



TS-DEM

Development of Electronic Modules

Electronics development support:
how it is organized

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CERN



Contents

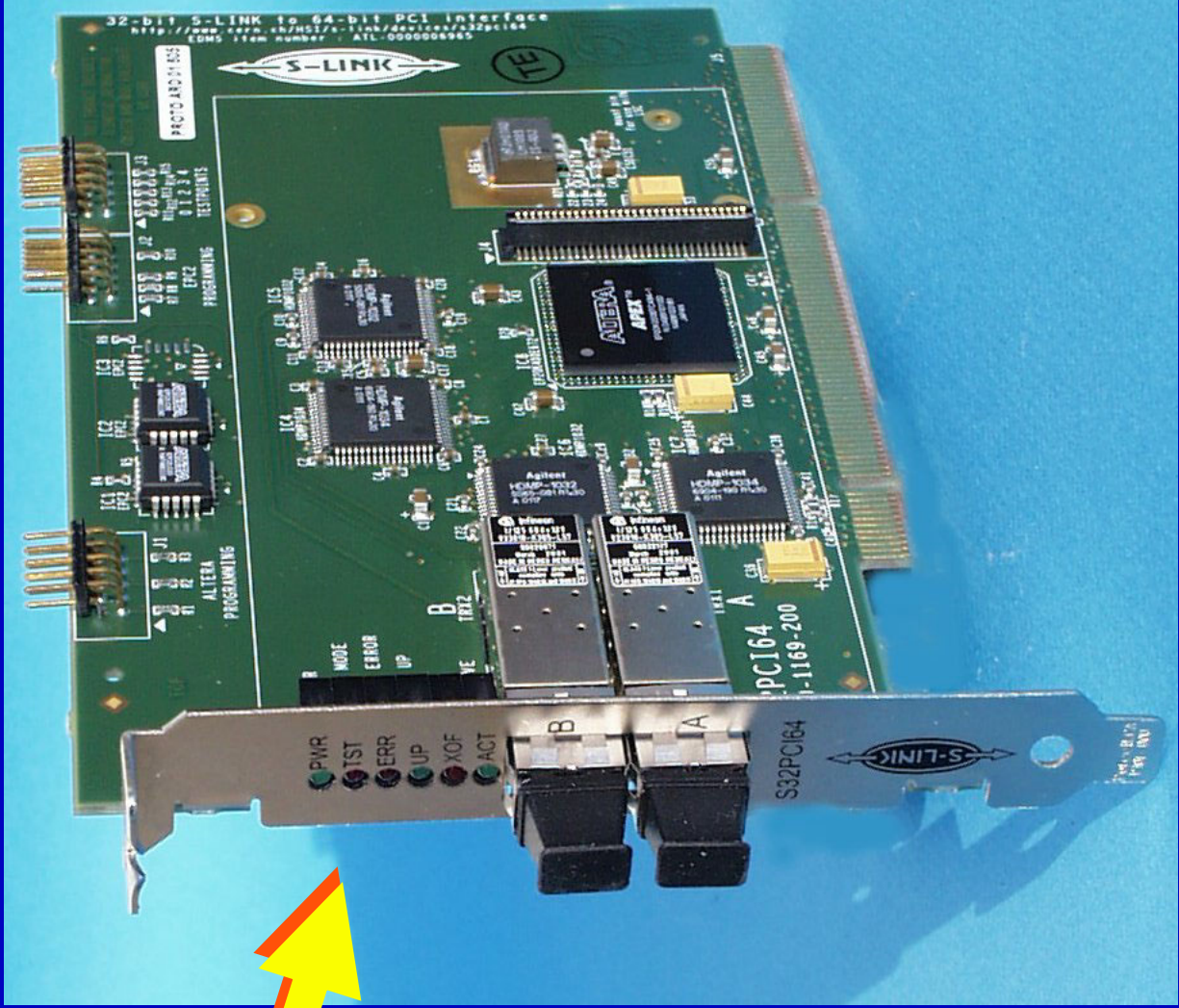
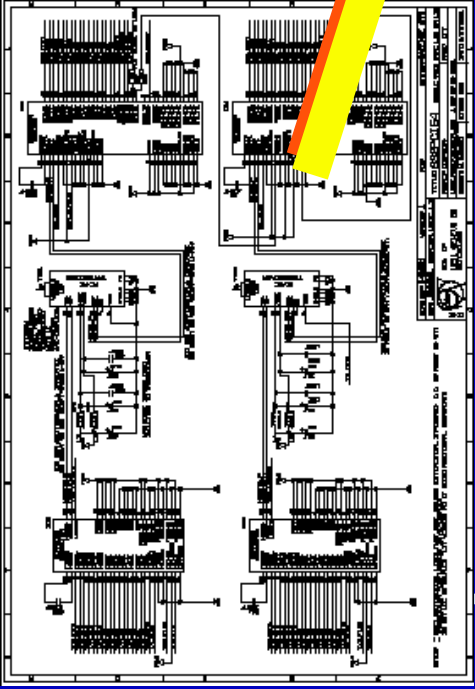
Overview of DEM

