

CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

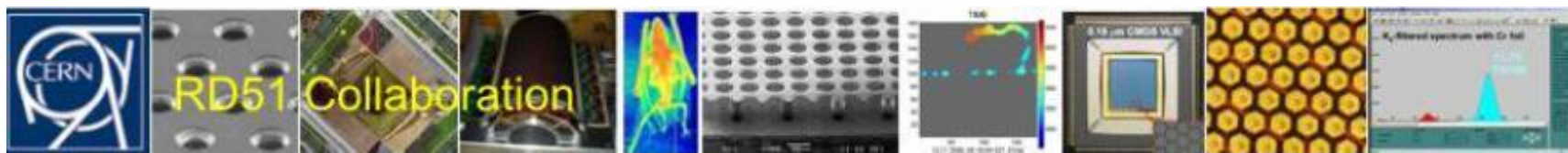
Manufacturing GEMs in India

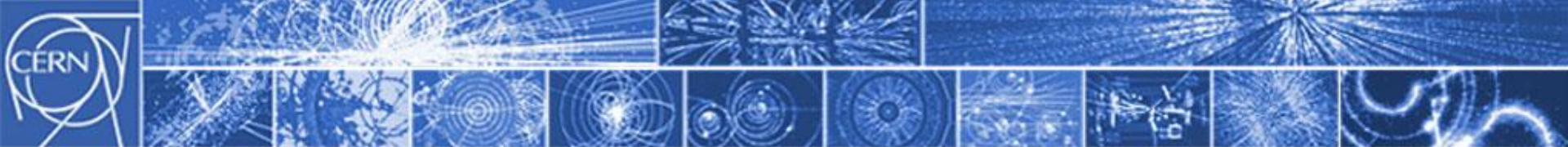
Archana SHARMA

Physics Department

CERN CMS PH-CMX

CH 1211 Geneva Switzerland





CERN

European Organization for Nuclear Research

Organisation Européenne pour la Recherche Nucléaire

COMPANIES in INDIA

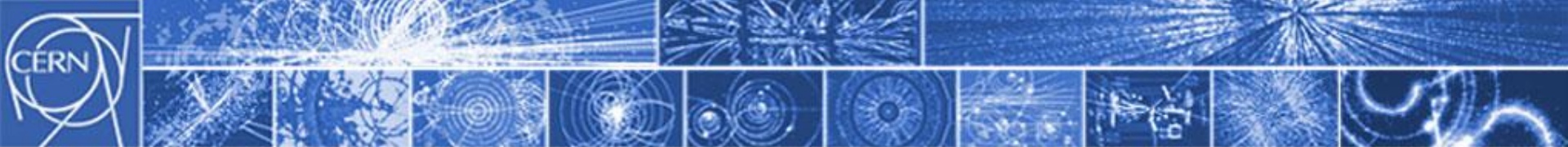
- Very interested in learning technology
- I visited KIED (Hyderabad) on Sep 24 2010
- KIED (Hyderabad) will visit CERN Nov. 7-8 2010
- New collaborators from BARC Mumbai and NISER Bhubaneswar (Orissa) will follow up
- Also investigating companies around Mumbai
 - One person visiting CERN Oct 20 - 31



Manufacturing GEMs in INDIA

Visit Keerthi Industries On 24.9.2010





CERN

European Organization for Nuclear Research

Organisation Européenne pour la Recherche Nucléaire

Keerthi Industries

Electronics Division

- Has capacity to process rigid, flex and rigid flex circuits.
- Polyimide (Kapton), Polyester circuits are manufactured.
- Capability matrix , machinery and other details are given in the following slides.



CERN

**Keerthi Industries Limited
Electronics Division**

Capability Matrix

No. of layers	1 – 6 Layers FPC;
Surface insulation	Cover layer/ solder mask
Laminate thickness (Excluding stiffener thickness)	5 mils to 13 mils (0.125mm to 0.762mm)
Max working panel	20” x 18” (500mm x 450mm)
Min finished hole	0.012” (0.30 mm)
Min.track width / space	4 mils / 4 mils (0.10mm / 0.10mm)
Surface Finish	Electrolytic tin Plating
	Immersion tin Plating
	Immersion silver Plating
	Hot Air Solder Leveling- lead free solder (HAL)
	Electroless Gold Plating (ENIG)
	Direct gold over copper, OSP etc.



Keerthi Industries Limited

Electronics Division



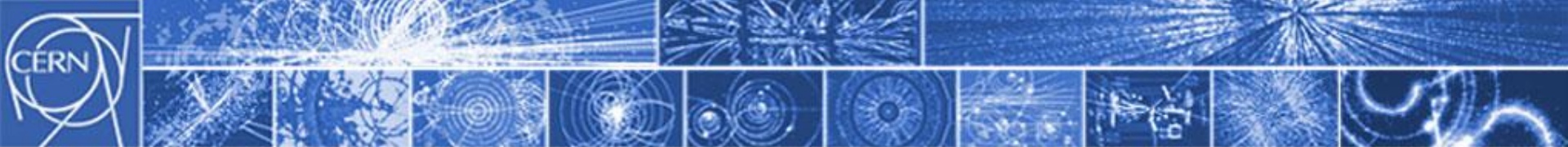
- *Keerthi Industries Limited ,Electronics Division,- 100% Export Oriented Unit under Electronic Hardware Technology Parks Scheme, Government of India.*
- *Leadership in product quality & size in India in Flexible Circuits market.*
- *Served prestigious clients such as GE, HP, Motorola, Tyco, Powerwave Technologies, Bharat Electronics Ltd, Variable Energy Cyclotron Center, Larsen & Toubro etc.*
- *Plant certified to ISO 9001 : 2008 by STQC.*
- *Products meet international specifications and approved by the Underwriters Laboratories (UL).*
- *Modern, state of the art manufacturing facility (43000 SFT plant); Major upgradation planned (addl. 30000 SFT potential space)*
- *DG sets for captive power generation – 360 KVA, 180 KVA & 10 KVA, Effluent treatment plant, DM water plant*

