

ILC HiGrade WP7 Couplers

Mickaël LACROIX, Alessandro VARIOLA

Summary

1. TTF3

1. Design
2. Process

2. XFEL

1. Design
2. Process
3. Couplers results

3. R&D

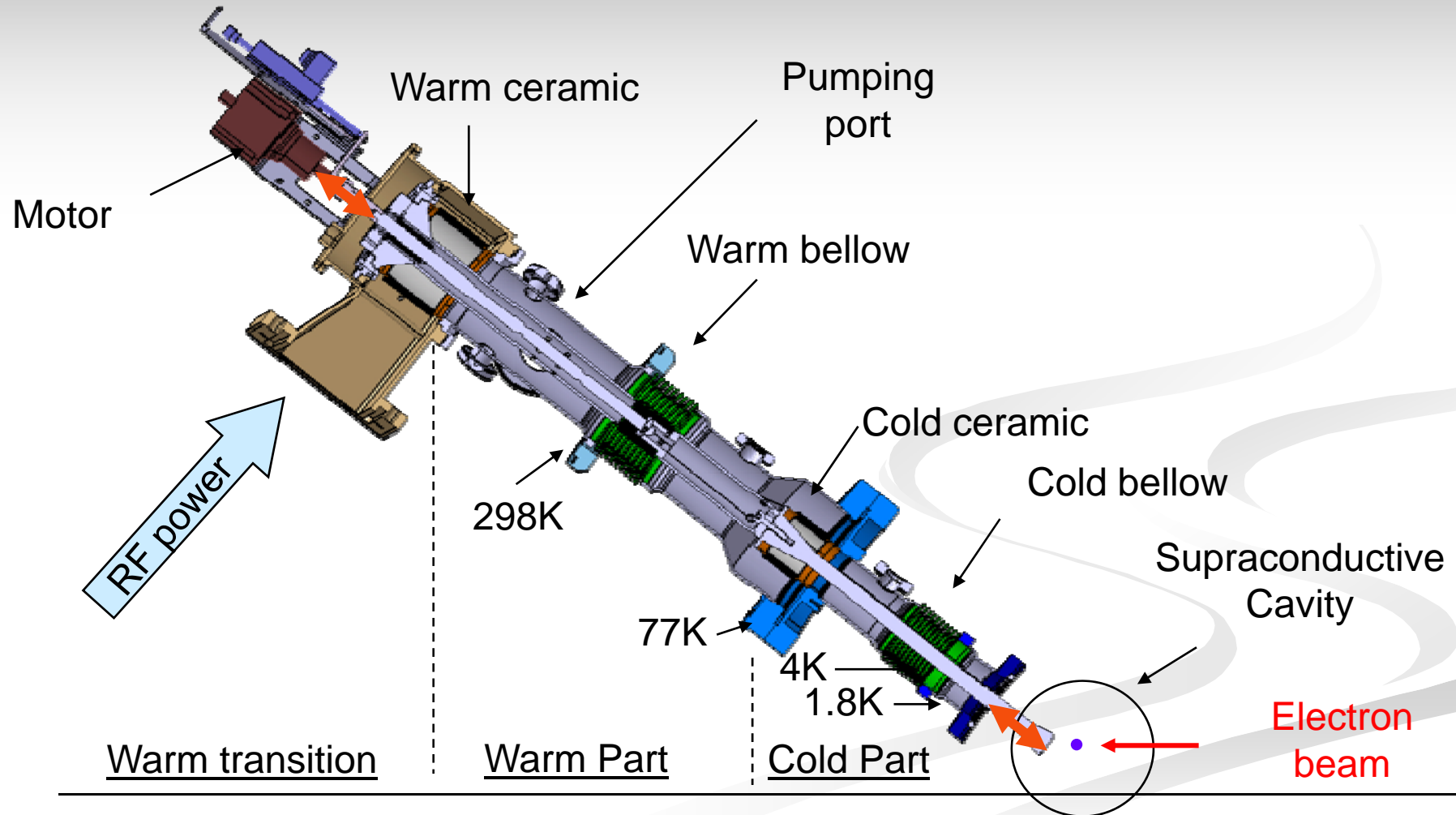
1. New station + Conditioning in series
2. 4Hz conditioning
3. TTF5

