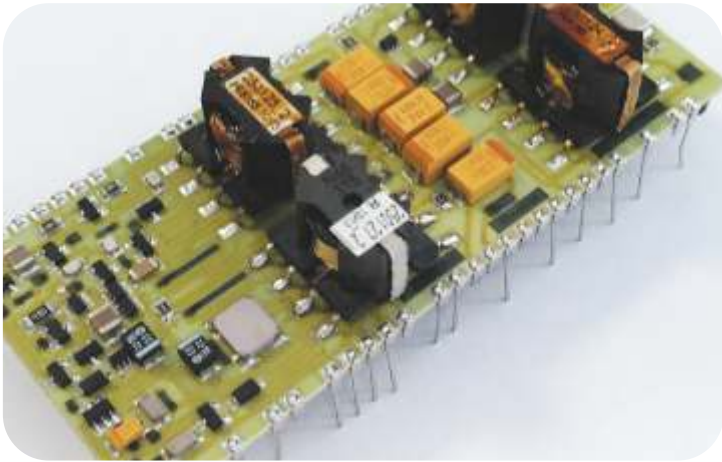


AUREL has a fully specialized laboratory with engineers skilled in the development of finished RF solutions .

AUREL offers its customers more than twenty years of experience in the development, prototyping and production of electrical circuits and RF modules on customer demand.

The appropriate equipments (spectrum analyzers, nets analyzers) allow to apply pre-compliance test directly in our plant.

