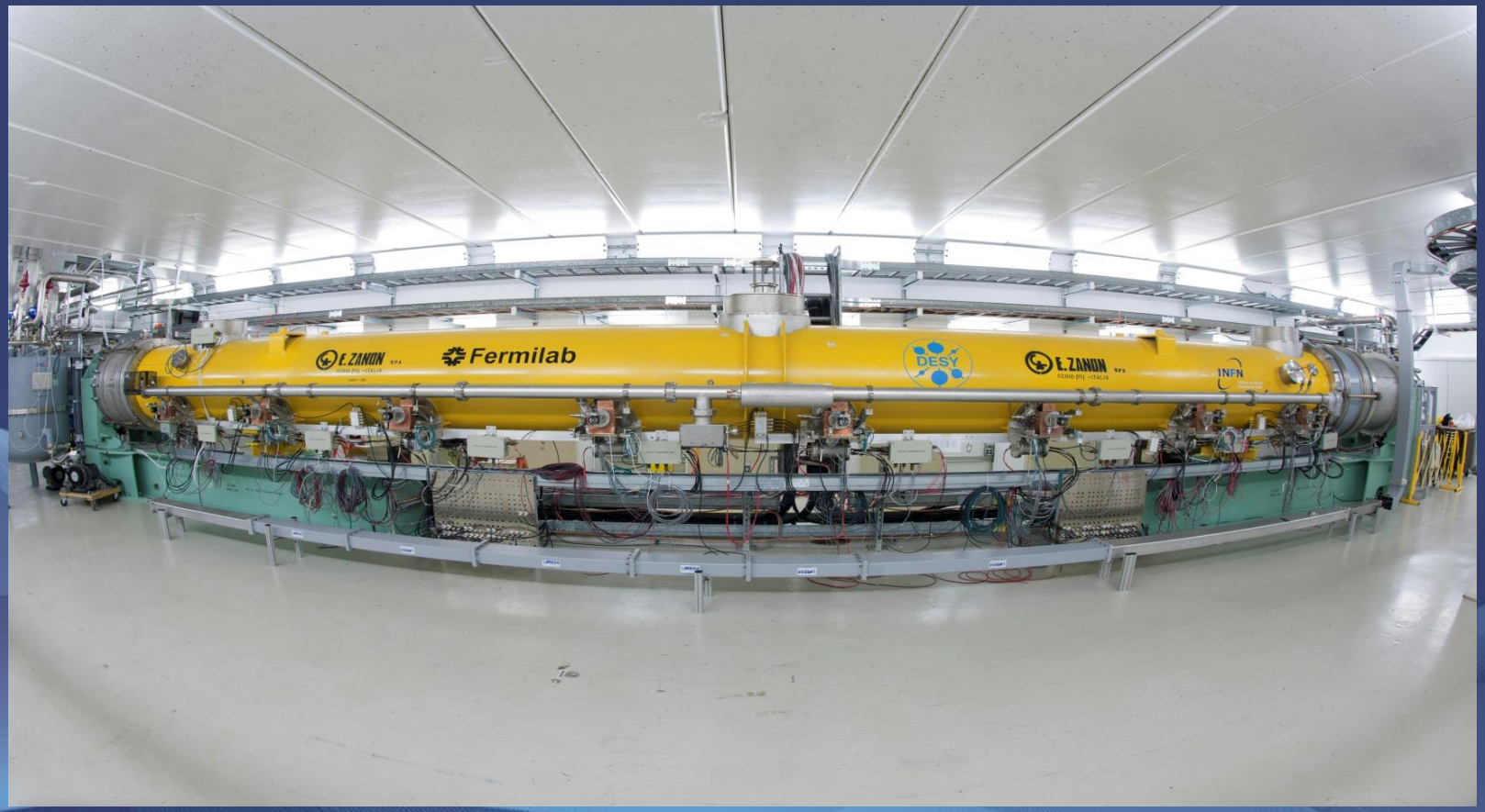
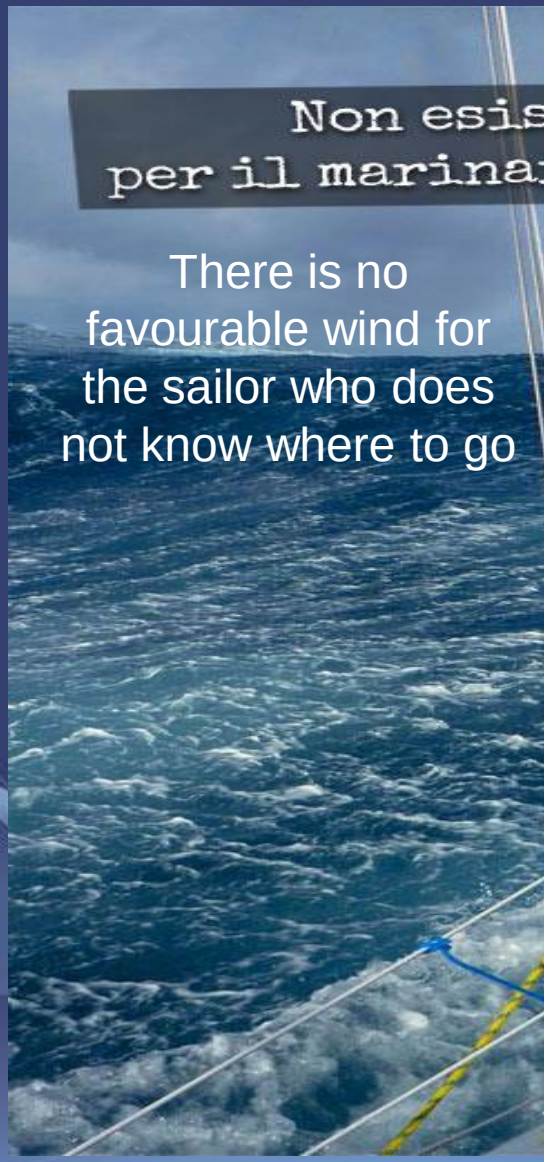