4. Schedules

1. XFEL
2. ILC-HighGrade: 3 scenarios

5. Conclusion

TTF3 Design





TTF3 Process

Industrial company



LAL

Activity	Start	End
Reception	00:00	00:05
Control	00:05	00:10
Cleaning and assembly Ops	00:10	00:15
Washing Cold Parts & Transition	00:15	00:20
Drying CP & T	00:20	00:25
Assembly CP & T	00:25	00:30
Baking CP & T	00:30	00:35
Mounting valves - 1st test	00:35	00:40
Washing Warm Parts	00:40	00:45
Drying WP	00:45	00:50
Assembly WP	00:50	00:55
Baking WP1	00:55	01:00
Mounting WP1 on CP1-1st test-pump	01:00	01:05
Baking WP2	01:05	01:10
Mounting WP2 on CP2-1st test-pump	01:10	01:15
Mounting Pump on T-1st test	01:15	01:20
Assembly on test frame and install heating wires	01:20	01:25
Vacuum pumping to 1E-7 mbar	01:25	01:30
Heating up to 150C	01:30	01:35
In situ baking 150C	01:35	01:40
Cooling down	01:40	01:45
Dismount heating valves	01:45	01:50
Assembly 1st pump	01:50	01:55
Mounting 7 Interface Boxes + Capacitors	01:55	02:00
RF conditioning	02:00	02:05
Adjust Antenna	02:05	02:10
Connect to waveguide - RF conditioning	02:10	02:15
Preparation for shipment	02:15	02:20
Disconnect from waveguide + dismount T B + C	02:20	02:25
Pack for shipment	02:25	02:30

DESY



XFEL Design



Design to minimize assembly time
(original design: counter flanges + 14 screws)



Prototype design



Industrial design

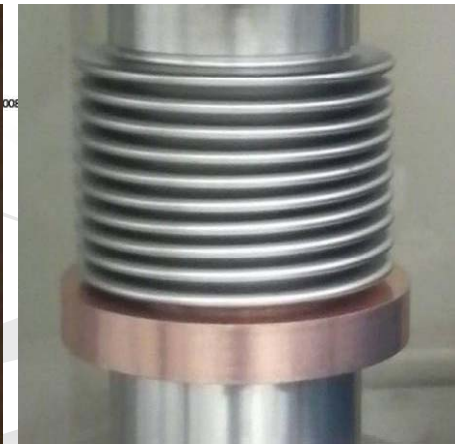


Copper + stainless steel + brass: 13 parts
brazed and soldered



Al alloy: 1 single part
- Prototypes: machined from single block
- Mass production: casting + final machining

