

The CERN logo, featuring the word "CERN" in a white serif font inside a white circle, which is partially overlaid by a white line that forms a stylized particle detector structure.

CERN

EST-DEM

**Development of Electronic Modules
Group**

Erik van der Bij
CERN

Agenda



Part 1: DEM General

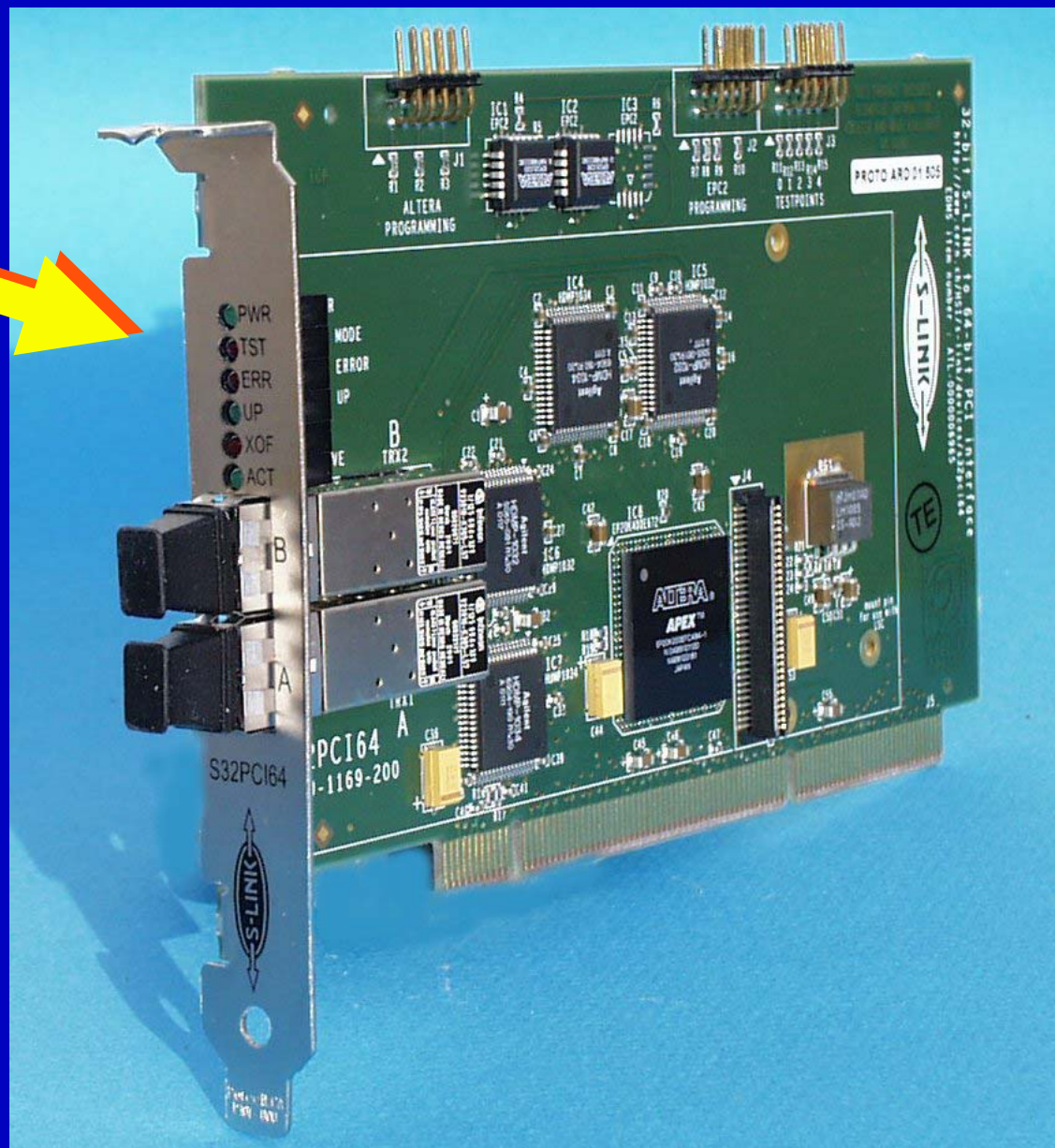
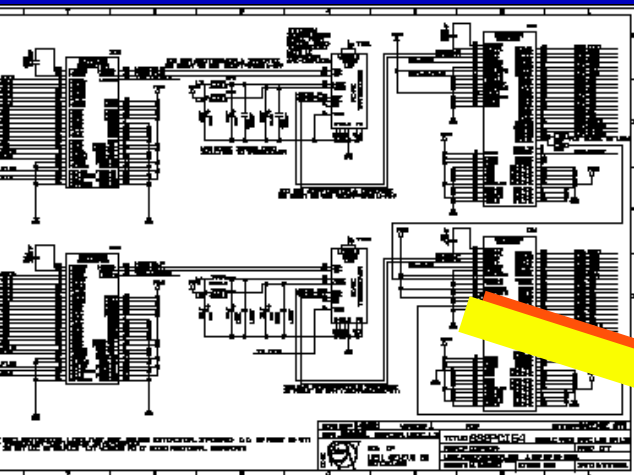
Services