Supply contracts

Service contracts

The good and bad of service contracts

Ingredients for success

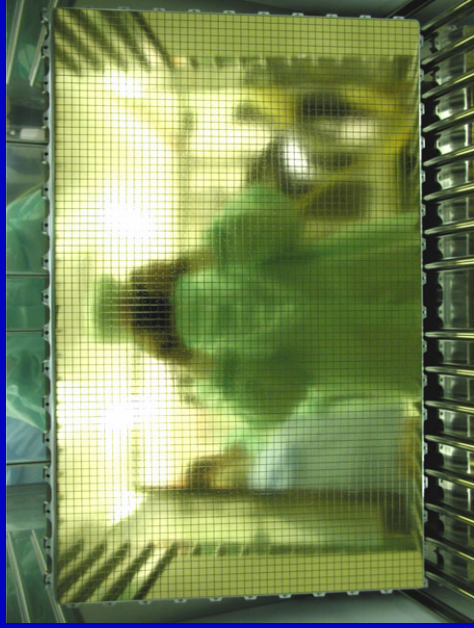


DEM
Turns schematics
into boards

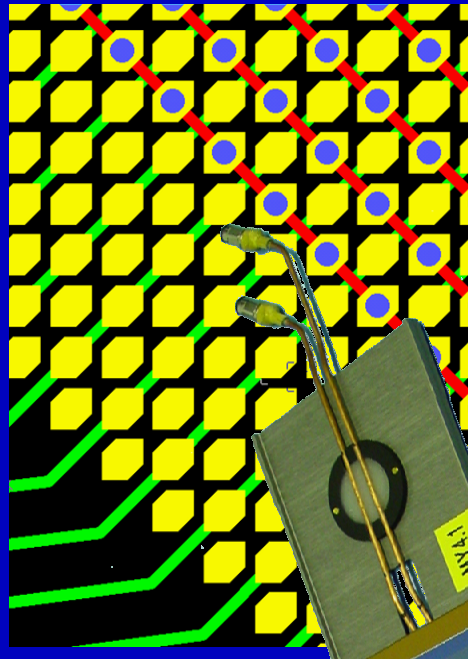
PCB design
Manufacture of
PCBs and special
circuits
Assembly