## MICROELECTRONICS

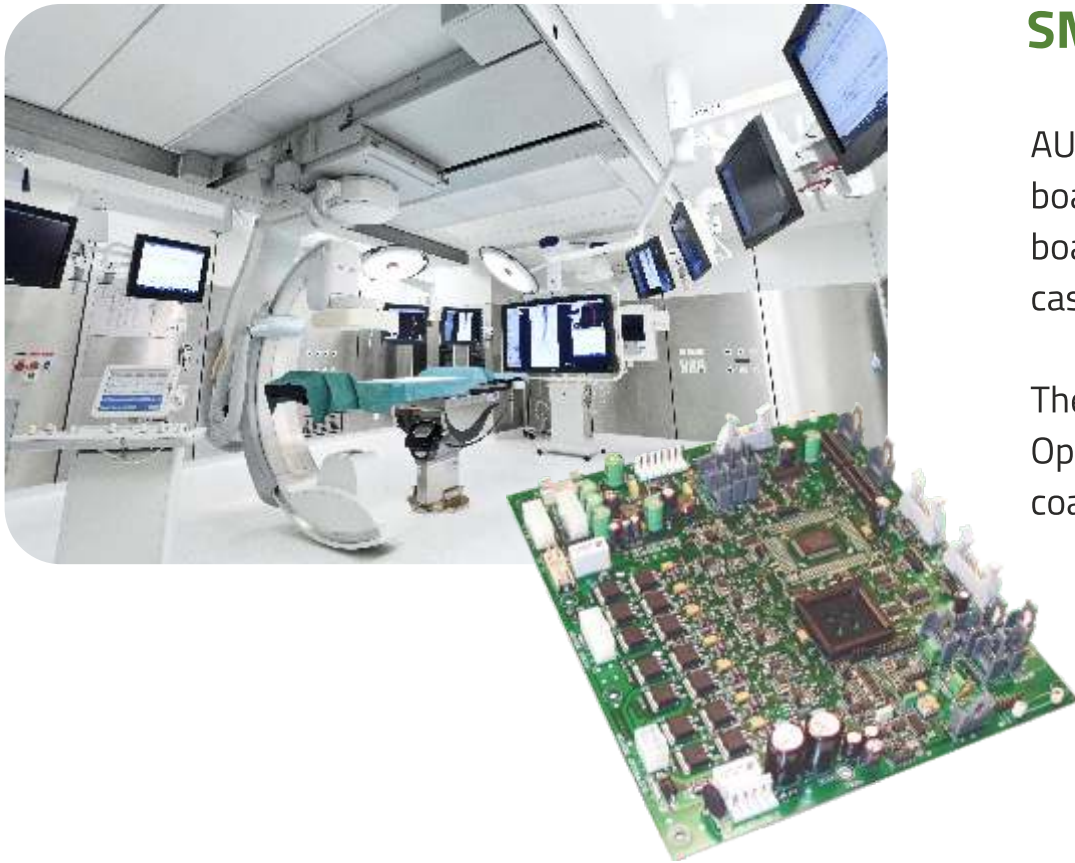


- Thick film hybrid circuits on Alumina
- Thick film hybrid circuits on Aluminum Nitride
- Thick film on Aluminum (THIFAL)
- SMD manufacturing service
- Insulated metal substrate circuits (IMS)
- Chip & Wire circuits
- Power resistors
- Braking resistors





## MICROELECTRONICS

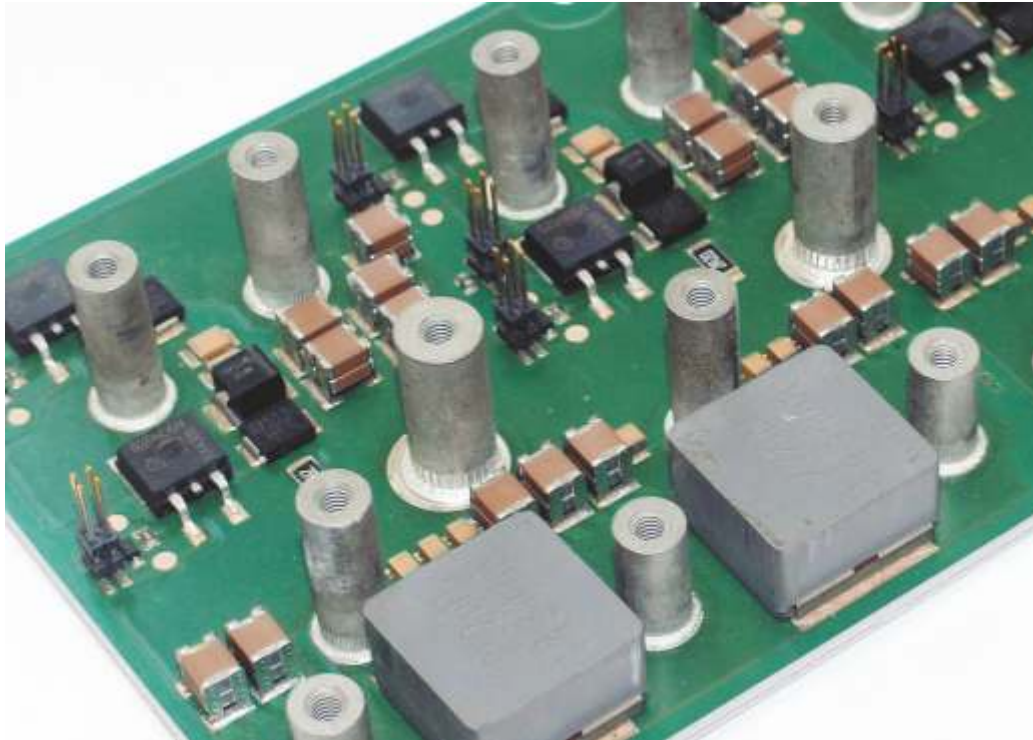


### SMT MANUFACTURING SERVICE

AUREL production lines are suitable for SMD technology boards or mixed technology on multilayer printed circuit boards, rigid or flexible, metal-core, handling components with case as 0201, BGA and micro BGA, also placed on both sides.

The quality of the product is ensured by AOI (Automatic Optical Inspection), X-Ray inspection, functional testing, coating.