4000 m²



Typical example of flex circuit manufactured by KIED



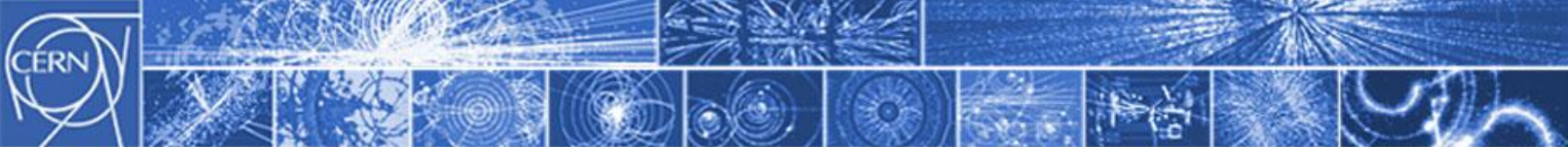


CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire



Rosenthal Auto Cutting machine

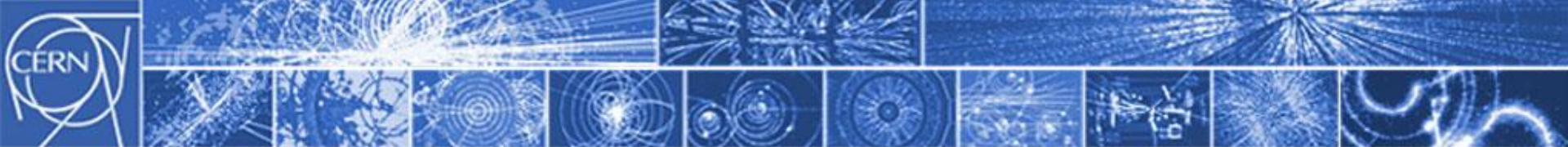


CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire



**CNC drilling and routing machines
– From Excellon USA**



CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire



**Precleaning
(conveyorised)**



CERN

éaire



WESTERN MAGNUM DRYFILM LAMINATOR

Dry film laminator



CERN

Imaging of circuit

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire



DIAZO DEVELOPER

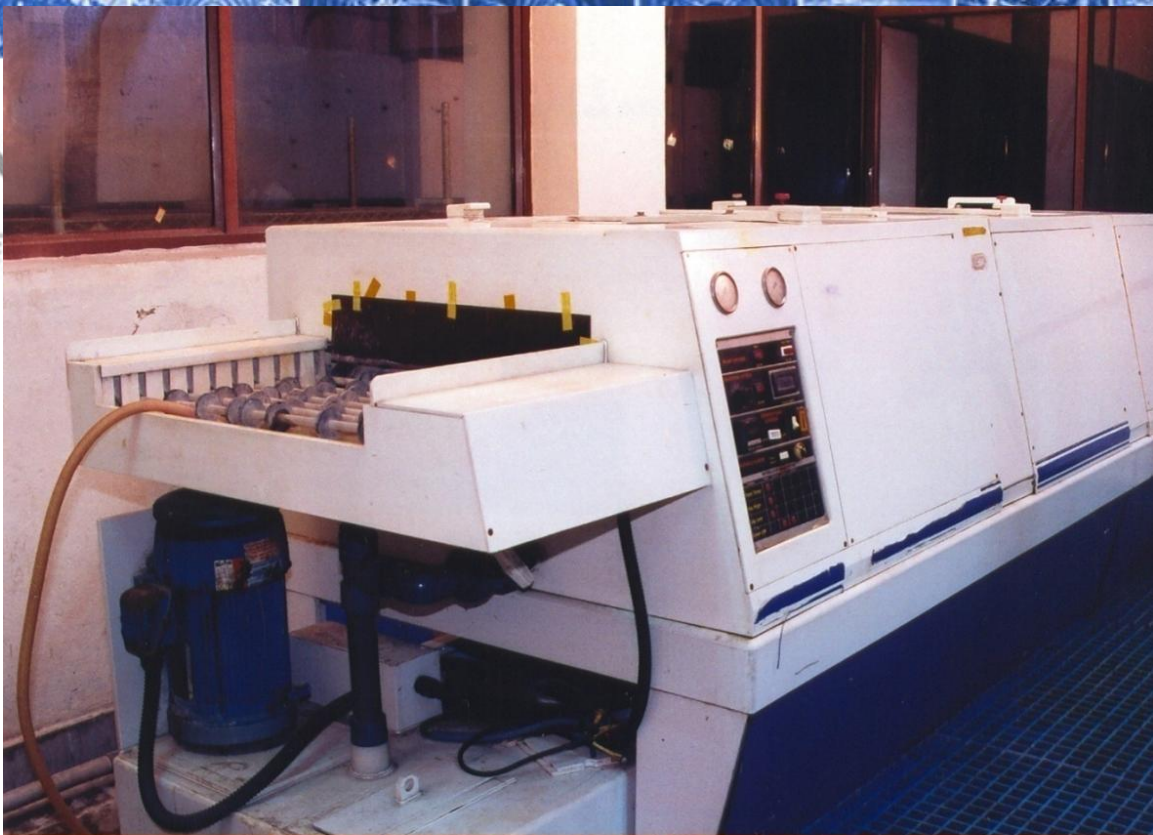


IMAGE MASTER 5000 imaging machine



CERN

éaire



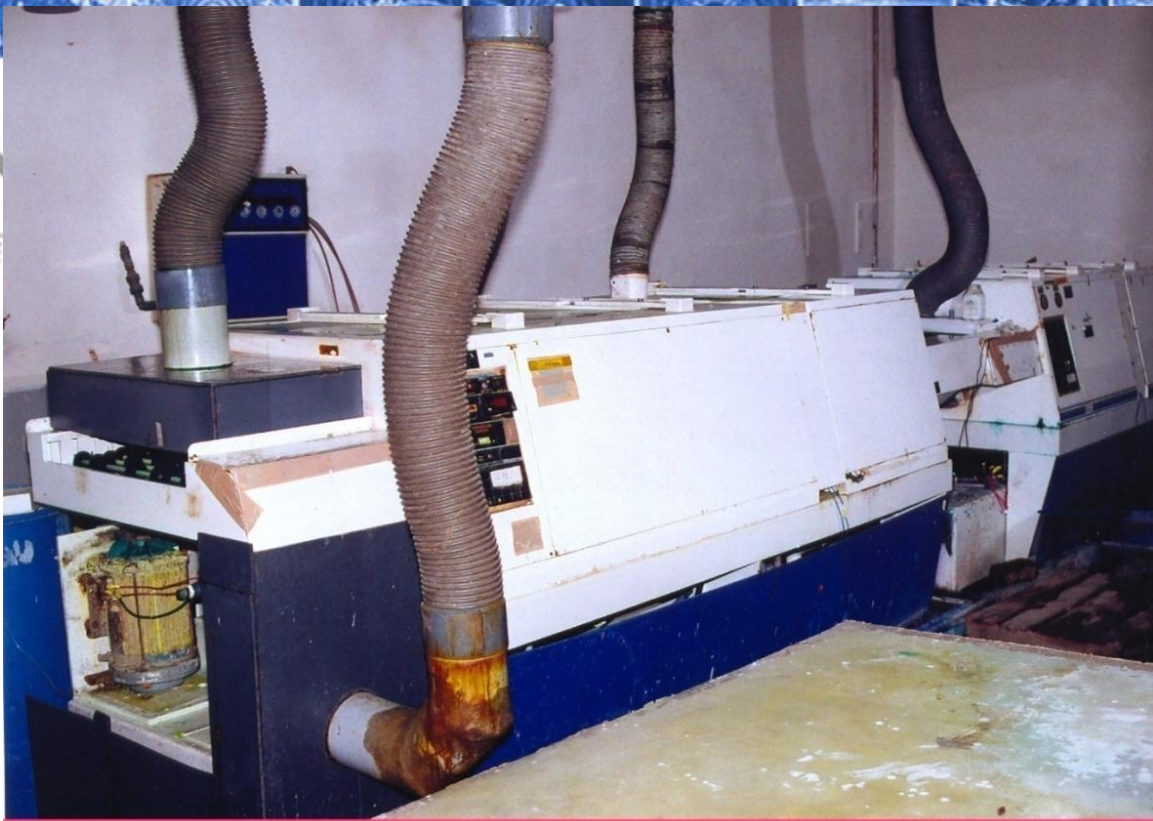
DRY FILM DEVELOPER

Developing of laminated dry film after imaging



CERN

éaire



Etcher and stripper

Etching and stripping operations



CER



aire

Laminar flow bench(KIRLOSKAR)

Clean room class 10000 for cover lay lamination



PHT | lamination press

**PHI lamination
presses == PLC
controlled**



CERN

éaire



Plating line --- electrolytic gold



CERN

Nucléaire



Electrolytic tin and copper plating lines

Plating lines --- Electroless copper, electrolytic tin, electrolytic copper



CERN

éaire

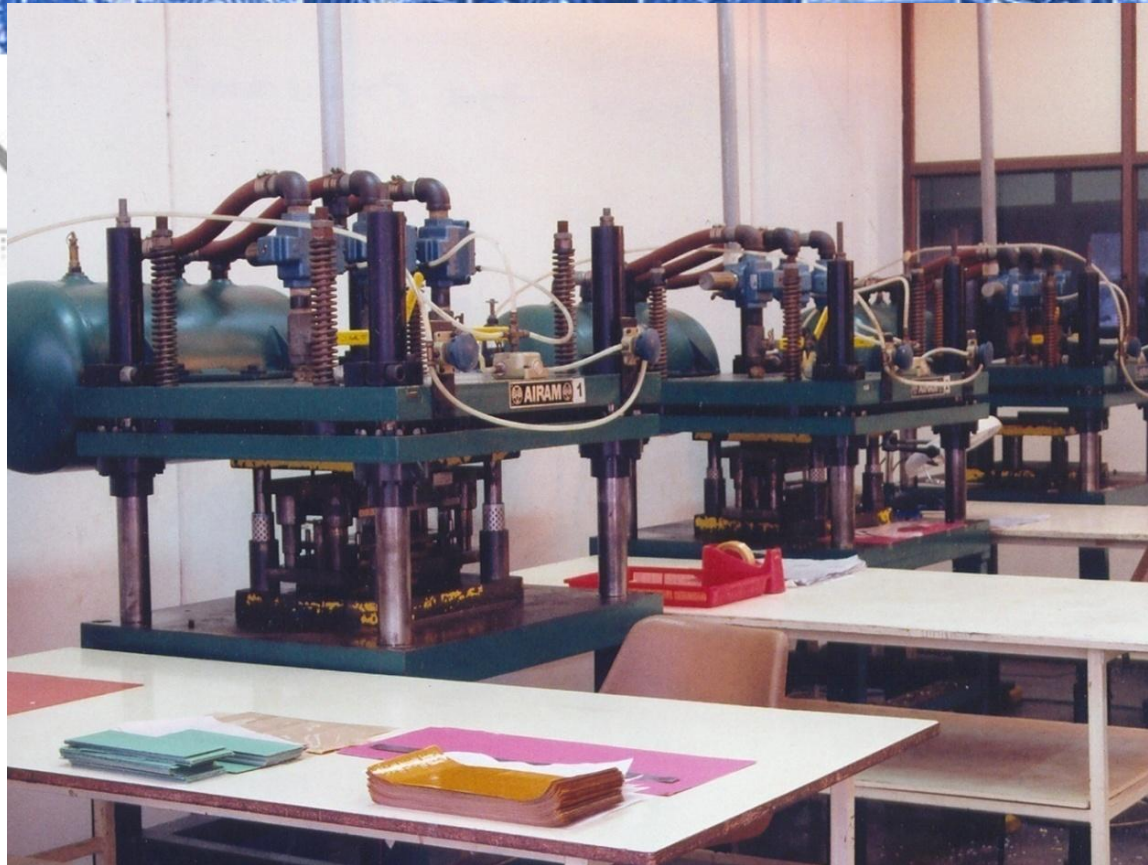


**with fluxing and
post cleaning**

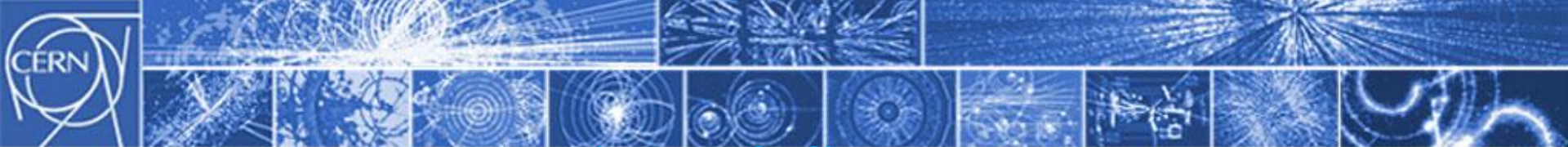


CERN

éaire



Profile cutting machines



CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

Flex PCB generally used for qualification:

COVERLAYER REGISTRATION

ADHESIVE SQUEEZE-OUT

SODA-STRAWING

FOREIGN ENTRAPMENTS

PHYSICAL TESTING REQUIREMENTS

FOLDING FLEXIBILITY

FLEXIBILITY ENDURANCE

TESTS FOR CHECKING CONSTRUCTION INTEGRITY



CERN



Analytical laboratory for in process testing



CERN

éaire



Profile projector for optical inspection



CERN

éaire



**UTRON PCB tester,flexible endurance tester,
high voltage tester,insulation resistance tester.**

Electrical and reliability testers



CERN

éaire



D.M. Water plant



Examples of Flexible Circuit Applications

(KIED manufactured FPCs for many of these applications)

CERN

European Organization for Nuclear Research
 Organisation Européenne pour la Recherche Nucléaire

Automotive

Instrument panels
 Headliner circuits

Computers & peripherals

Dot matrix print heads
 Disk drives
 Ink jet print heads
 Printer head cables

Consumer

Digital & video cameras
 Personal entertainment

Industrial controls

Laser measuring
 Inductor coil pickups
 Copy machines
 Heater coils

Medical

Hearing aids
 Heart pace-makers
 Defi brillators
 Patient Monitoring Systems

Instruments

NMR analyzers
 X-ray equipment
 Particle counters
 Infrared analyzers

Telecom

Cell phones
 High -speed cables
 Base stations
 Smart cards & RFID

Military & Aerospace

Satellites

Instrumentation panels
 Plasma displays
 Radar systems
 Jet engine controls
 Night vision systems