TS-DEM

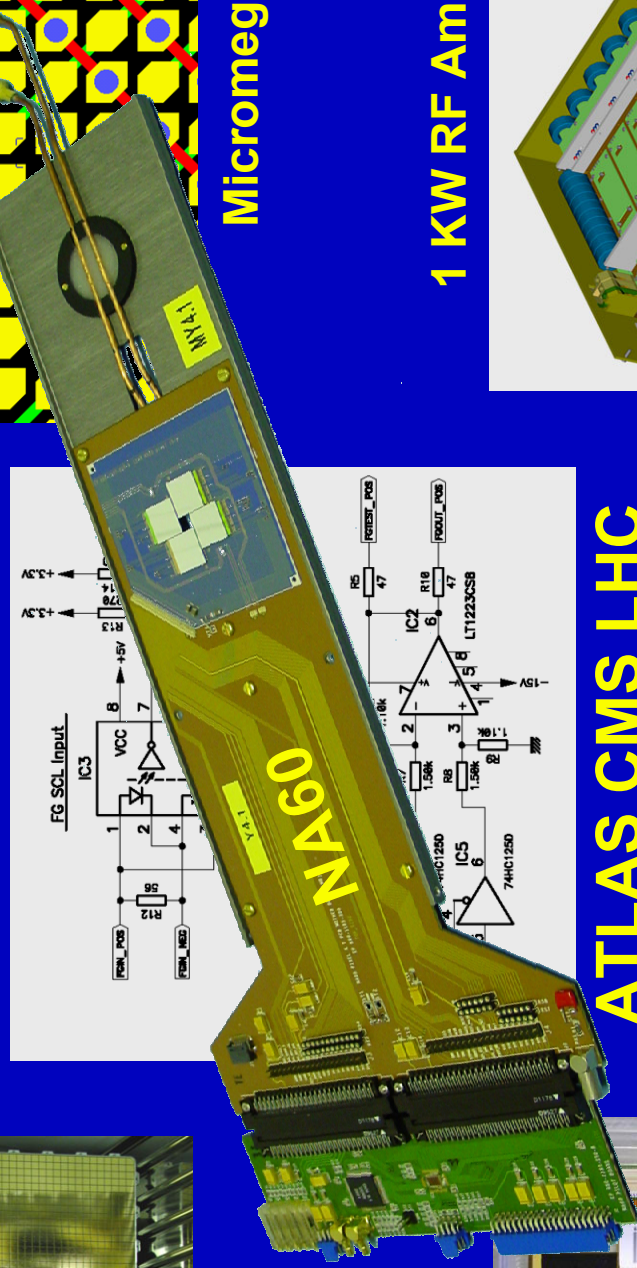
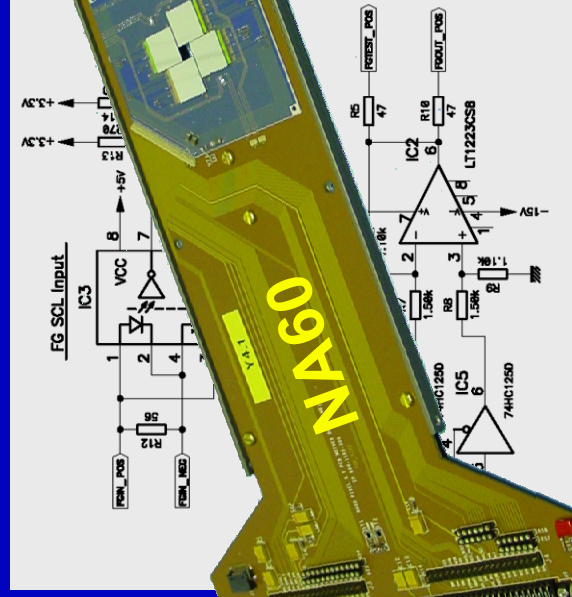
Layout
Production
Assembly
Expertises