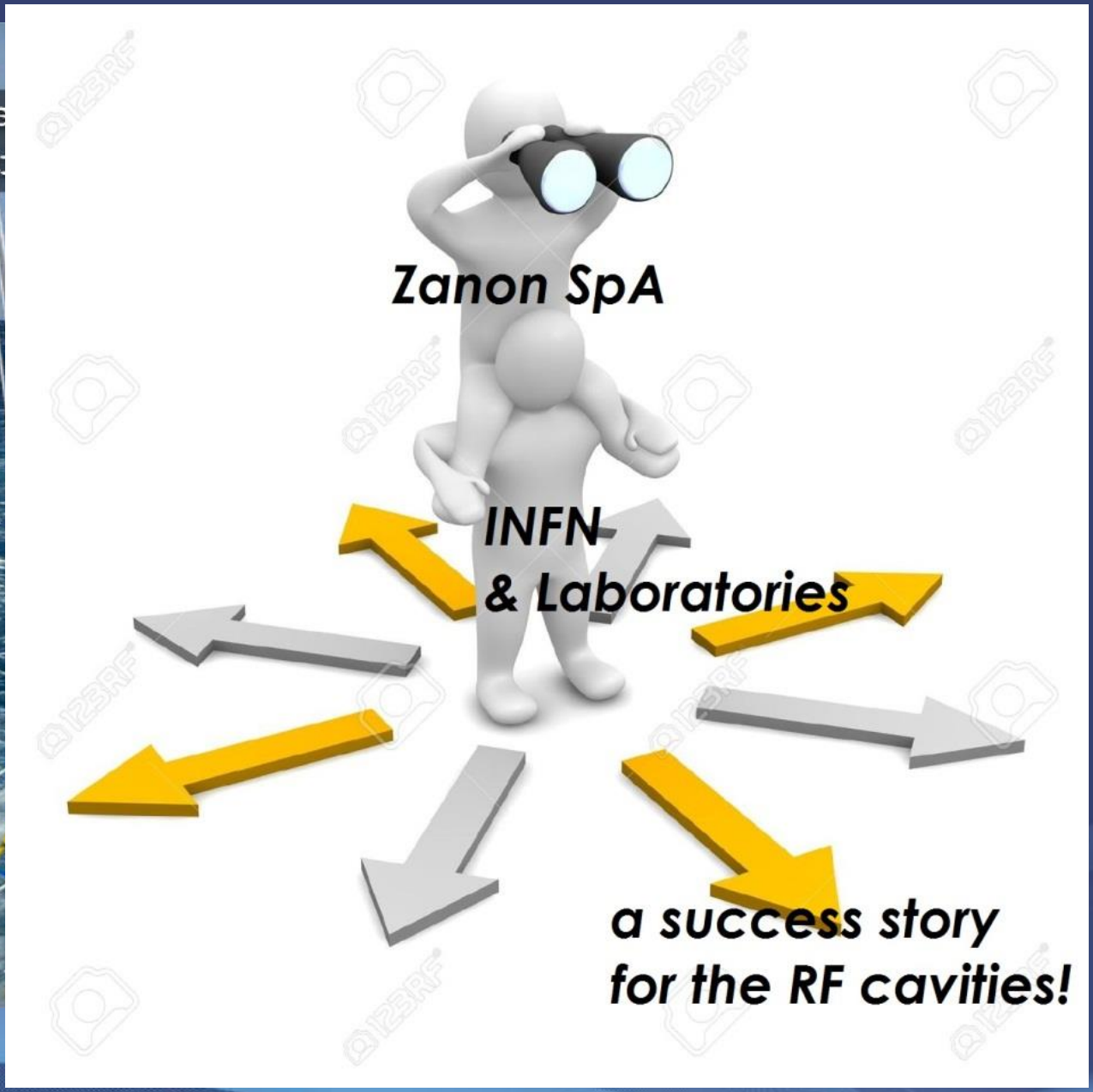
E. ZANON