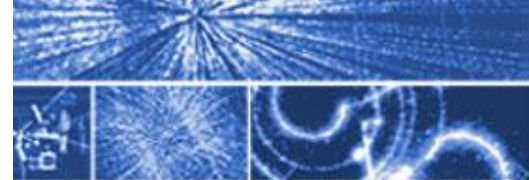
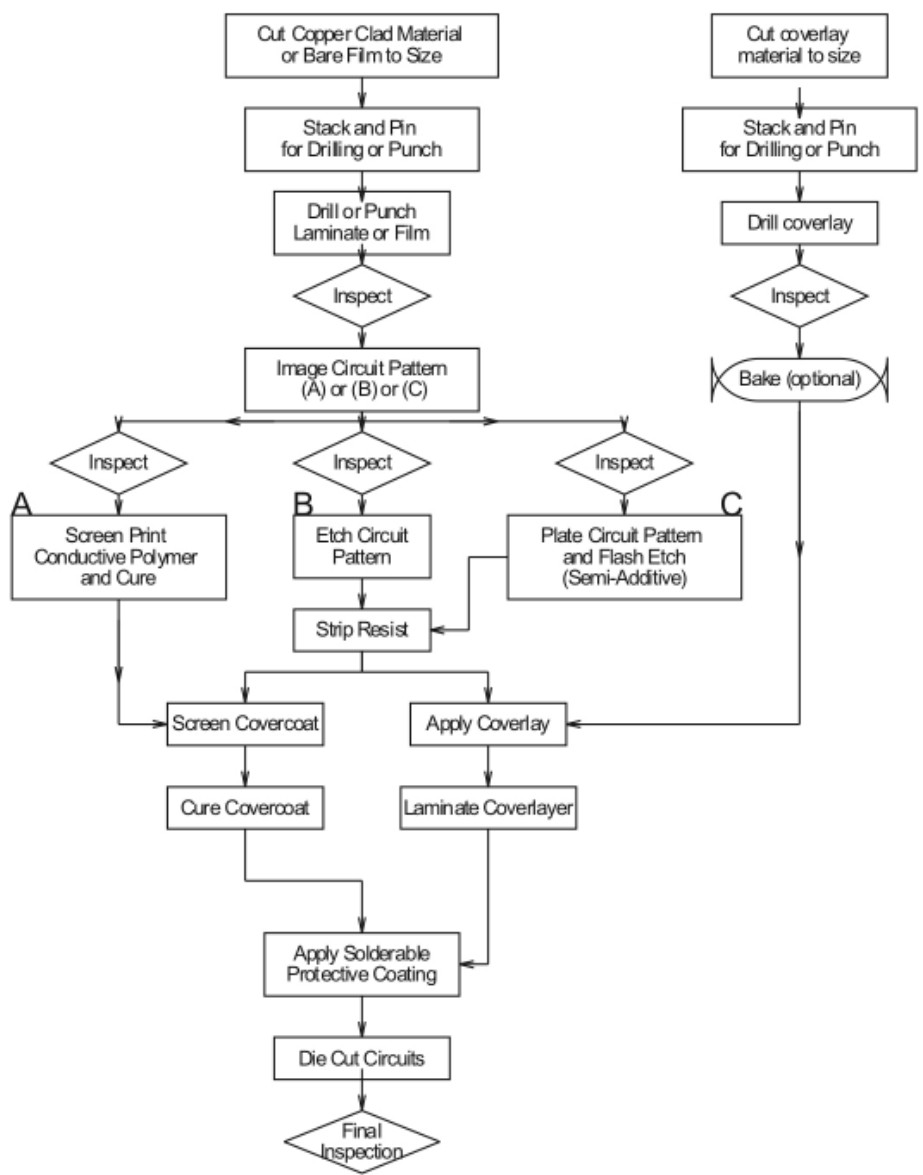
Smart weapons

Laser gyroscopes
 Torpedoes
 Electronic shielding
 Radio communications
 Surveillance systems



CERN

Single Layer Flex Manufacture

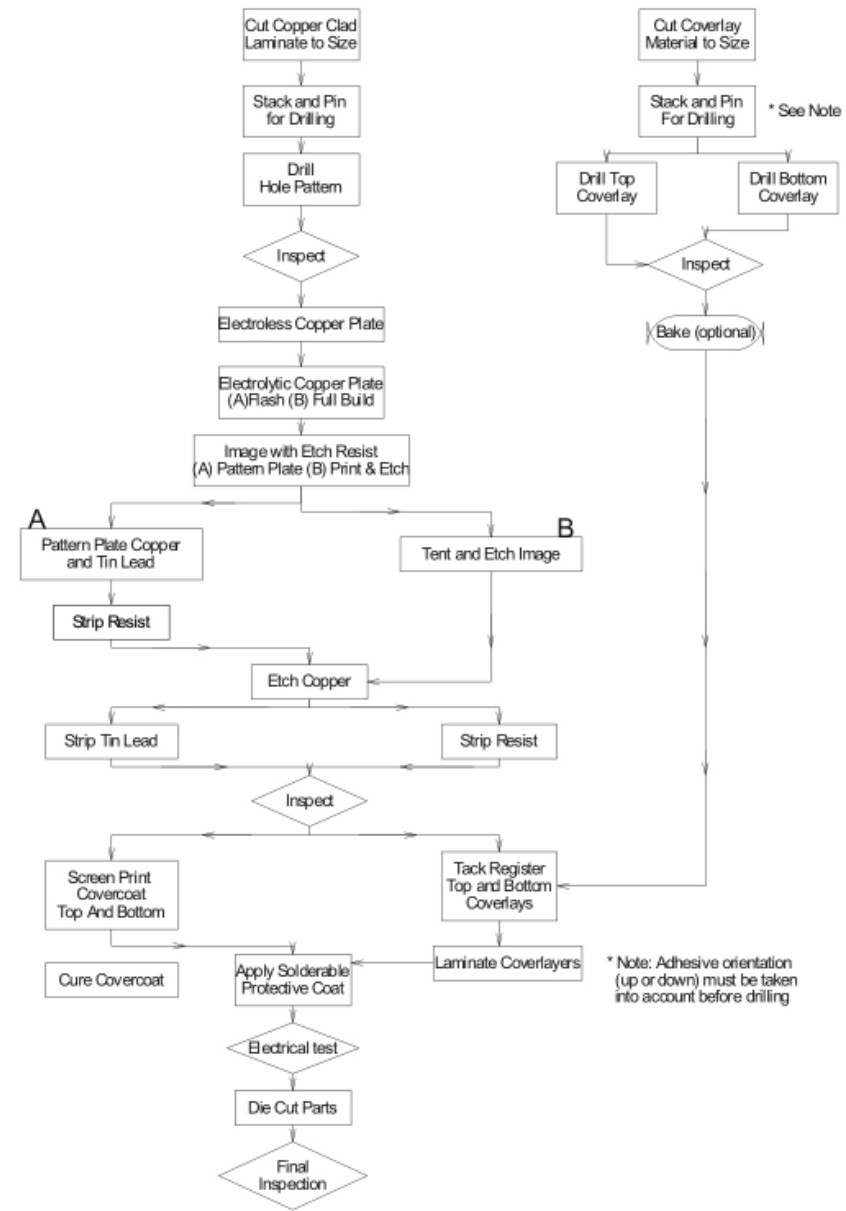


h
e Nucléaire

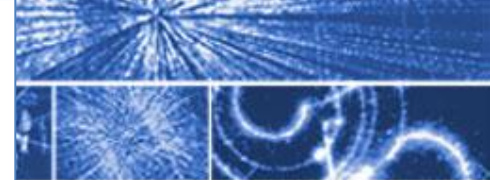


CERN

Double-Sided Flex Manufacture



* Note: Adhesive orientation (up or down) must be taken into account before drilling

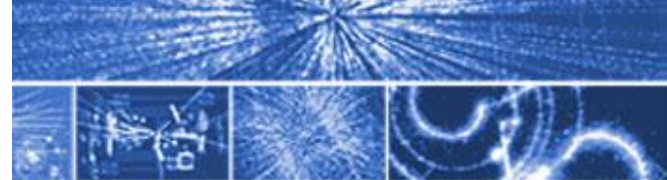
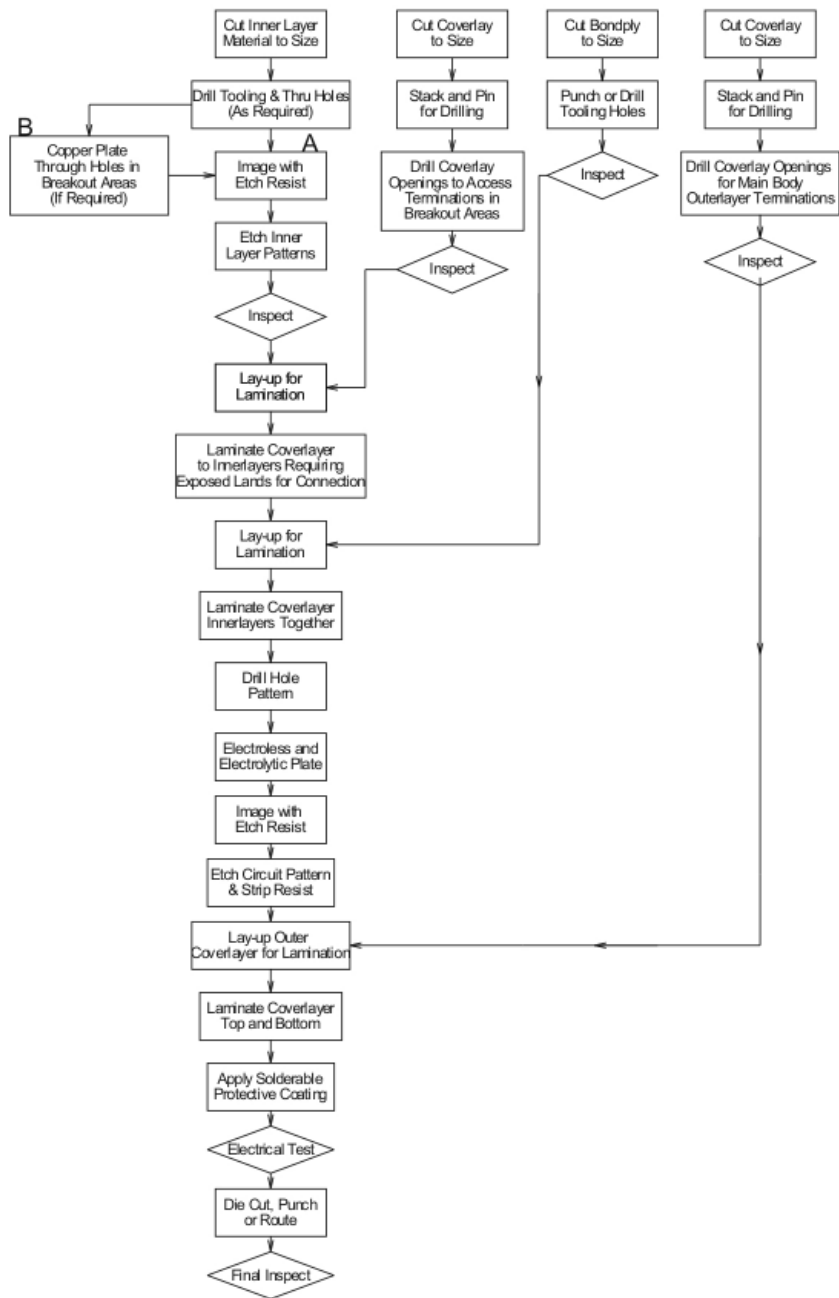