ALICE HMPID



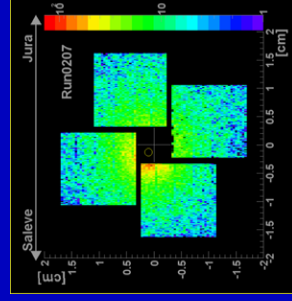
Micromega CAST



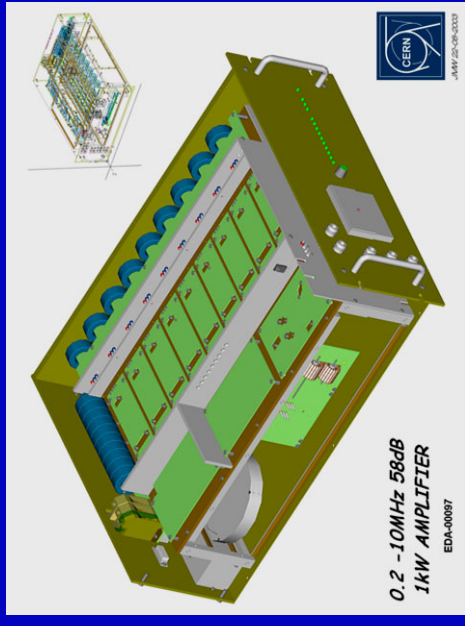
TOTEM



ATLAS CMS LHC



1 KW RF Ampli LEIR





Turn-around time

Prototype electronics production
multi-layer PCB, standard priority

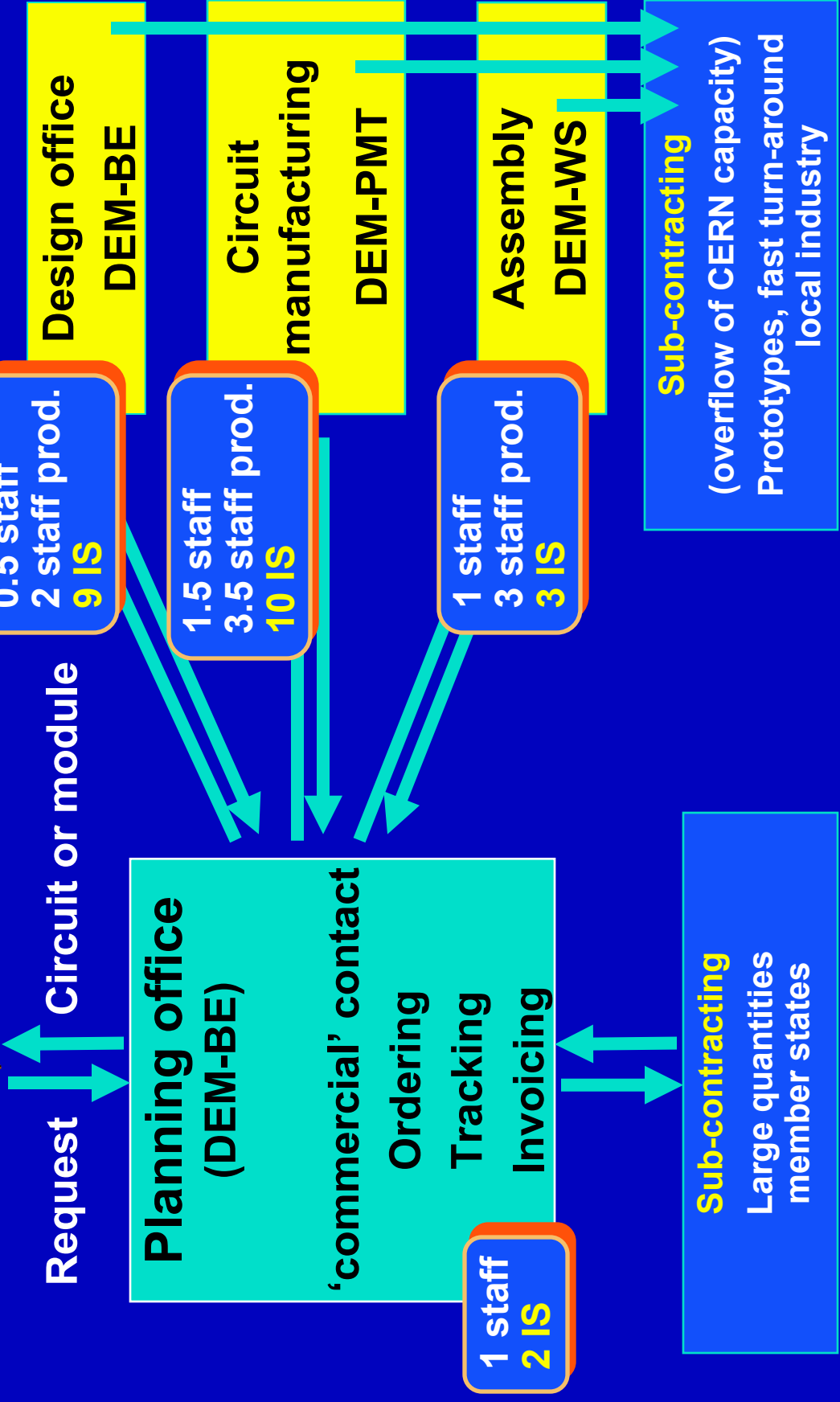
Layout (and queue) 4 weeks	PCB fabrication 3 weeks	Assembly 2 weeks	Margin 1 week
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We do these steps for over 2000 projects per year