Waveguide to coax interface part

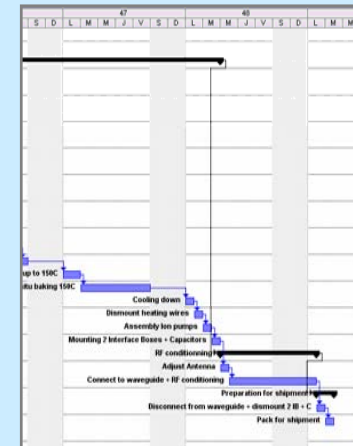


XFEL Process

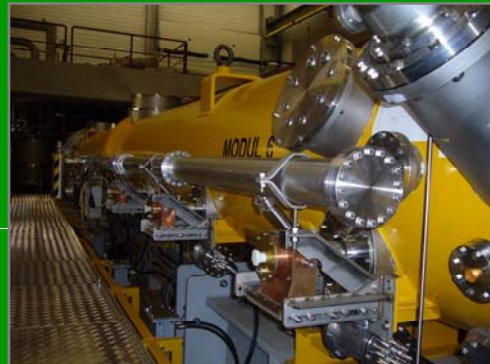
Industrial company



At LAL



At CEA/IRFU

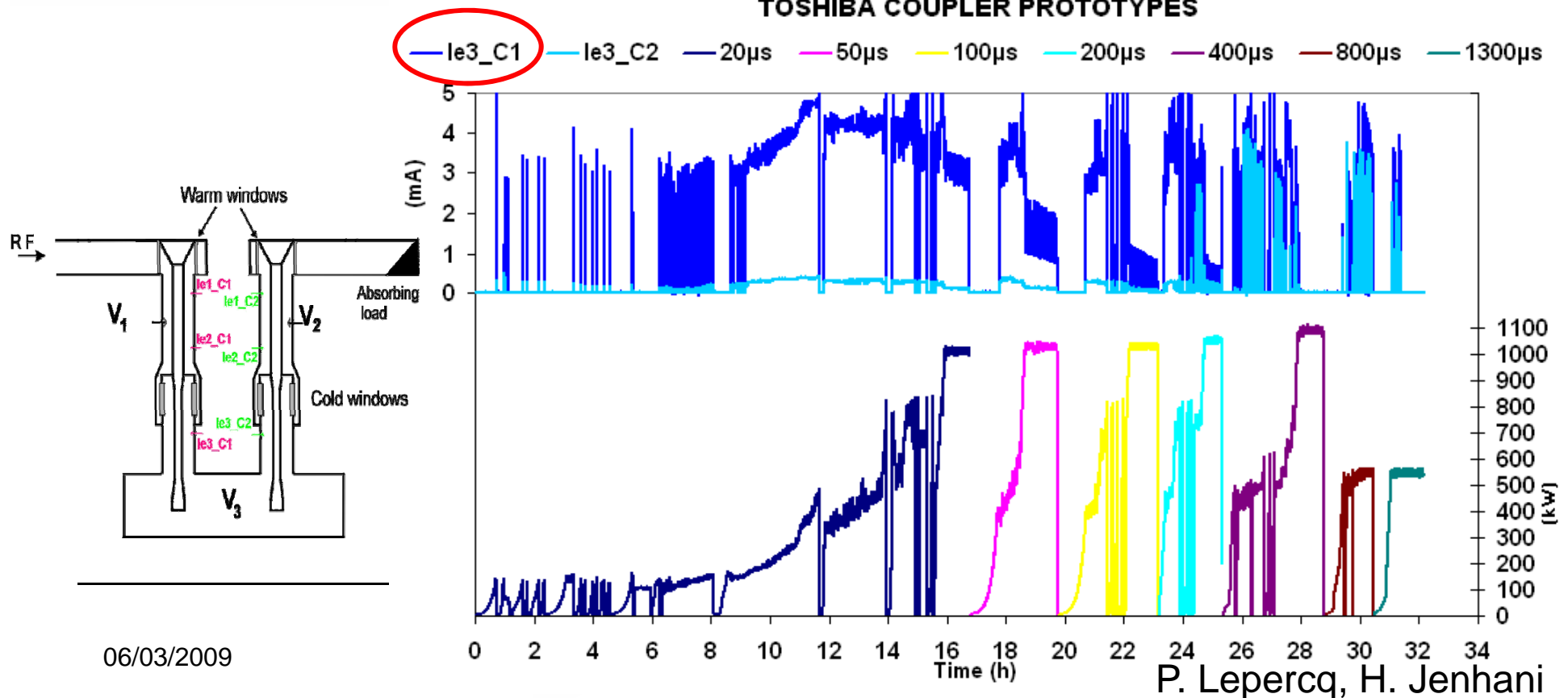


TOSHIBA XFEL coupler prototypes conditioning

- **Totally automated conditioning was impossible:** conditioning was assisted by operators.
- Conditioning procedure was **modified** several times to pass through high activity power levels.
- **Too many e- current and vacuum interlocks** during the conditioning.
- After the 20 μ s step: no vacuum interlocks but many e- current interlocks and **very high current fluctuation**.