Nucléaire



CERN

Multilayer Flex Manufacture

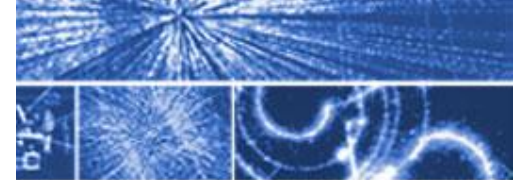
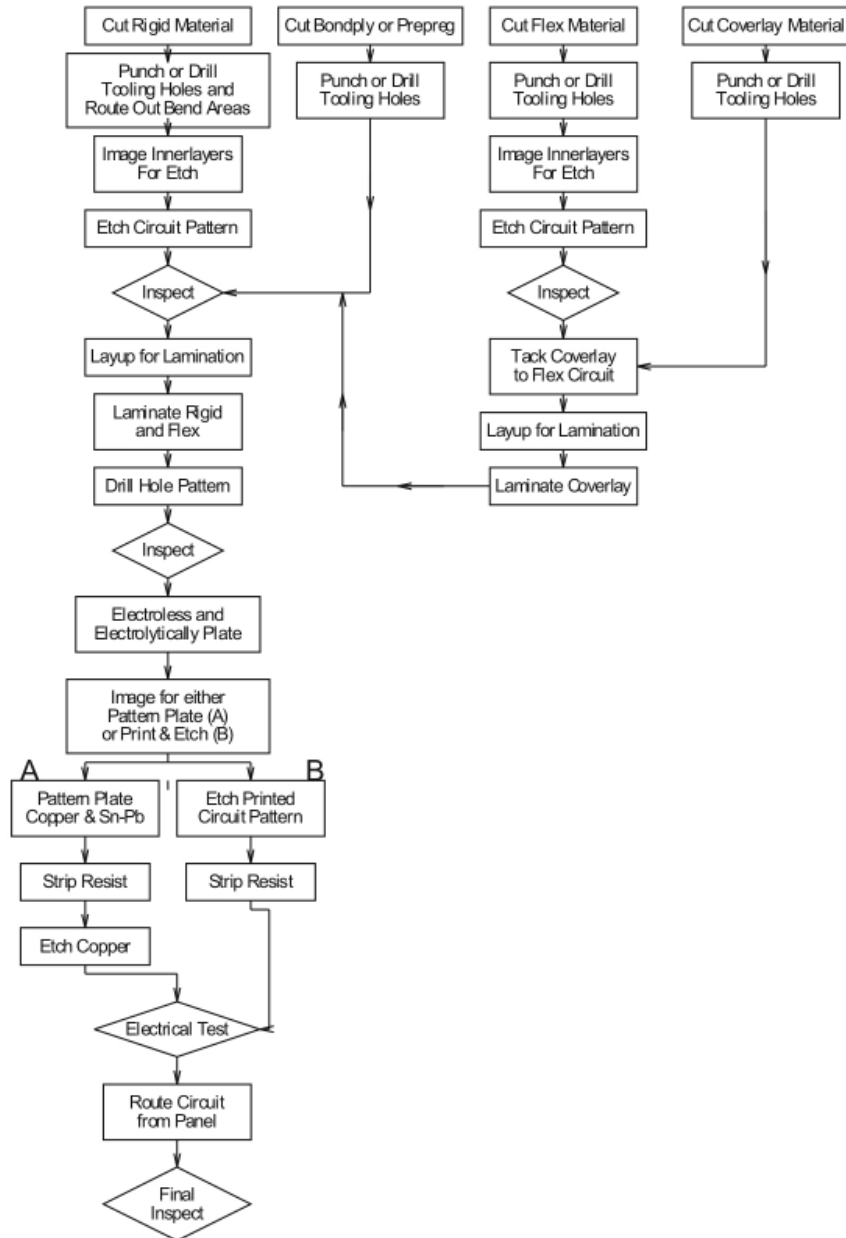


Research
cherche Nucléaire

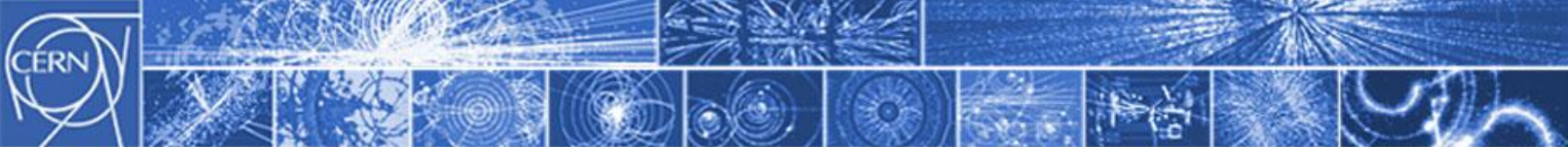


CERN

Rigid-Flex Manufacture



Nucléaire



CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

Jobs based essentially on etching, manufactured by KIED

Hyderabad Batteries Limited : Electrode Pcb's for defence applications.

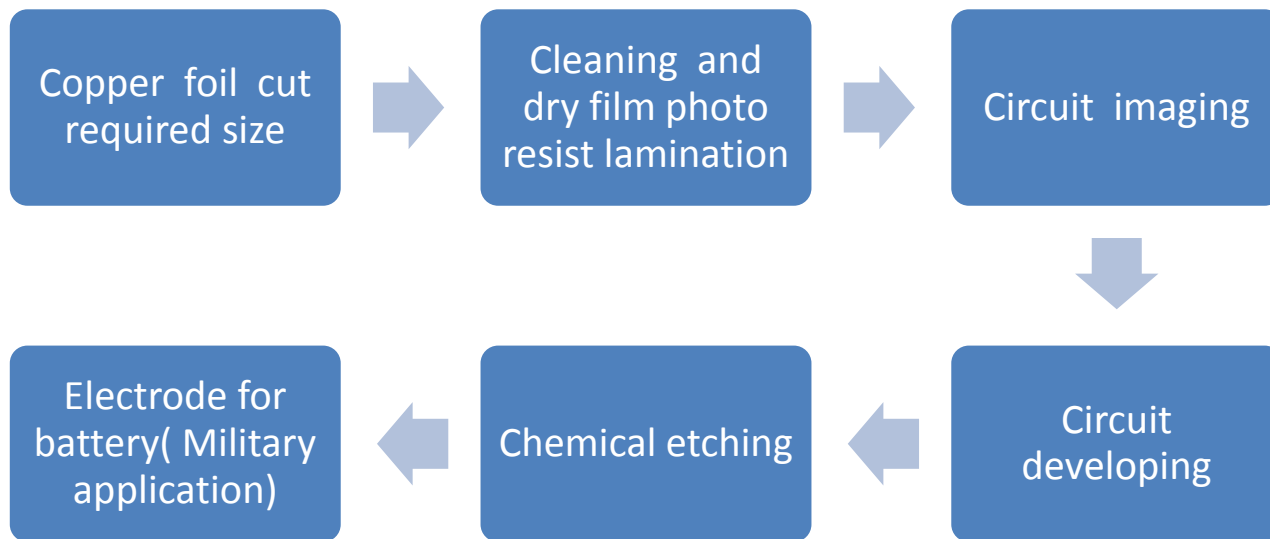
Bharat Electronics Limited : Patch antenna with fine lines

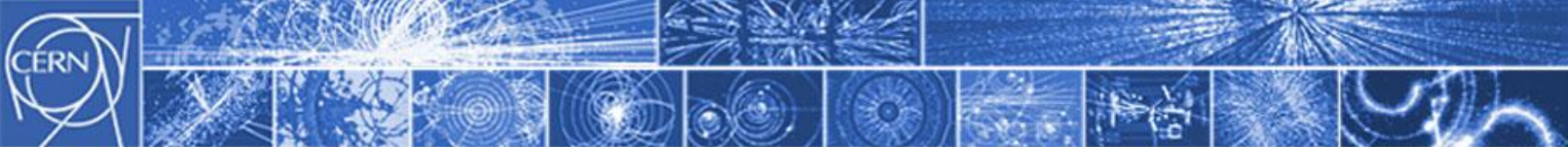
GE Health Care (India & US) : Circuits for MRI Scanners

Larsen & Toubro Limited : Circuits for patient monitoring systems

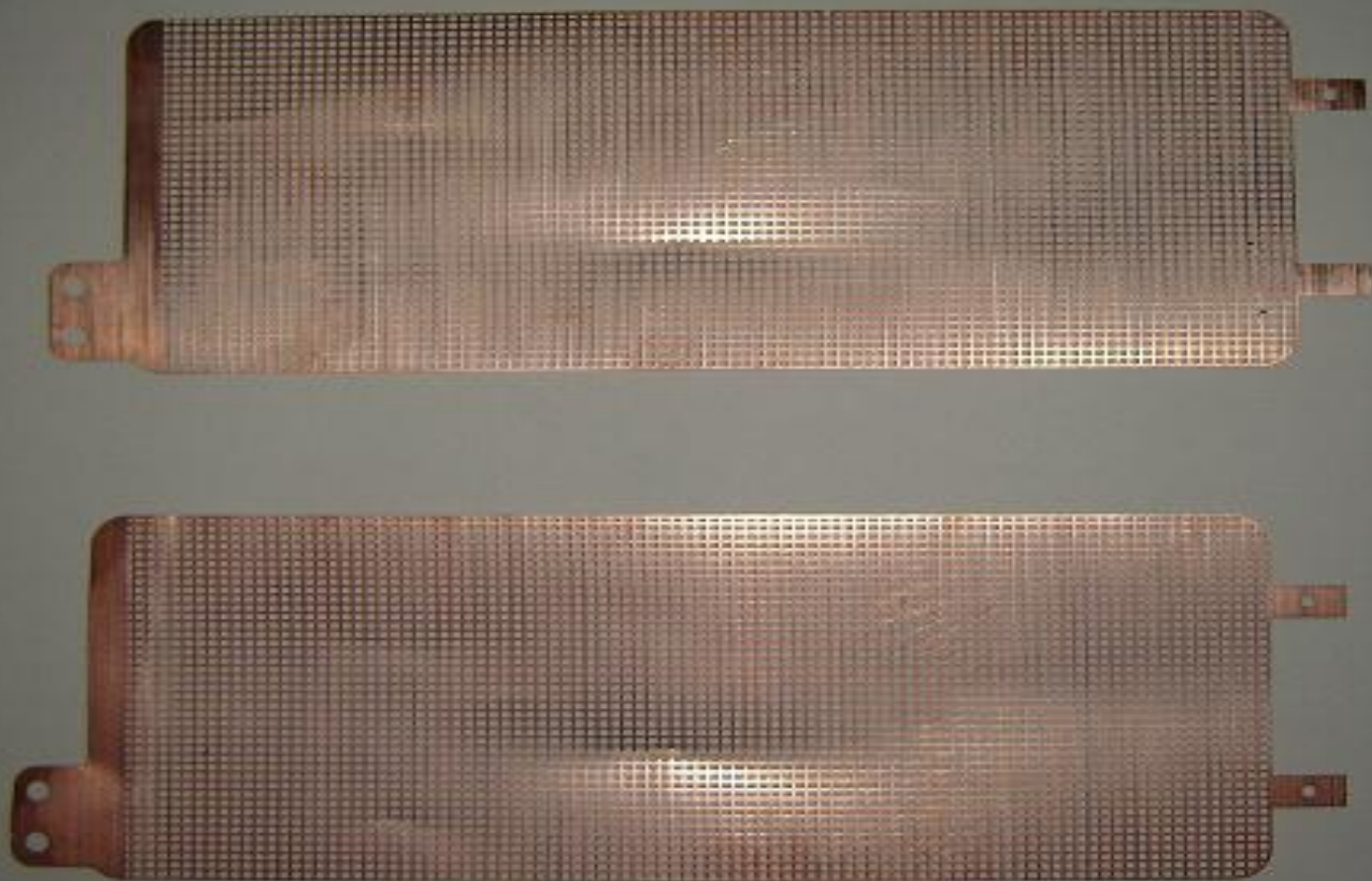
and several others

Process of etching for manufacturing electrodes (no drilling required)