Organisation

Turn-around times

Conclusions

Part 2: Special Circuits



MANDATE
 Turn schematics
 into boards
 (standard + special)

PCB design

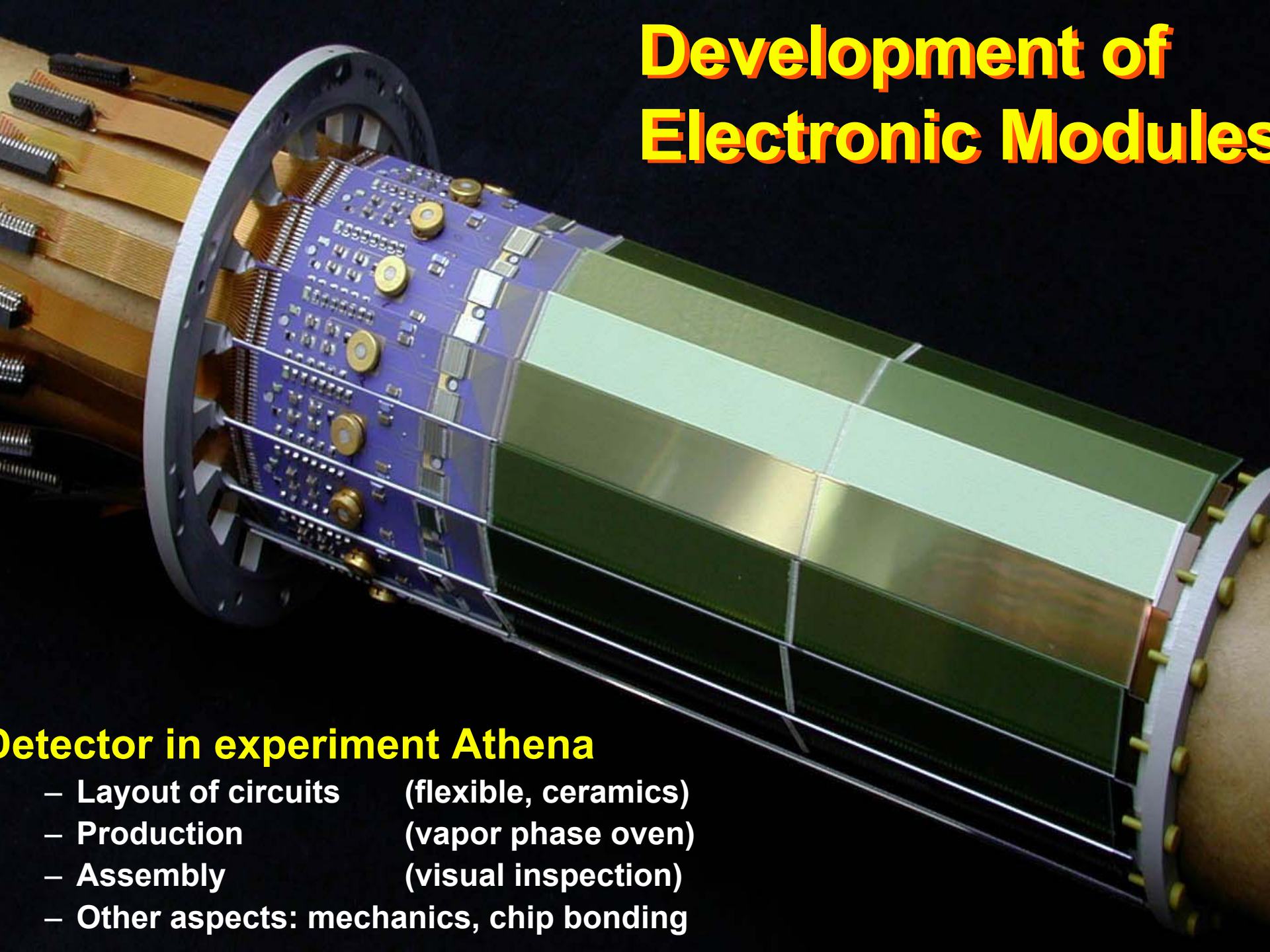
Manufacture of
 special circuits
 and PCBs