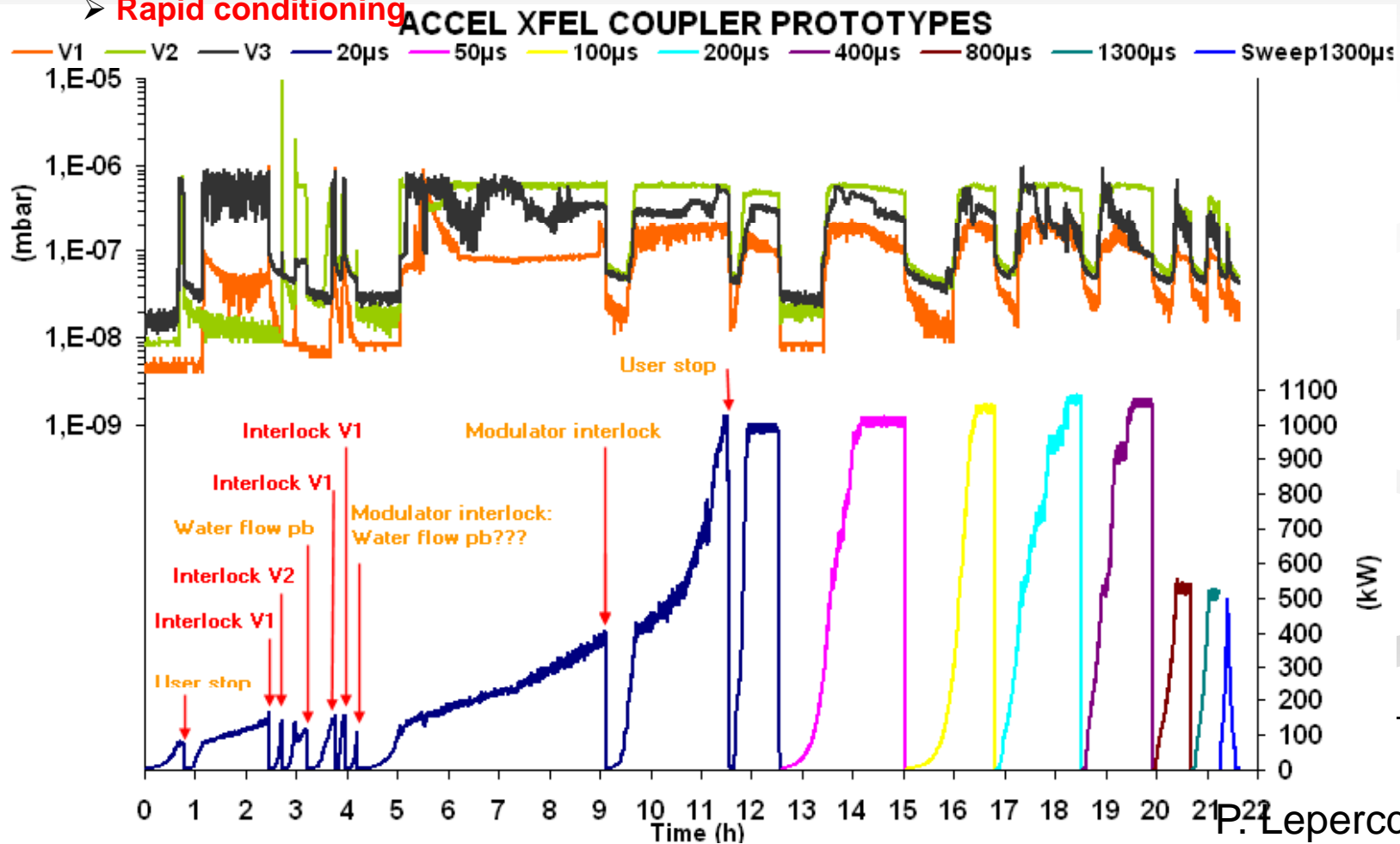
The conditioning wouldn't be possible using the standard conditioning procedure

TOSHIBA COUPLER PROTOTYPES



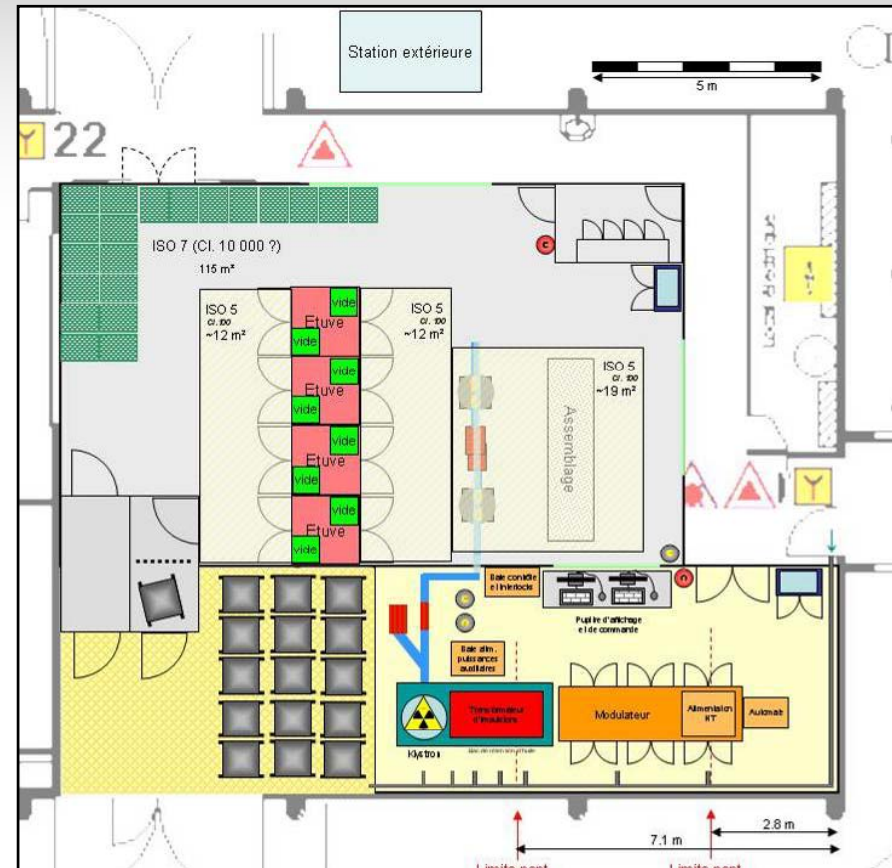
ACCEL XFEL coupler prototypes conditioning