European Organization for Nuclear Research



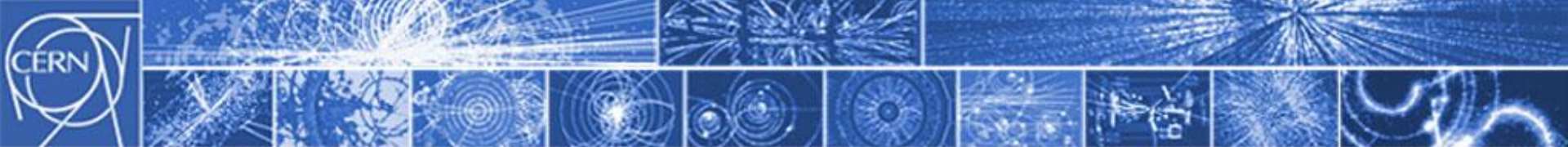


CERN

Our other prestigious customers
for flex pcbs: National and
International

- SINP
- TVSE
- Panasonic
- Motorola
- Masimo
- Baxter
- AT&T
- JTS
- Power wave Technologies
- Telxon
- Intermec
- 3-5 systems
- Huges Network
- HP
- FCI OEN
- SFO
- BDL

and many more



CERN

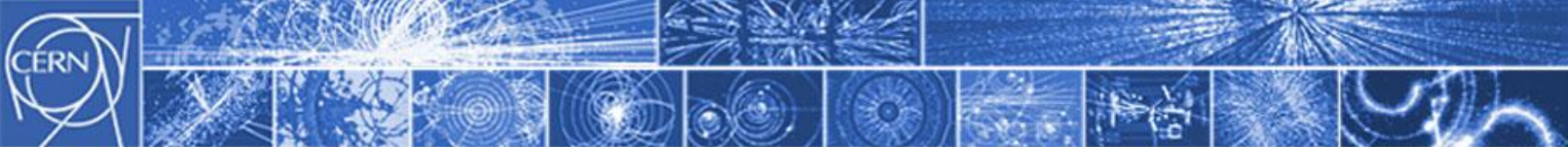
PCBs made for SINP

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

A) Large rigid PCBs

B) Kapton PCBs

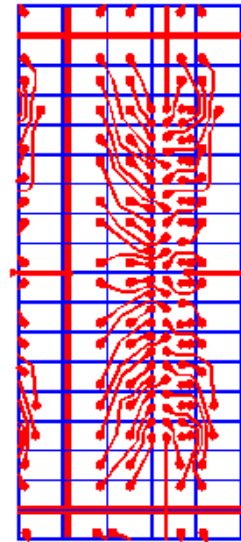
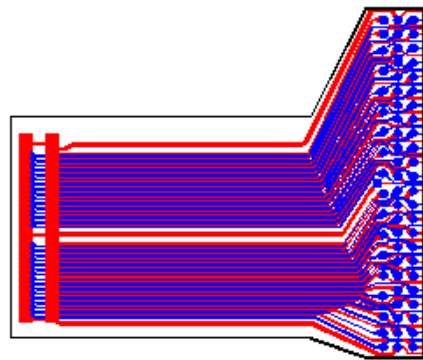
The following slides show the different types of PCBs made by us for their projects



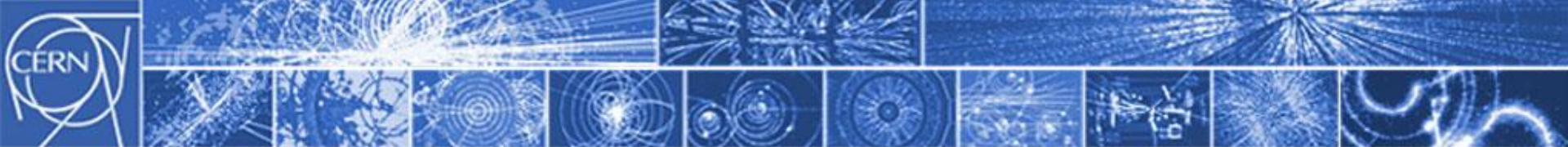
CERN

European Organization for Nuclear Research

re

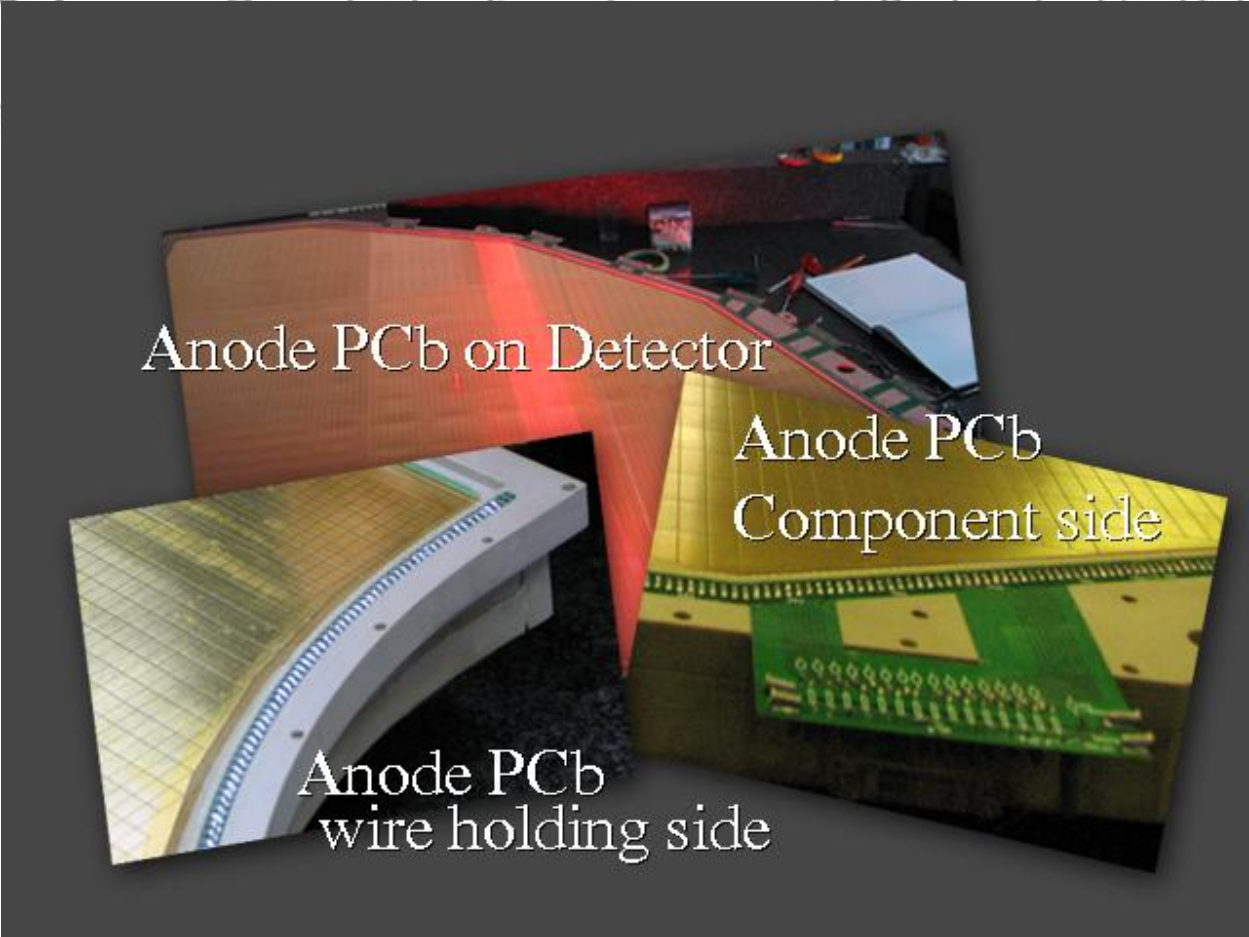


Kapton and Cathode PCB



European Organization for Nuclear Research

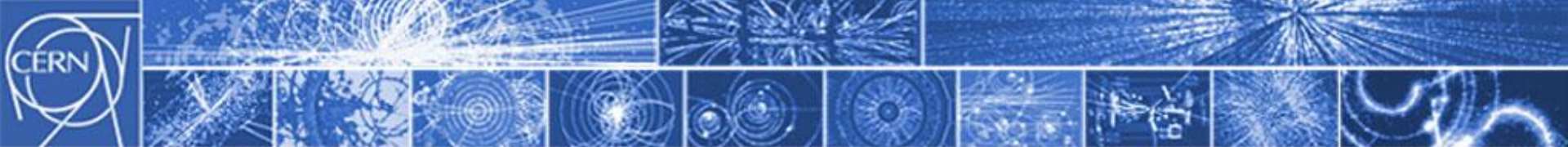
CERN



Anode PCB on Detector

Anode PCB
Component side

Anode PCB
wire holding side

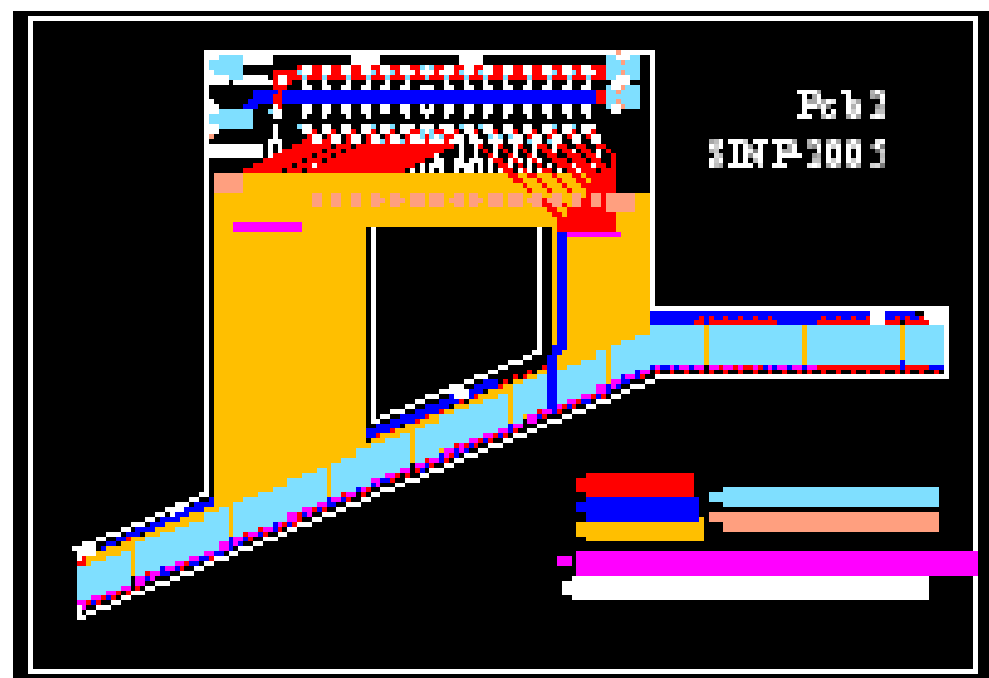
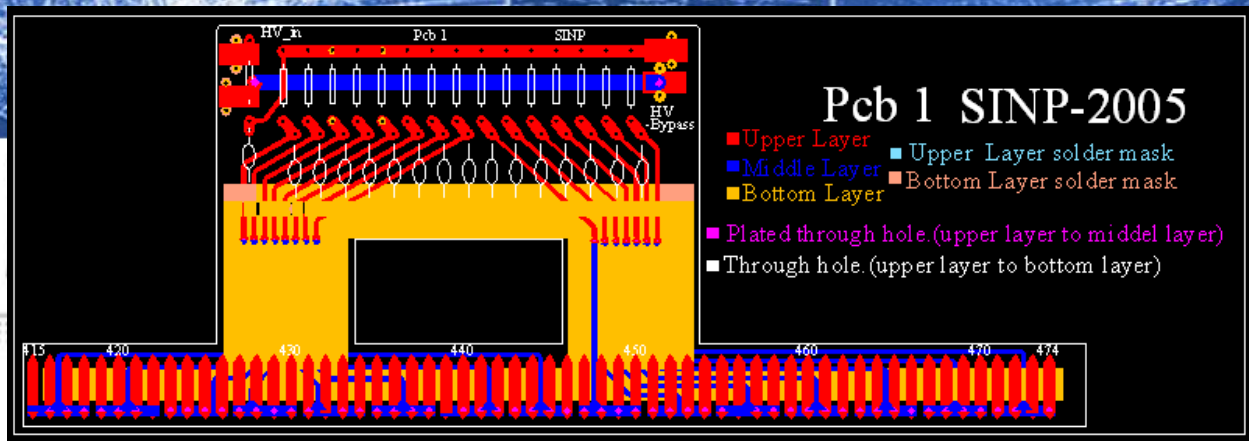