Assembly

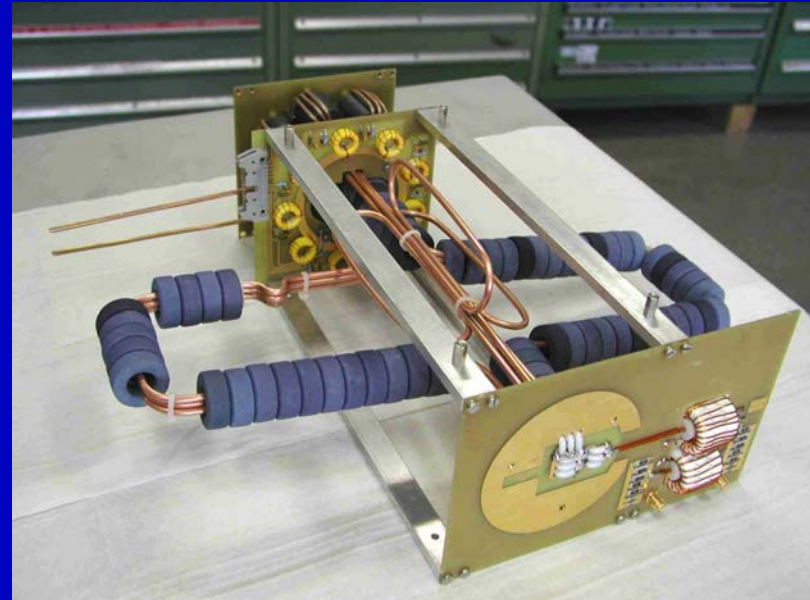
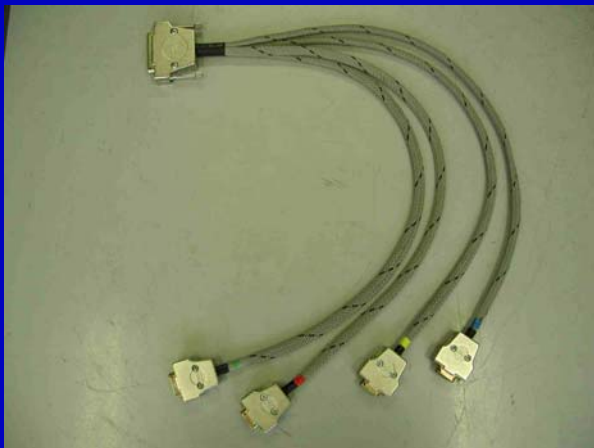
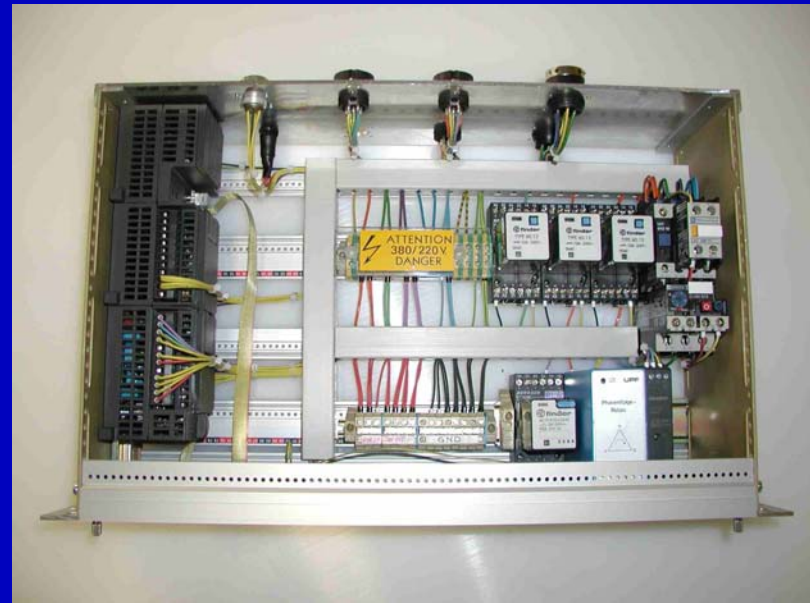
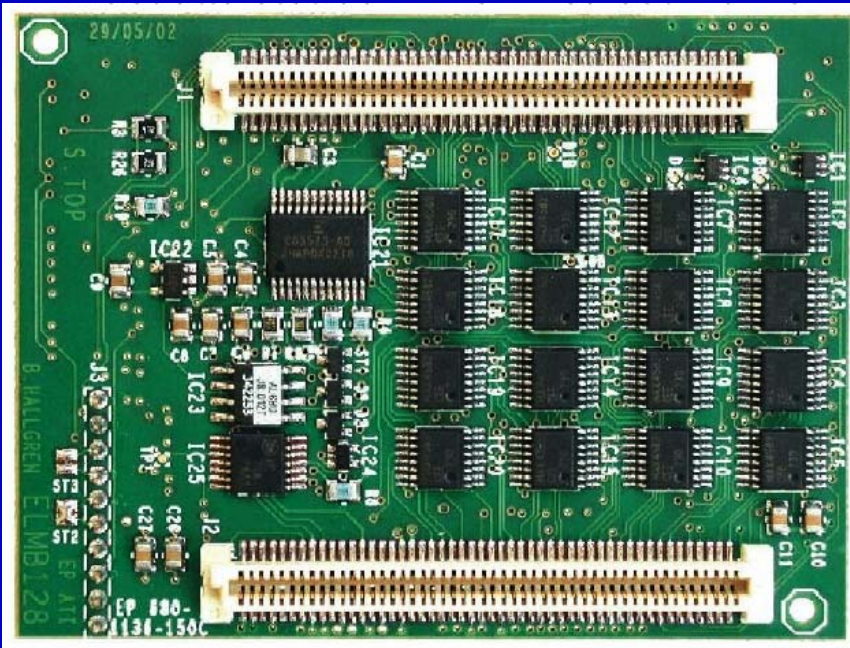
Development of Electronic Modules