- Automated conditioning (standard procedure)
- Few interlocks and low e- current activity in general
- After the 20 μ s step: no interlocks
- **Rapid conditioning**



R&D : Some examples

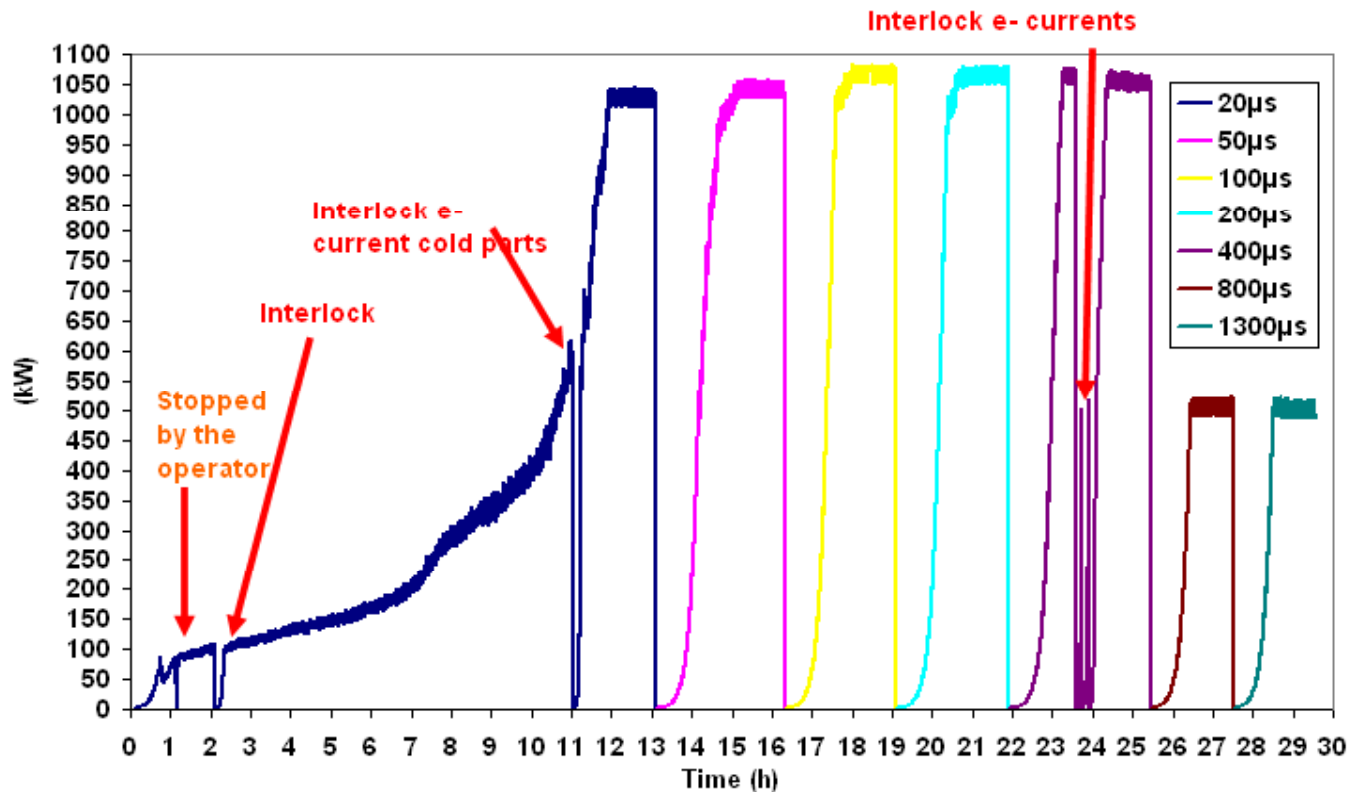
- Design a new XFEL Infrastructure
 - RF station
 - Ovens
 - Mobile clean room class100
- Conditioning of 2 pairs in series



E. Genesseau

R&D: TTF-III coupler RF conditioning (4Hz)