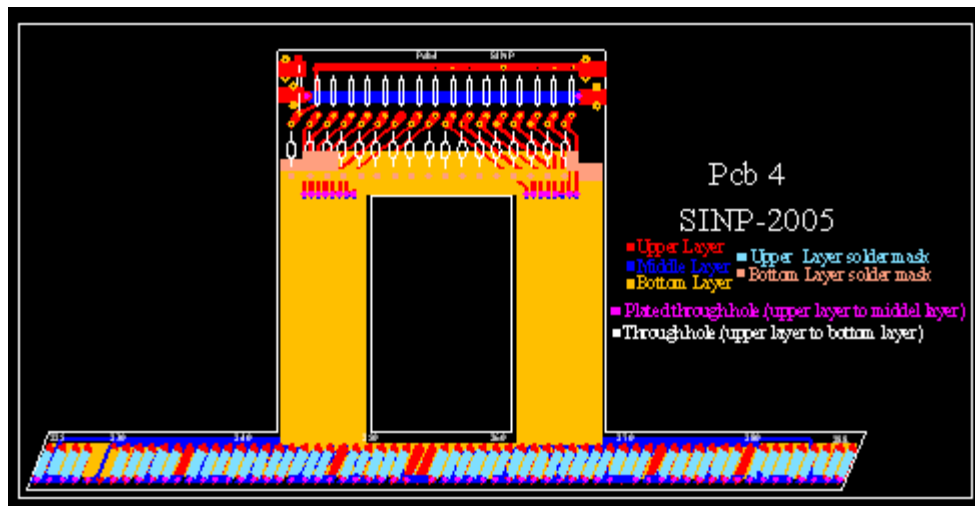
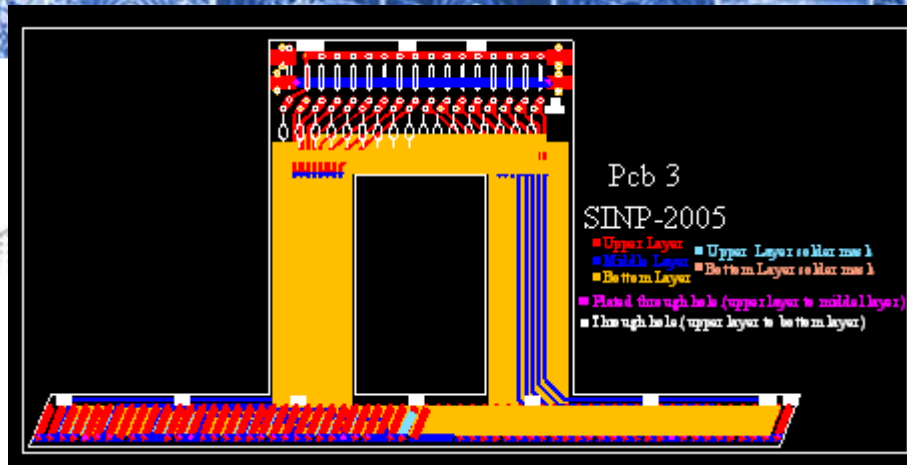
CERN

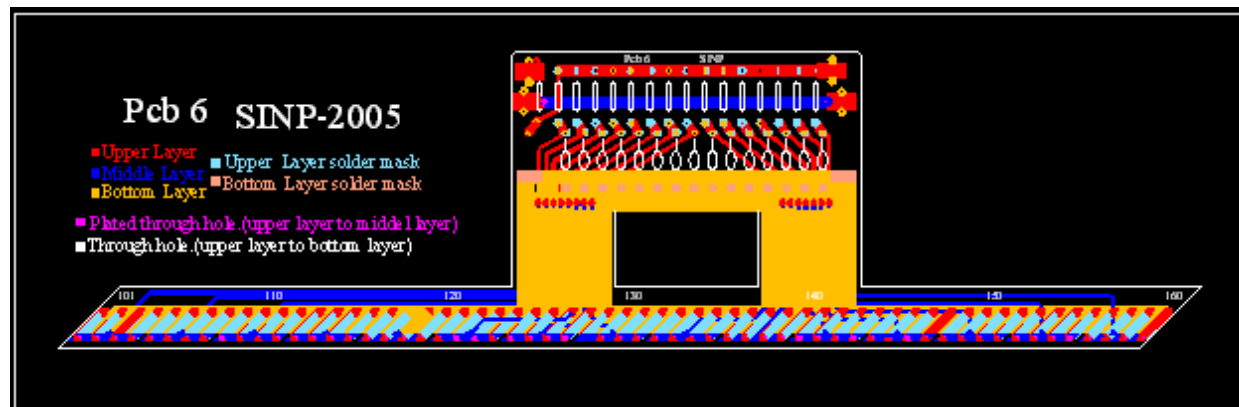
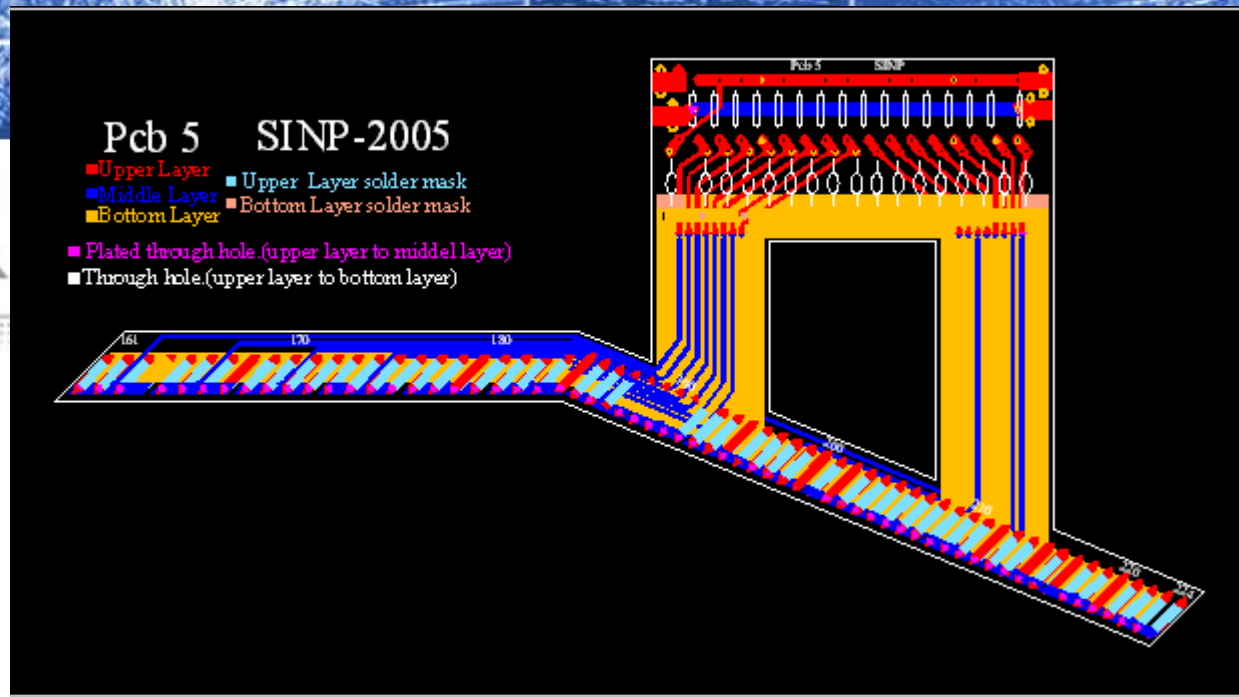
European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

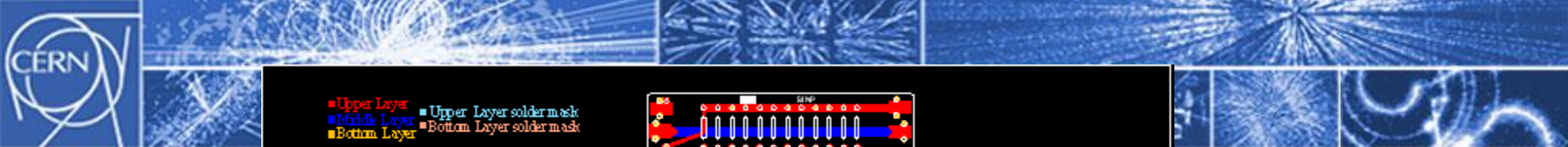
Anode PCBs

(shown in the following slides)