## MICROELECTRONICS



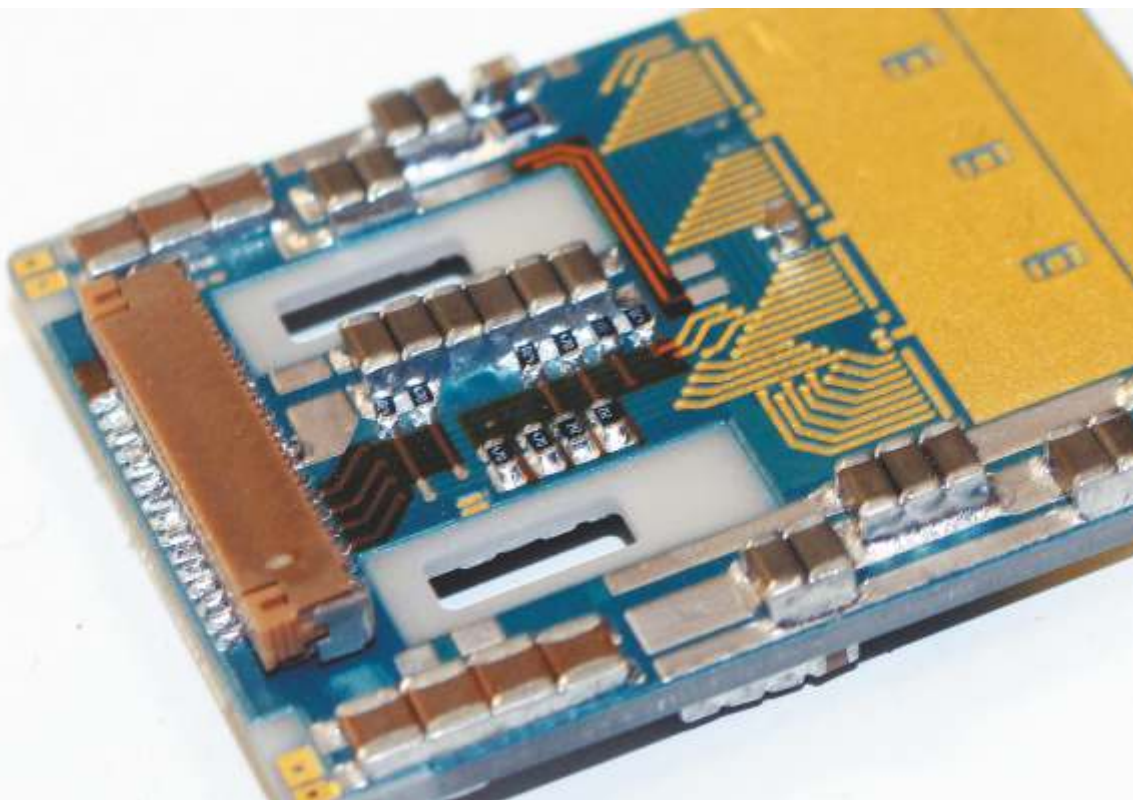
### INSULATED METAL SUBSTRATE

IMS Technology is suited for applications where it is requested to increase thermal dissipation in high wattage surface mount design.

This technology limits the need to use multiple parts while achieving maximum insulation (> 2 kV) for modules 100% tested and ready for production.

- **INDUSTRIAL**  
power suppliers, inverters, soldering machines
- **AUTOMOTIVE**  
ignition, electronic control units, lamp gears, fan controls
- **LIGHTING**  
light sources, street lights, power leds, power lighting
- **SOLAR ENERGY**  
inverters, concentration units