Processed in Feb. 2009



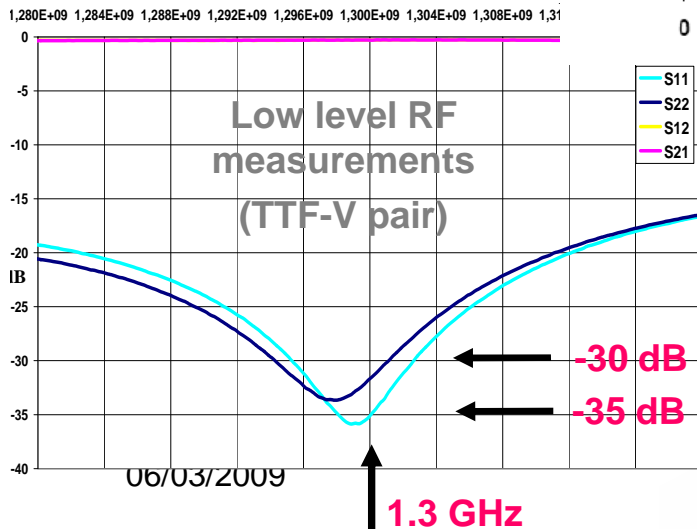
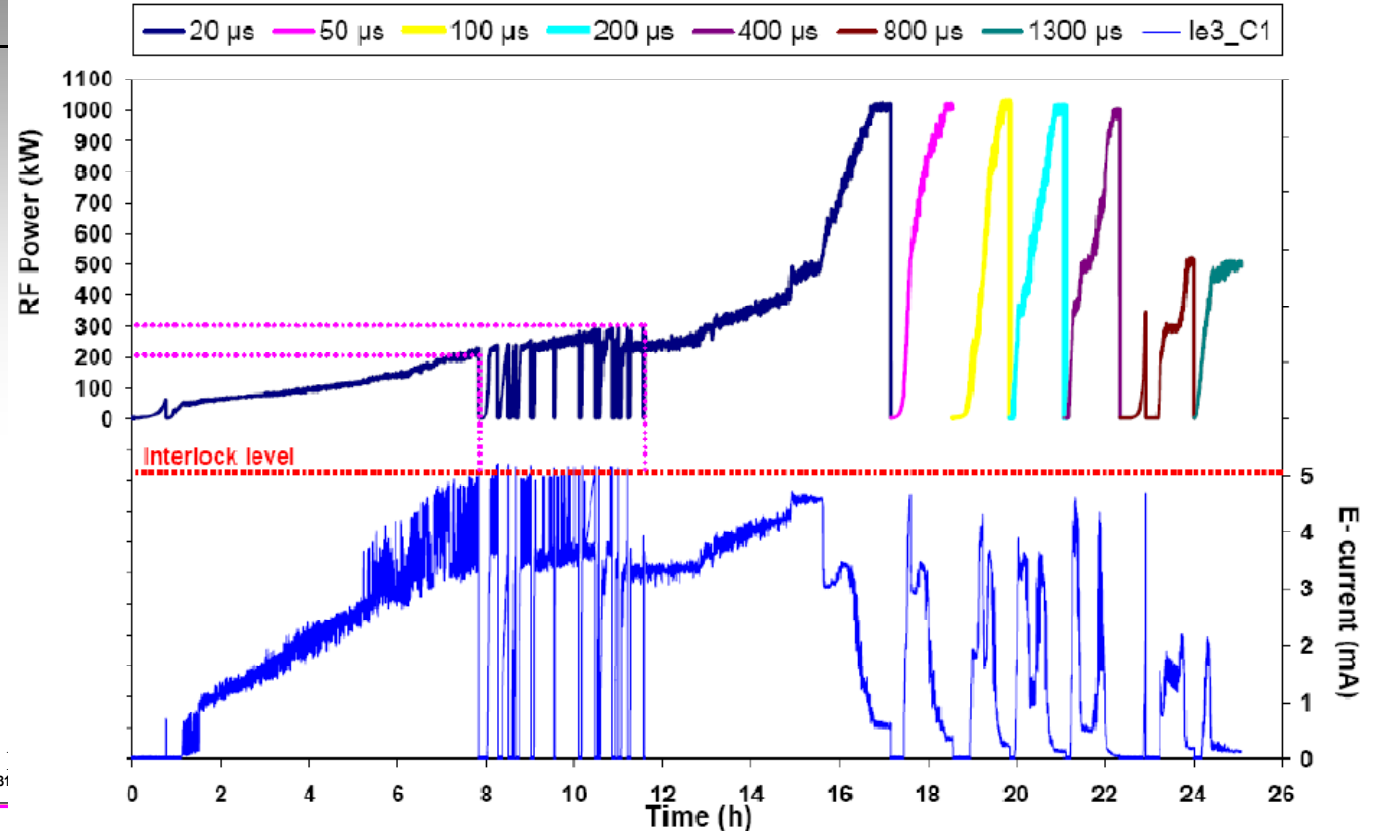
Conditioning of a TTF-III coupler pair (CP3_H45C59_H46C60) using 4Hz repetition rate instead of 2 Hz in order to have **more conditioning effect**. The **conditioning time is comparable** the usual performances.