Detector in experiment Athena

- Layout of circuits (flexible, ceramics)
- Production (vapor phase oven)
- Assembly (visual inspection)
- Other aspects: mechanics, chip bonding



Examples of "standard" work



CERN



EST-DEM General organisation



Request

Circuit or module

Planning office
'commercial' contact

Ordering
Tracking
Invoicing

Design office
DEM-BE

Circuit manufacturing
DEM-PMT

Assembly
DEM-WS

Sub-contracting
Large quantities
member states

Sub-contracting
(overflow of CERN capacity)
Prototypes, fast turn-around
local industry

Working method

You have a single point of entry and exit

- BE will take a job and follow it from PCB design to assembly
- you just have to **review the layout** and **provide the non-standard components**

You receive planning and estimated pricing

- receive sheet with total cost before receiving bill (optional)
- planning and priorities defined by CERN staff
- you can access Industrial Support for technical details

BE – Design office

Marcello d'Auria

Layout of PCB, flexible circuit, hybrid or fine-pitch detectors

Design of associated small mechanics (front-panels, crates)

Creation of schematic and padstack symbols

- Cadence and PCAD libraries

Storage of manufacturing files

- PCB production, assembly, bill of material all in EDMS (EDA-xxxxx)

Organisation of in-house production and assembly

- prototype quantities: <10 pieces

Organisation of outsourcing of production and assembly

- small scale production: 10-50 pieces
- Limited help for large scale production

Technical advice on manufacturing

PMT – Fabrication

Rui de Oliveira

Special circuits

- flex-rigid boards
- multi-layer boards with integrated metal or pyrolytic carbon
- high-definition circuits (traces and isolation 5 to 10 μm)

Thick-film hybrids

- serigraphy of conducting paste on ceramic substrates (aluminium, aluminium nitride, berillyumoxide)

Chemical treatment

- thin metal sheets (copper, inox, nickel, aluminium, titanium)

Standard printed circuit boards (incl. halogen free)

- single side to multi-layer boards (upto 14 layers, class 6)
- flexible circuits (kapton)