## MICROELECTRONICS



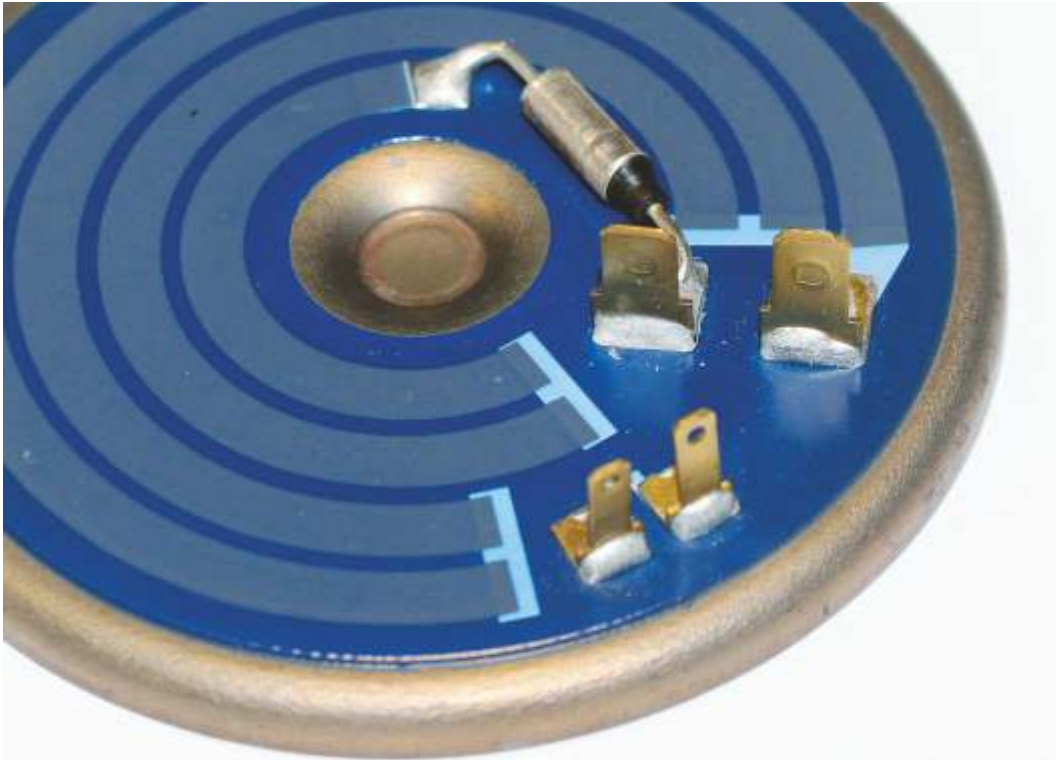
### THICK FILM ON ALUMINA & ALUMINUM NITRIDE

AUREL has wide expertise in design and production of different hybrid circuits types on alumina or aluminum nitride substrates, with complex lay-out and through hole metallization.

The technology allows a high degree of integration, multilayer structures and laser trim.

- BIOMEDICAL
- AUTOMOTIVE
- SENSORS
- AVIONIC

## MICROELECTRONICS



### POWER RESISTORS ON STAINLESS STEEL & CERAMICS SUBSTRATES

Heating elements and power resistors are realized by printing on top of Stainless Ferritic or Austenitic steel/ceramics substrates, an electrically insulating , but thermally conductive, ceramic dielectric layer.

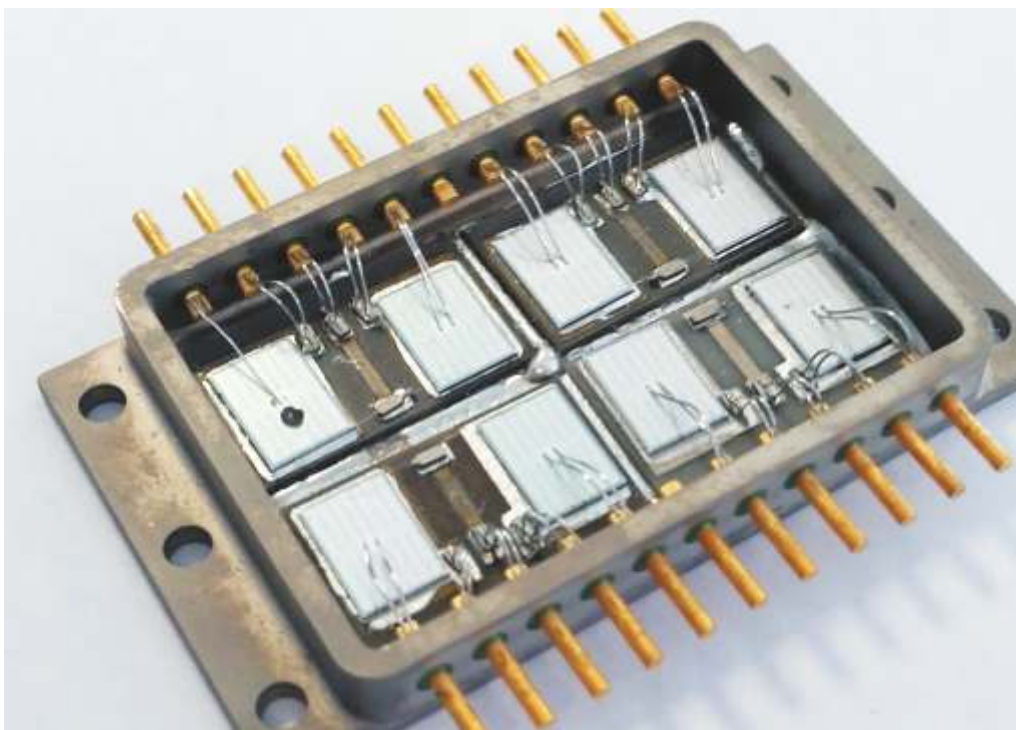
On top of it are subsequently printed conductive and resistive layers to obtain the desired power value.