R&D: TTF-V coupler RF conditioning at LAL



TTF-V coupler pair assembled for the RF tests

S21



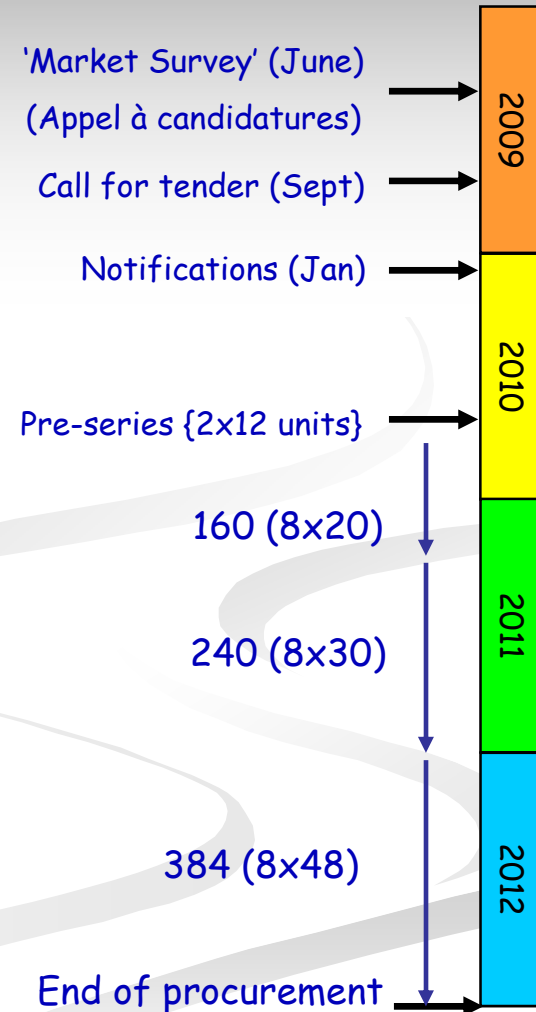
Easy conditioning in **24 h only**

Next step: A TTF-V coupler pair will be conditioned at **KEK** following their **conditioning procedure for ILC couplers** (March 2009)

XFEL Schedule

- **Tendering dossier:**
- French public market, {restricted market 'marché restreint'}
- Progressive batches if transition conditions are fully performed.
- **Requirements from tenders:**
- Certified materials (certificates 3-1B)
- Written procedures (validation)
- Qualified operators & operations
- Specific samples, before market notification & pre-series
- **During mass production:**
- Quality Control Plan
- Permanent follow up on production site
- Full traceability
- Statistic inspection & performance tests
- **End deliveries:**
- 808 couplers {404 per tender a priori}
- Engineering documents (drawings, calculation notes, etc...)
- Production data (brazing, welding, baking records, etc...)
- Test reports (out gazing, vacuum leak checks, etc...)
- RF processing performance (at LAL-Orsay)

XFEL Schedule by A. Fallou



ILC HiGrade → 1st scenario - baseline

- **Tendering dossier:**
- French public market, {restricted market 'marché restreint'}
- Progressive batches if transition conditions are fully performed.
- **Requirements from tenders:**
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Add an order of
24 couplers

Beginning-middle 2011
ILCHIGrade couplers are ok

'Market Survey' (June)
(Appel à candidatures)
Call for tender (Sept)

Notifications (Jan)

Pre-series {2x12 units}

160 (8x20)

240 (8x30)

384 (8x48)