Tight planning and follow-up needed
Need companies that you can rely on



TS-DEM



staff: includes section leaders staff prod: staff dedicated to production IS: industrial support



Supply contracts

Printed circuit boards

- 300 KCHF/year, increases to 400 KCHF (LHC production)
- Have 4 contracts (Italy, Belgium, France, Norway)
- difficult to balance (60%, 15%, 15% and 10%) as one is much cheaper
=> next time only two companies

Front-panels and small mechanics

- 150 KCHF/year
- distributed over 2 companies (Spain, France)
- has a local stock of half-products (from Stores)
- Call for Tender came up with 3 interesting companies (ESP, FR, S), try them all out for three months (blanket order) before deciding to make a contract with only 2.

Pay some attention to small contracts

- you can save on a single Xerox copier 1500 CHF/year



Service contracts

Design office (S081-> FSU-03)

- 11 people (9 designers + 2 for documentation, ordering and billing)
- per year: 500 new designs, 150 modifications, 150 production only
- 1. Client sees first Section Leader about planning and technical solution
- 2. Section leader plans during weekly meeting with Team Leader

Fabrication of Printed circuit boards (S081-> FSU-04)

- 10-11 people
- around 1000 jobs per year
- Client sees first Section Leader for complicated projects; for simple projects client goes directly to Team leader



Service contracts

Assembly (S081-> FSU-03)

- 3 people. Part of FSU of design office
- around 200 prototype jobs per year
- Client sees first Section Leader for complicated projects; for simple projects client goes directly to Team leader
- larger jobs done on premises of contractor



CERN

The good and bad of service contracts

A good way to stay competitive

–keeps us and the contractor sharp (DEM has real prices, no mix w staff)

Flexibility in size

–can add or remove people with low effort and within a short time

Contractor does not have knowledge in our domains

–it's only the Team at CERN

Skills not updated

–hardly any formal training given

To keep clear separation staff/IS, cannot use IS for

CERN core technologies, responsibility for software and hardware, research on working methods and new programs, contacts with companies, reception of clients during absence of section leader



FSU should improve some things

Extra layer of management

- Team leader has now a manager local at CERN
- IS personnel will feel more part of their own company

Contract for 5+1+1 years instead of 3+1+1

- a change of contract is always difficult

However: price increase

- extra layer of management
- Swiss contract instead of French



Ingredients for success

Keep CERN core technologies with CERN staff

- manufacturing of high-density circuits in cleanroom
- SMD assembly of prototypes (<10 pieces)
- *still it would be a disaster if full change of IS personnel happens*

Don't mix CERN staff and contract personnel

CERN staff should be first interface to client

- **planning & decisions where and how work should be done**
- **technical discussions directly between client and industrial support**