A major advantage of this technology is the maximum speed in terms of heat transfer.

- TEA KETTLES
- DOMESTIC FOOD PROCESSORS
- MILK FROTHERS
- HUMIDIFIERS
- PROFESSIONAL BRAISING PANS
- COFFEE MACHINES
- FOOD STEAMERS



# MICROELECTRONICS



## CHIP & WIRE (CLEAN ROOM ISO 7)

Chip on Board (C.O.B) technology consists of die directly attached to its substrate.

C.O.B. assemblies allow to achieve high density and better performances due to shorter interconnection paths.

Wire bonds in Au (25  $\mu\text{m}$  thick) are used.

AUREL boasts a clean room (class ISO 7) with automatic die attach and wire bonding machines.

# MICROELECTRONICS

## APPLICATION TECHNOLOGIES

### SUBSTRATES

- Aluminium Oxide
- Aluminium Nitride
- Silica Glass
- PET
- PC
- Polyimides

### FILMS THICKNESS RANGE

- Screen Printing: 5 – 100  $\mu\text{m}$
- Ink-jet Printing: 2 – 20  $\mu\text{m}$
- Spray Coating: 1 – 15  $\mu\text{m}$

### DEPOSITION TECHNIQUE

- Screen Printing
- Spray Coating
- Ink-jet Printing

### MATERIAL VISCOSITY RANGE

- Screen Printing Paste: 3000 - 50000 mPas-s
- Ink-jet Printing Ink: 1 – 2.5 mPas-s
- Spray Coating Lacquer: 2 – 150 mPas-s

### MATERIAL CURING TECHNIQUE

- Thermal
- Near IR
- UV



## MICROELECTRONICS



## EQUIPMENTS

AUREL is also able to carry out qualified test using the following equipments:

- Climatic chambers
- Thermo stream
- X-Ray machine
- Gros & fine leak
- Pind test
- Constant acceleration up to 5.000g
- Shear strength
- Shocks and vibration

## AUTOMATION DIVISION



To realize robust and reliable equipments and automations in both standard and custom configurations in order to meet our customers requirements from the lab scale for R&D and prototyping to the massive production volumes for industry applications.

To envision the future of automation in order to propose to all our customers not only simple machines but performing solutions for their processes.

## AUTOMATION DIVISION

### HIGH-PRECISION SCREEN PRINTERS

For thick film technology, polymeric, solder pastes, glues, resins, solder masks, varnishes  
On ceramic substrates, flexible foils, glass, metal, green tape, LTCC. Via filling and PHM.