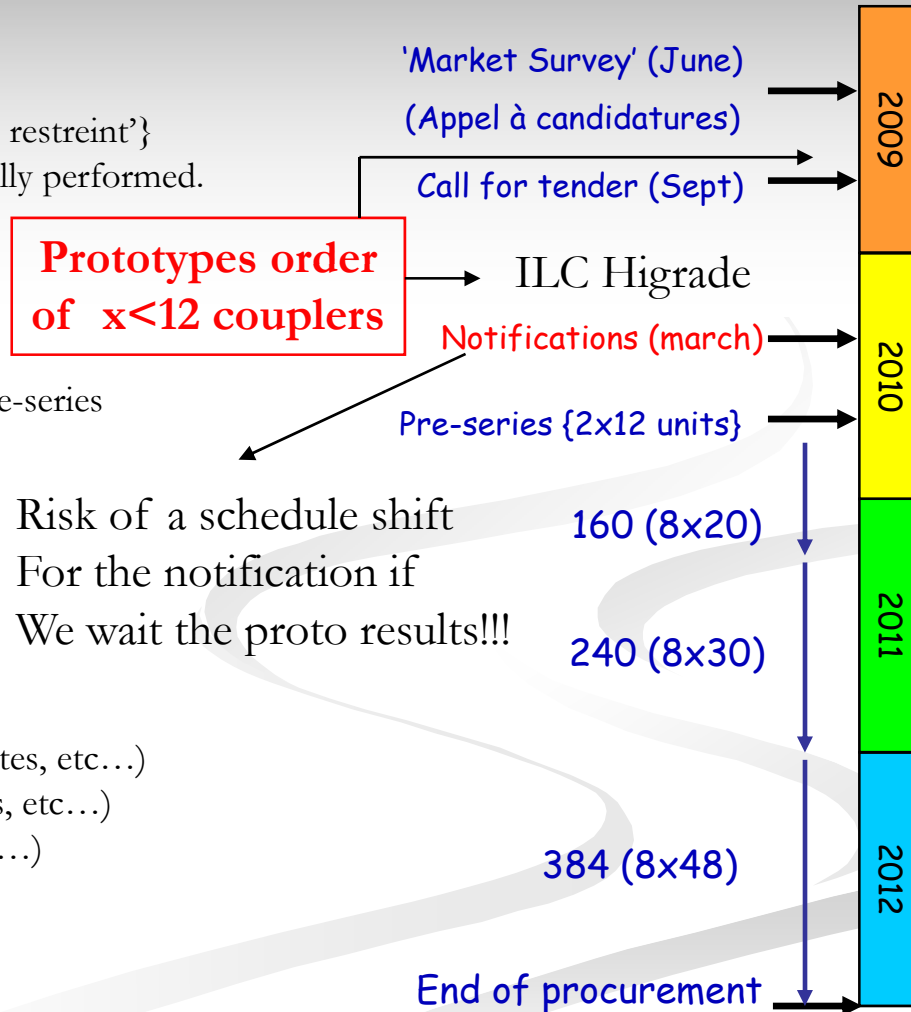
End of procurement



ILC HiGrade → 2nd scenario – XFEL happy?

- **Tendering dossier:**
- French public market, {restricted market ‘marché restreint’}
- Progressive batches if transition conditions are fully performed.
- **Requirements from tenders:**
- Certified materials (certificates 3-1B)
- Written procedures (validation)
- Qualified operators & operations
- Specific samples, before market notification & pre-series
- **During mass production:**
- Quality Control Plan
- Permanent follow up on production site
- Full traceability
- Statistic inspection & performance tests
- **End deliveries:**
- 808 couplers {404 per tender a priori}
- Engineering documents (drawings, calculation notes, etc...)
- Production data (brazing, welding, baking records, etc...)
- Test reports (out gazing, vacuum leak checks, etc...)
- RF processing performance (at LAL-Orsay)

XFEL Schedule by A. Fallou



ILC HiGrade → 3rd scenario

- **Tendering dossier:**

- French public market, {restricted market 'marché restreint'}
- Progressive batches if transition conditions are fully performed.

- **Requirements from tenders:**

- Certified materials (certificates 3-1B)
- Written procedures (validation)
- Qualified operators & operations
- Specific samples, before market notification & pre-series

- **During mass production:**

- Quality Control Plan
- Permanent follow up on production site
- Full traceability
- Statistic inspection & performance tests

- **End deliveries:**

- 808 couplers {404 per tender a priori}
- Engineering documents (drawings, calculation notes, etc...)
- Production data (brazing, welding, baking records, etc...)
- Test reports (out gazing, vacuum leak checks, etc...)

XFEL Schedule by A. Fallou

Scientific reports based on the existing TTF 3 30 couplers

Add an order of 24 couplers

Beginning-middle 2011
ILCHiGrade couplers are ok

'Market Survey' (June)
(Appel à candidatures)

Call for tender (Sept)

Notifications (Jan)

Pre-series {2x12 units}

160 (8x20)

240 (8x30)

384 (8x48)

End of procurement



Pros and Cons

- 1st scenario:
 - seems ok
- 2nd scenario:
 - need **new people** in the staff to follow this contract
 - Could **XFEL** be **delayed** to get the results before XFEL notifications?
- 3rd scenario:
 - is it feasible **without declaring spent money?**

Conclusion

- **Define an ILC HiGrade Delivery Schedule with all the work packages**