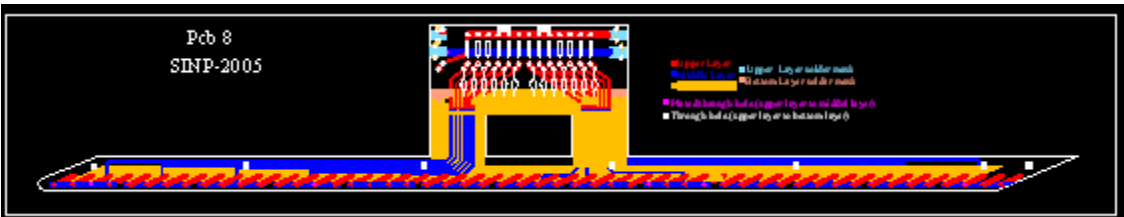
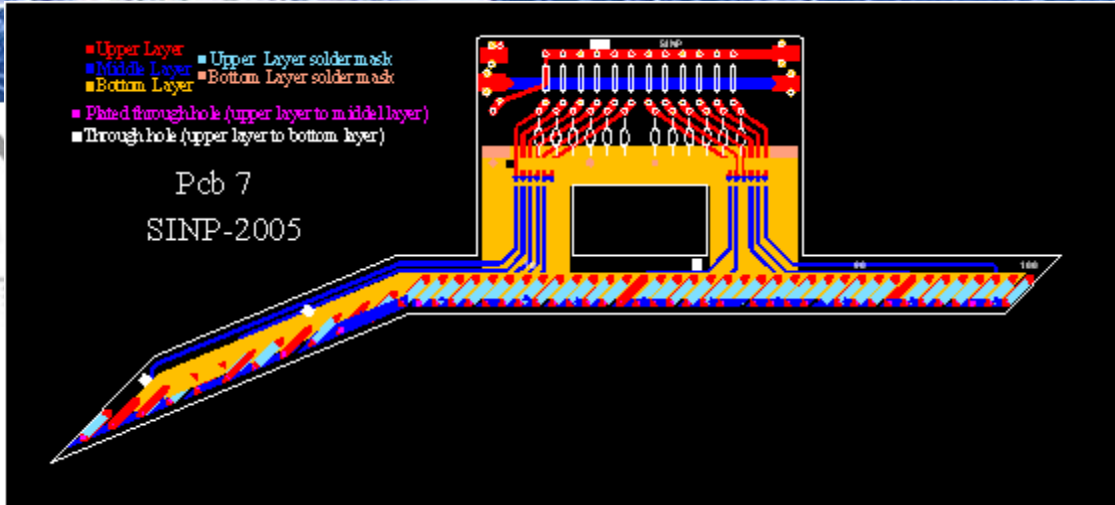


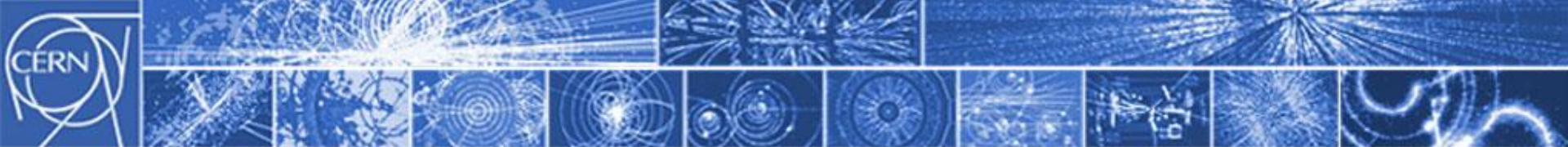




CERN

Nucléaire



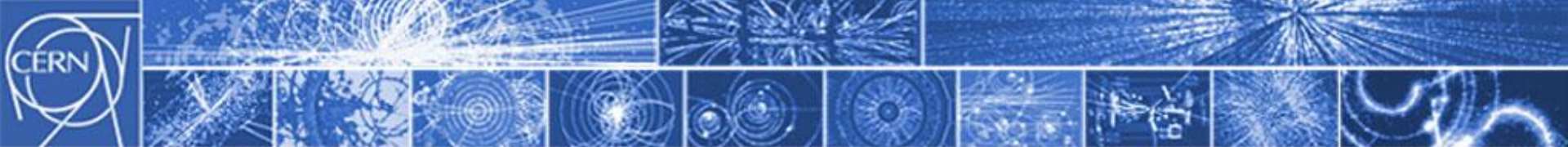


CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire

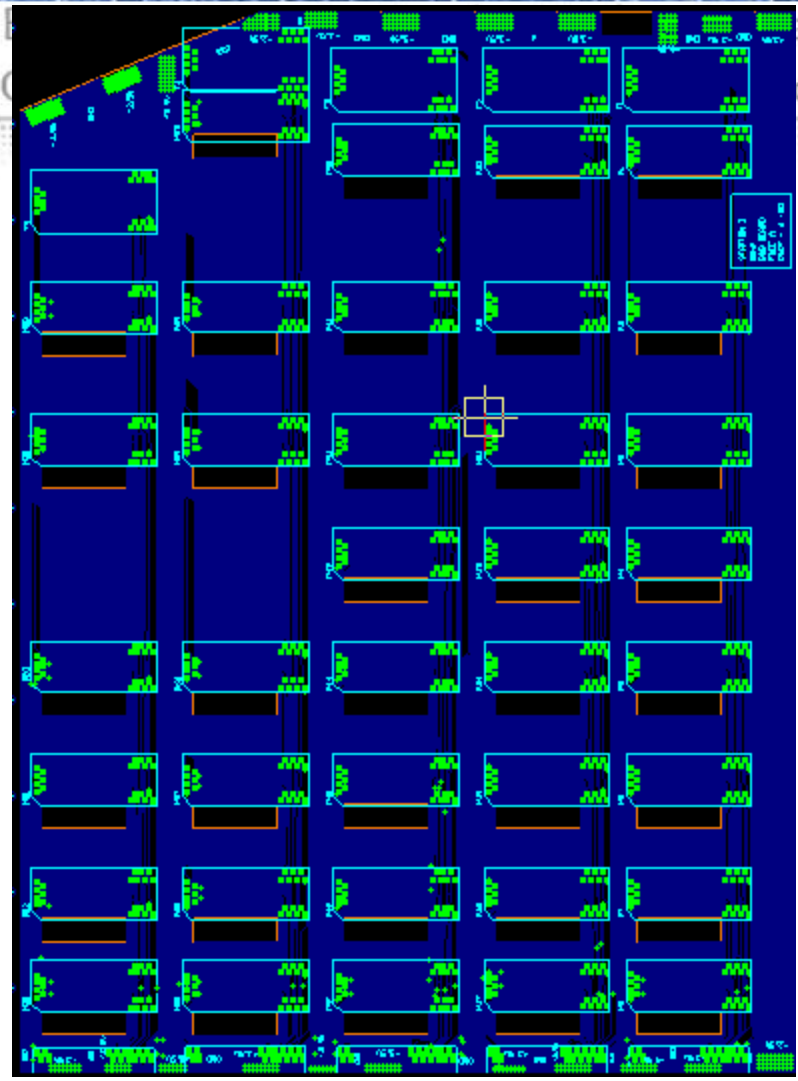
ALICE PCBs

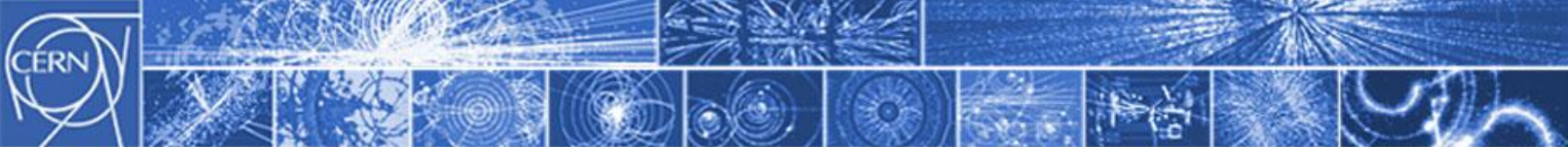
(shown in the following slides)



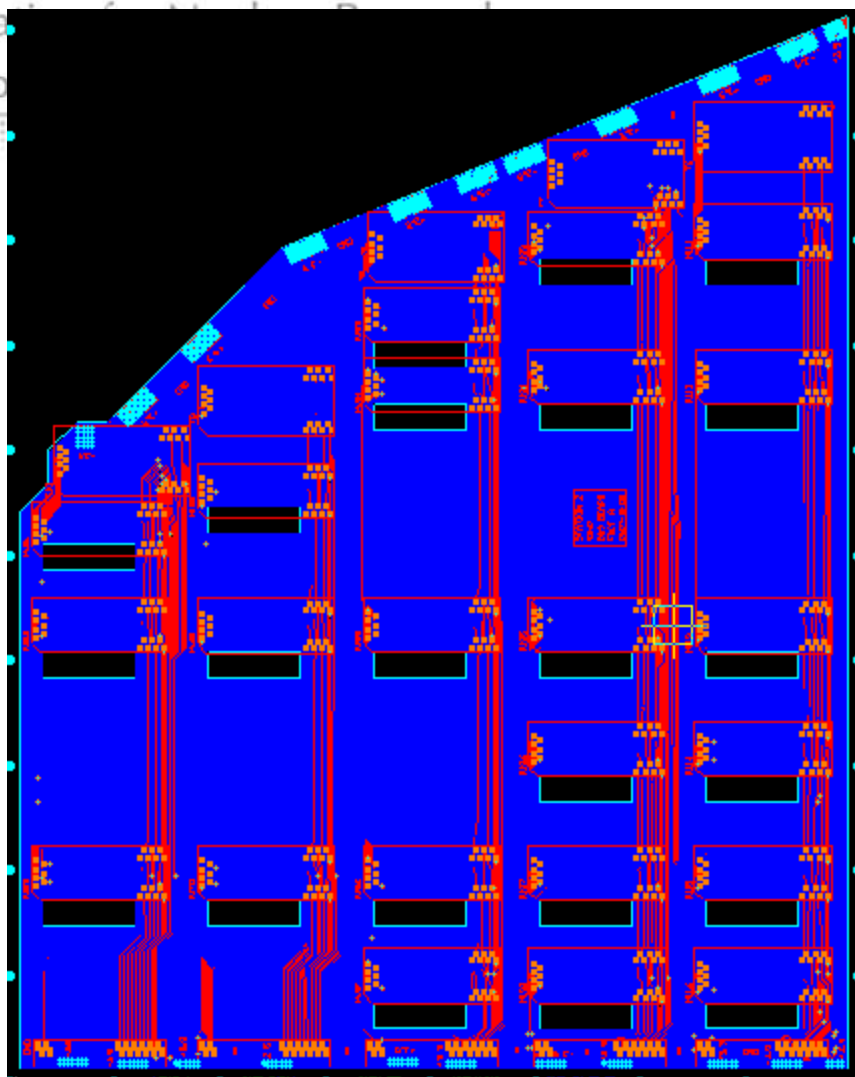
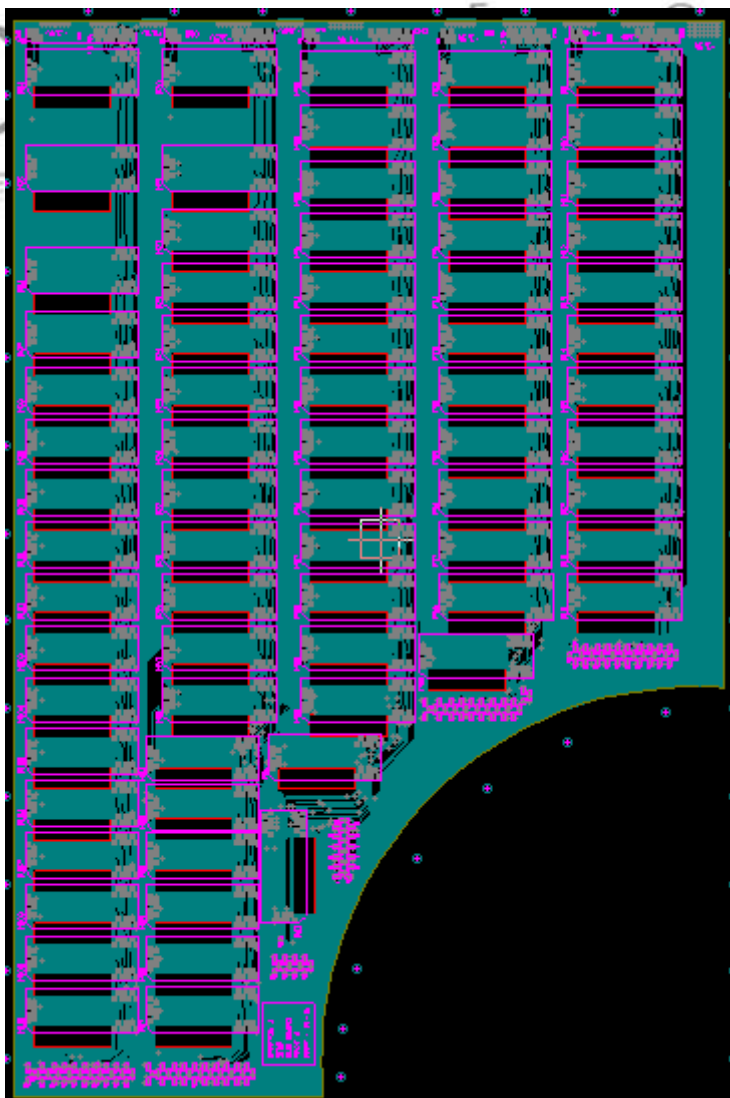
CERN