C1010D



C920



VS1520A



VS2025

# AUTOMATION DIVISION

## LASER SYSTEMS

For Ohmic trimming of thick film and chip resistors and for active and functional trimming of hybrids, digital and RF circuits.  
For cutting, drilling, scribing, routing and marking of ceramic, glass, green tape, PET, polyimides, etc



ALS300



XCEL LASER



ALS200

## AUTOMATION DIVISION

### CONVEYORED OVENS

A206 is a conveyed oven for drying thick film pastes or curing polymeric pastes, adhesives, resins, glues.

Far IR heating by means of ceramic panels is the recommended way to dry and cure properly printed wet pastes, especially for thick film circuits.



### BATCH OVENS & FURNACES

Static batch ovens and furnaces designed for a wide range of thermal treatments, like drying and firing of thick film pastes, curing of polymeric and resins.

They are offered either as free-standing or bench top depending on the capacity and they are suitable for prototyping, low-volume and pre-series production.

## AUTOMATION DIVISION

### XCEL FLEXIBLE WORK-CELL PLATFORM

XCEL Series is a versatile multi-functional work cell based on a Cartesian platform with linear drives that allows fast and highly precise movements of the work head.

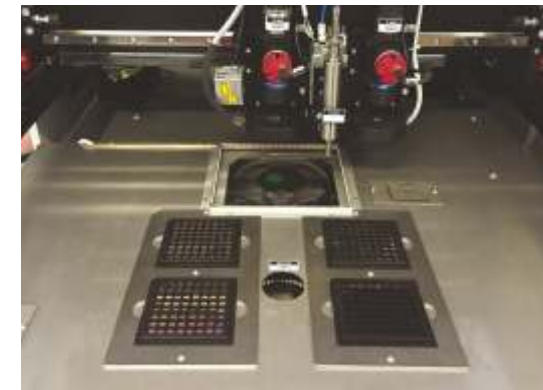
XCEL is offered either as a stand alone unit or integrated in a line with automatic handling modules for high volume production.

#### Main function

- Dispensing
- Ink-Jet and Paste Jet
- Spray Coating
- Odd shape / Pick&Place
- AOI
- Die Inspection & Sorting
- Laser Micromachining
- Automated Assembly



In-Line Multifunctional XCEL for dispensing and assembly on DCB substrates for power modules



Silicon Die Inspection & Sorting



# AUTOMATION DIVISION

## SOLUTION FOR INDUSTRY

The new generation AUREL Automatic Lines are conceived with a modular approach that permits the customer to build up the production line starting from a first base line and to add step-by-step additional modules according to the real production trend.

AUREL Automatic Lines are designed to grant the highest throughput and to minimize the human factor reducing the setup and the product changeover times to achieve the highest OEE.



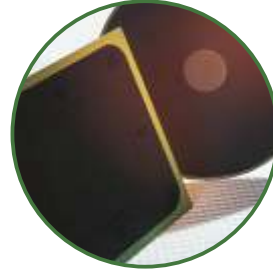
# AUTOMATION DIVISION

## NEW TECHNOLOGIES

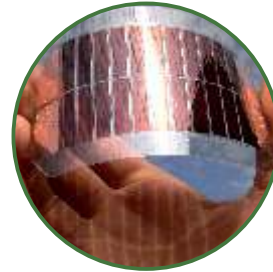
### MANUFACTURING EQUIPMENT FOR ENERGY APPLICATIONS

- SOFC (SOLID OXIDE FUEL CELLS)
- DSSC (DYE-SENSITIZED SOLAR CELLS)
- NANOMATERIALS (GRAPHENE AND OTHER 2D MATERIALS)

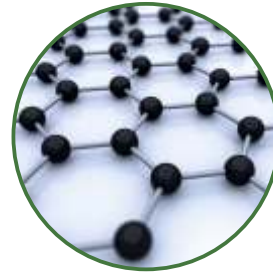
SOFC



ENERGY



GRAPHENE



Multifunction workcell for  
microspray, glass assembly,  
automatic vision, ink jet