Technical advice on material selection and processes



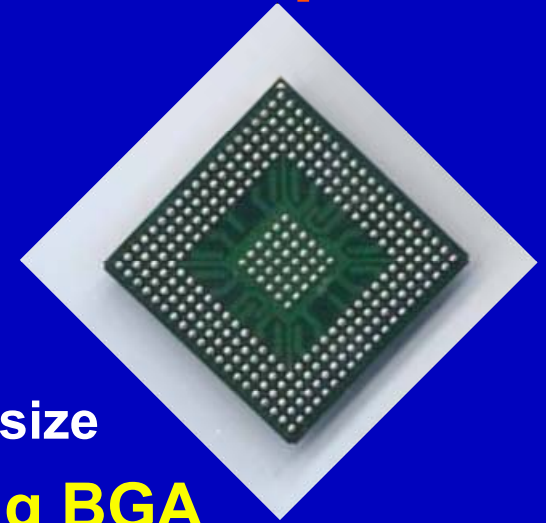


WS – Assembly workshop

Claude Millerin, Nicole Wauquier

Mounting of components

- through-hole
- PLCC, SOIC
- BGA down to 0.8 mm pitch
- resistors and capacitors down to 0201 size



Replacing of components, including BGA

Production of cables (coax, flatcables, twisted pair)

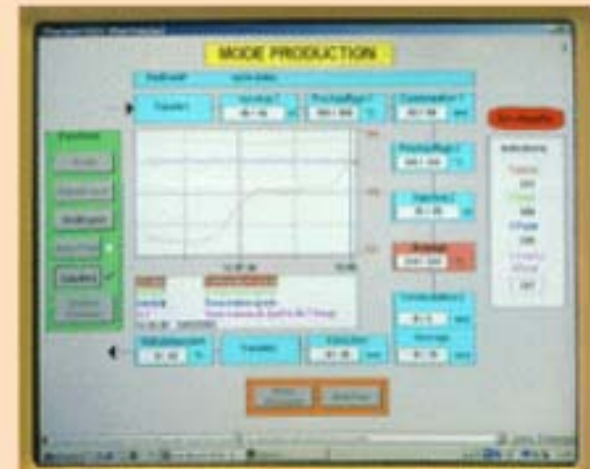
Wiring of crates

30-minute express service for small interventions

Technical advice

- component selection and manufacturing

Condensation oven



Brasage écran

Turn-around time

Prototype electronics production
multi-layer PCB, standard priority

Layout (and queue) 4 weeks	PCB fabrication 3 weeks	Assembly 2 weeks	Margin 1 week
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Only in exceptional cases this time can be reduced

PCB fabrication can handle 2 urgencies per day

– e.g. double sided PCB in 3 days, single sided 1 day

Replacement of component: 30 minute service

What can you do?

Be realistic with planning. Count on 10-12 weeks!

Inform us about the tendency of workload

- Will there be less or more prototyping next year?

Pass all your electronics jobs via this central service

- unifies manufacturing files (formats and EDMS central storage)
- better quality and cheaper (P+M, less s/w licenses required)
- uses global SPL contracts for outsourcing (cheaper)
- assures stability of DEM
- **is much easier for your already overloaded engineers!**

Conclusions

DEM provides you a turn-key solution

- from your design to wired boards in 10 weeks
- all services close to the engineers
- production in small to medium quantities
- advice on manufacturing (material, components, processes)

DEM has contracts with industry

- local industry for prototyping
- in other CERN member states for medium scale production

The service can save you a lot of time and cost

CERN

DEM
on
the
web!

Erik

CERN - EST DEM Group - Microsoft Internet Explorer provided by CERN

cern.ch/est-div-dem

EST-DEM Development of **E**lectronic **M**odules Group

Layout, production and assembly of printed circuit boards, flexible circuits, ceramic hybrids and fine pitch detectors are the fields for which the DEM Group in the EST Division provides CERN-wide support.
The group concentrates on the development of prototype modules and can also manage large scale productions that are outsourced to industry.

General Information

- [Overview](#)
- [News](#)
- [Contact us](#)

Services

- [Layout](#)
- [Production](#)
- [Assembly and cabling](#)

Products

- [Patents & technologies](#)
- [Examples](#)

Other CERN support for electronics

- [Electronic Design Automation support \(IT-division\)](#)

Internet