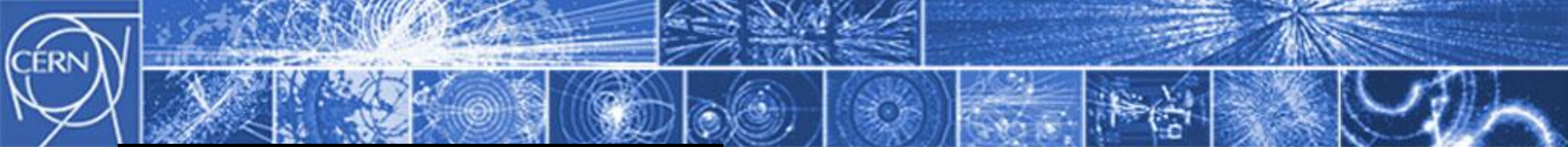
Research
Centre for Nuclear





aniza
Europ

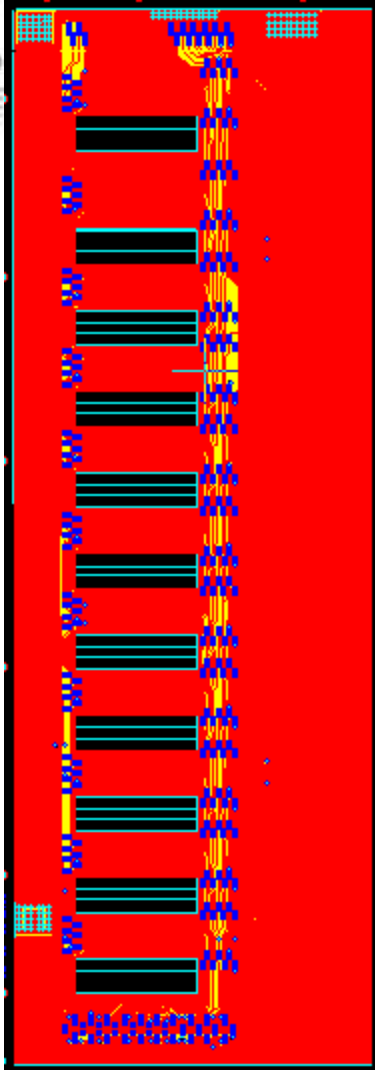
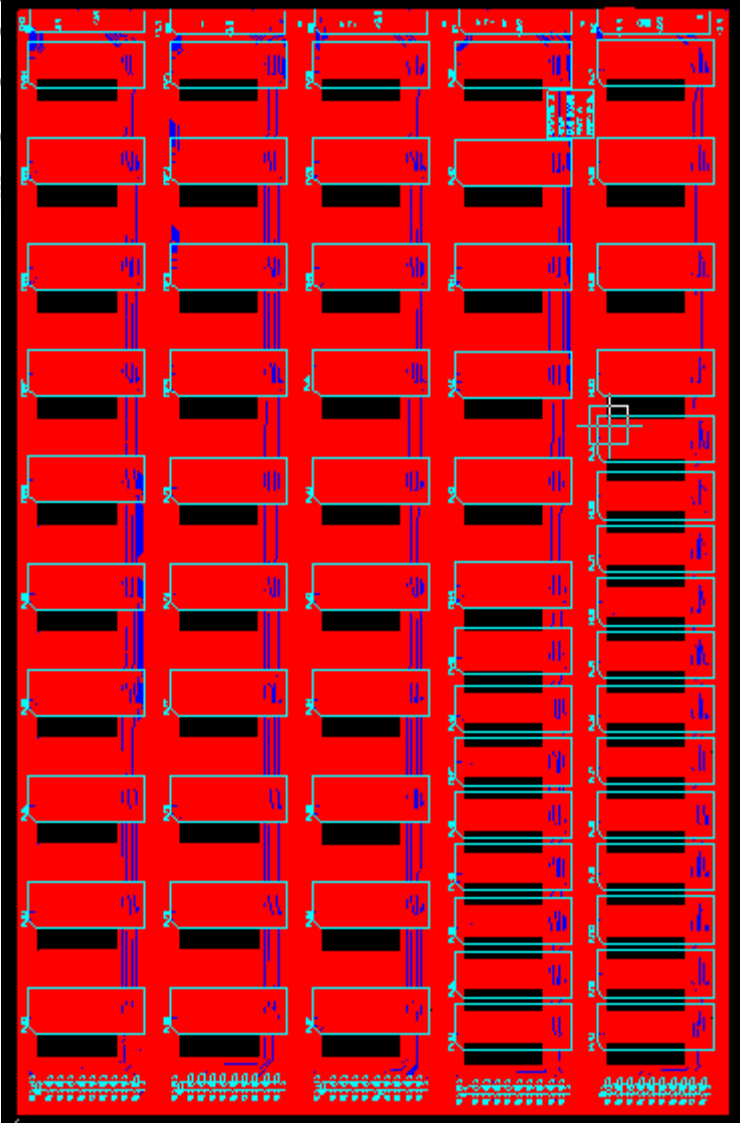


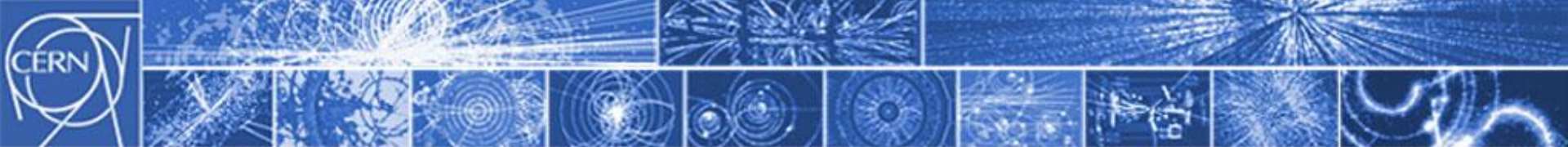


CE

Organization for Nuclear Research
européenne p

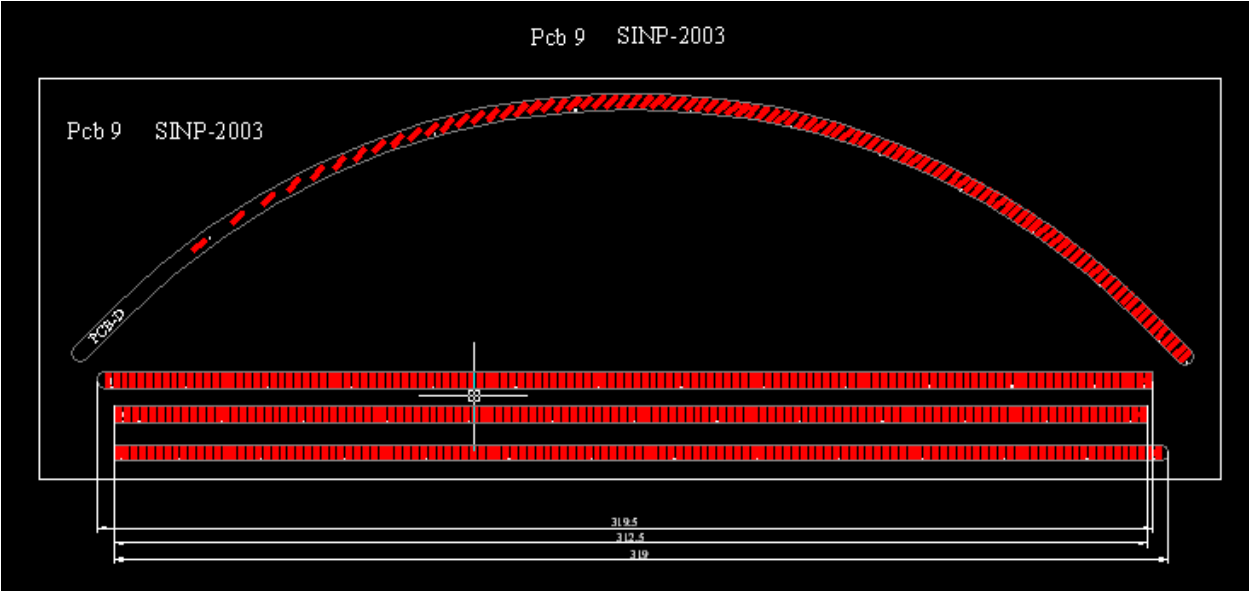
nucléaire





CERN

European Organization for Nuclear Research
Organisation Européenne pour la Recherche Nucléaire





- Keerthi Industries Limited, Electronics Division,
Plot no 40, IDA, Balanagar, Hyderabad ,500037

(formerly Hyderabad Flextech Limited)

Name was changed after amalgamation with our
sister concern



Keerthi Industries Limited

CERN

European Organization for Nuclear Research

Organisation Européenne pour la Recherche Nucléaire

- ISO – 9001 – 2008
- UL - 94 V-0 for all flex circuit types manufactured

Supplying Flex circuits to major telecom
aerospace , defence and medical
applications since 1995

Capable of manufacturing 37000 square meters
of fpcs per annum

Achievement award from DoE (three more awards were received for excellence)