Screen printing systems



Ovens and Furnaces



Laser machines for scribing and  
routing on glass, silicon and  
ceramic

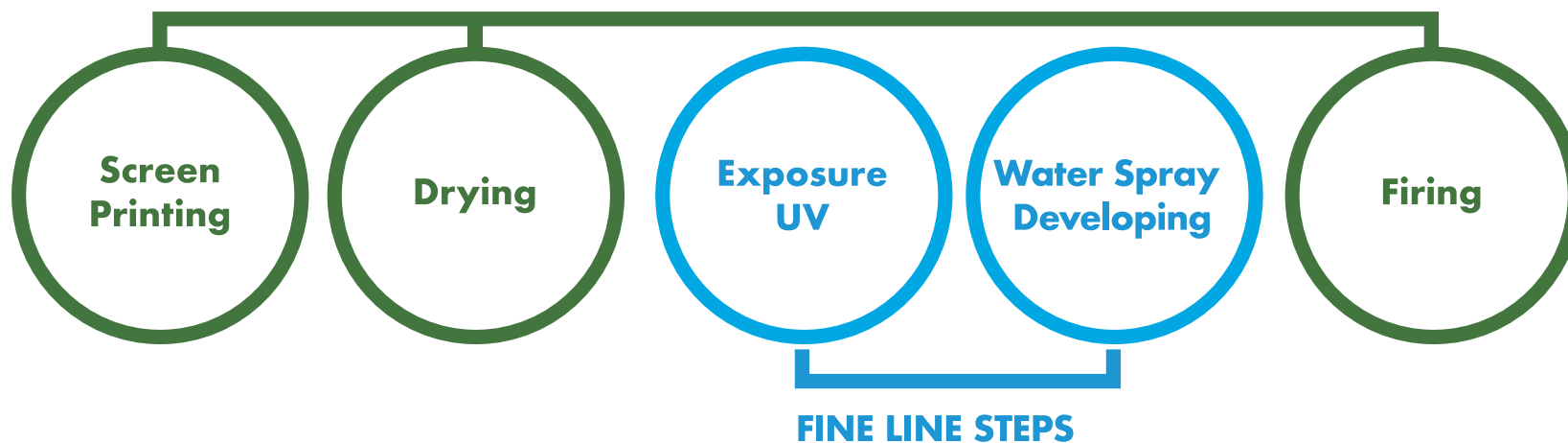
## AUTOMATION DIVISION

### FINE LINE THICK FILM TECHNOLOGY

Inexpensive thick film process with fine line resolution starting from just 20µm offers the next level of integration in printed electronics and complements our traditional high density multilayer thick film circuits expertise.

50 years of experience in thick film and printed electronics allow us to render full project support from feasibility study and small scale production in Aurel to automation of a customer's facility with proven equipment and tooling.

### FINE LINE THICK FILM PROCESS



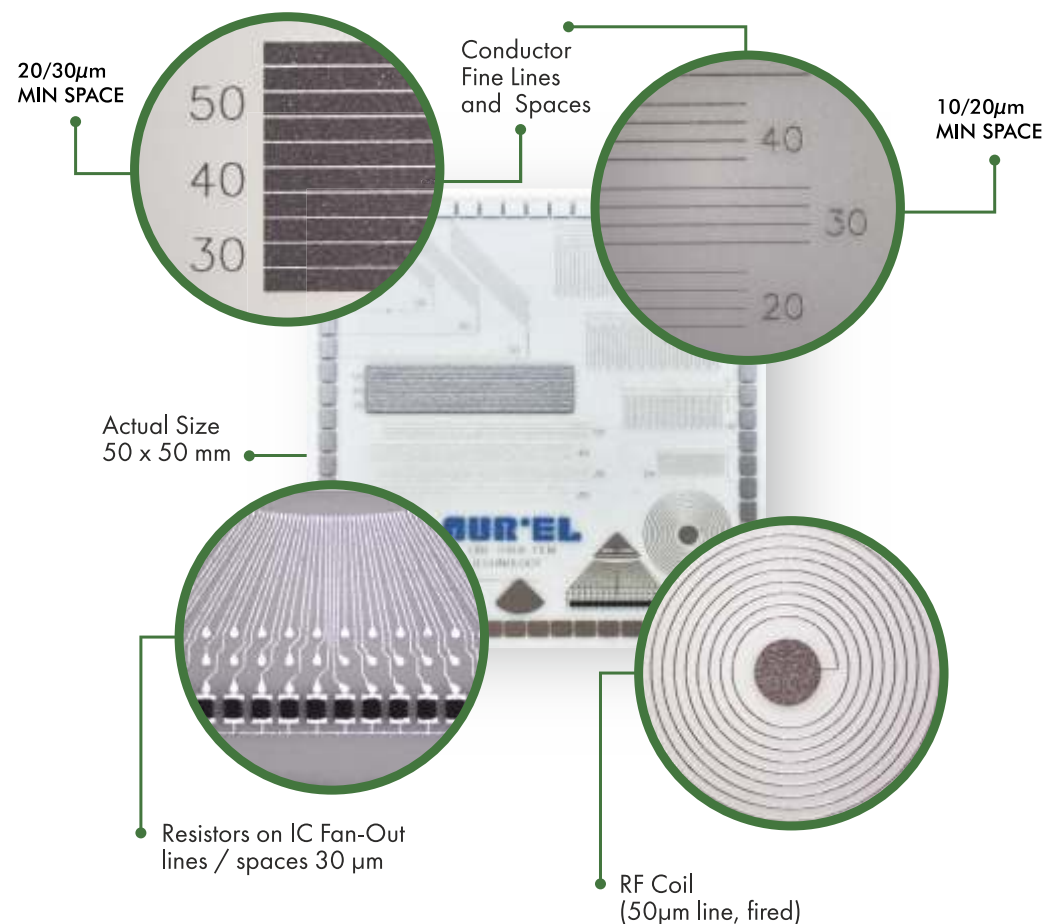
# AUTOMATION DIVISION

## NEW TECHNOLOGIES

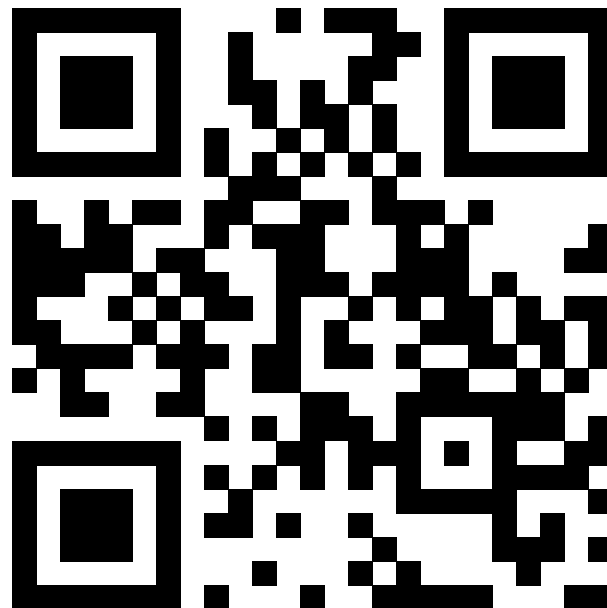
	Min line	Min space
● «As fired» alumina:	20 $\mu\text{m}$	30 $\mu\text{m}$
● Lapped alumina:	10 $\mu\text{m}$	15 $\mu\text{m}$
● Green tape LTCC:	20 $\mu\text{m}$	30 $\mu\text{m}$
● Multilayers:	30 $\mu\text{m}$	40 $\mu\text{m}$
● Photoimageable pastes: Ag, AgPd, Au, W		
● Fired thickness:	5...8 $\mu\text{m}$	
● X/Y shrinkage:	< 10%	
● Resistivity:	3...4 mOhm / sq. at typical thickness	

### Combinations with regular thick film

- Regular thick film areas and SMD solder pads areas
- Interposers for stacked dice, uBGA and fan-out on alumina and LTCC green tapes
- Resistors, dielectrics and various conductors in multilayer structures



THANKS FOR YOUR ATTENTION



[WWW.AUREL.IT](http://WWW.AUREL.IT)



**AUREL**

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