RF SC CAVITIES –a story

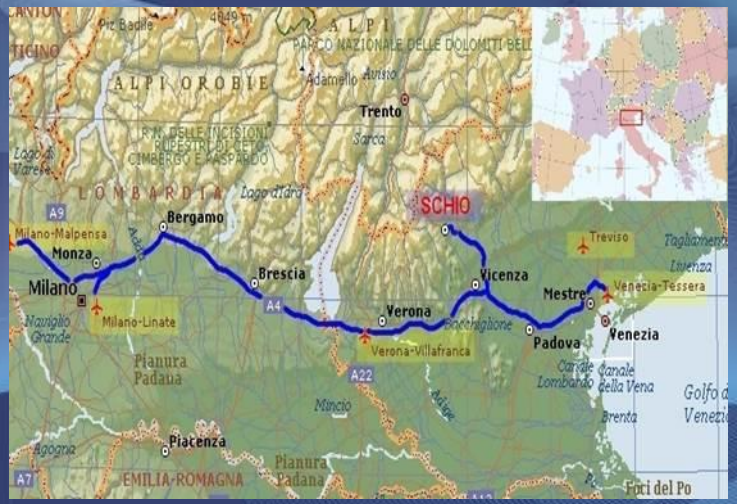


AMICI Industry days – Padova 18 19 April 2017


Non esis
per il marina
There is no favourable wind for the sailor who does not know where to go


Zanon SpA
INFN
& Laboratories
a success story
for the RF cavities!

The Company



The Company was founded in1919 and it is located in the North-East of Italy (70Km far from Padova).

210 persons actually involved at E. Zanon in the offices and workshop.

Since the beginning activity in the field of steel ,metal sheet works and welding technologies.

In the years production focused to heavy components for chemical industry and starting in the late 60th, early 70th activities , collaboration with research institutes and laboratory (Italy, EU, USA)

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Some typycal production

Chemical industy

Some typical production

Research institutes , laboratory , experiments
I.N.F.N. CERN DESY CEA JET ITER

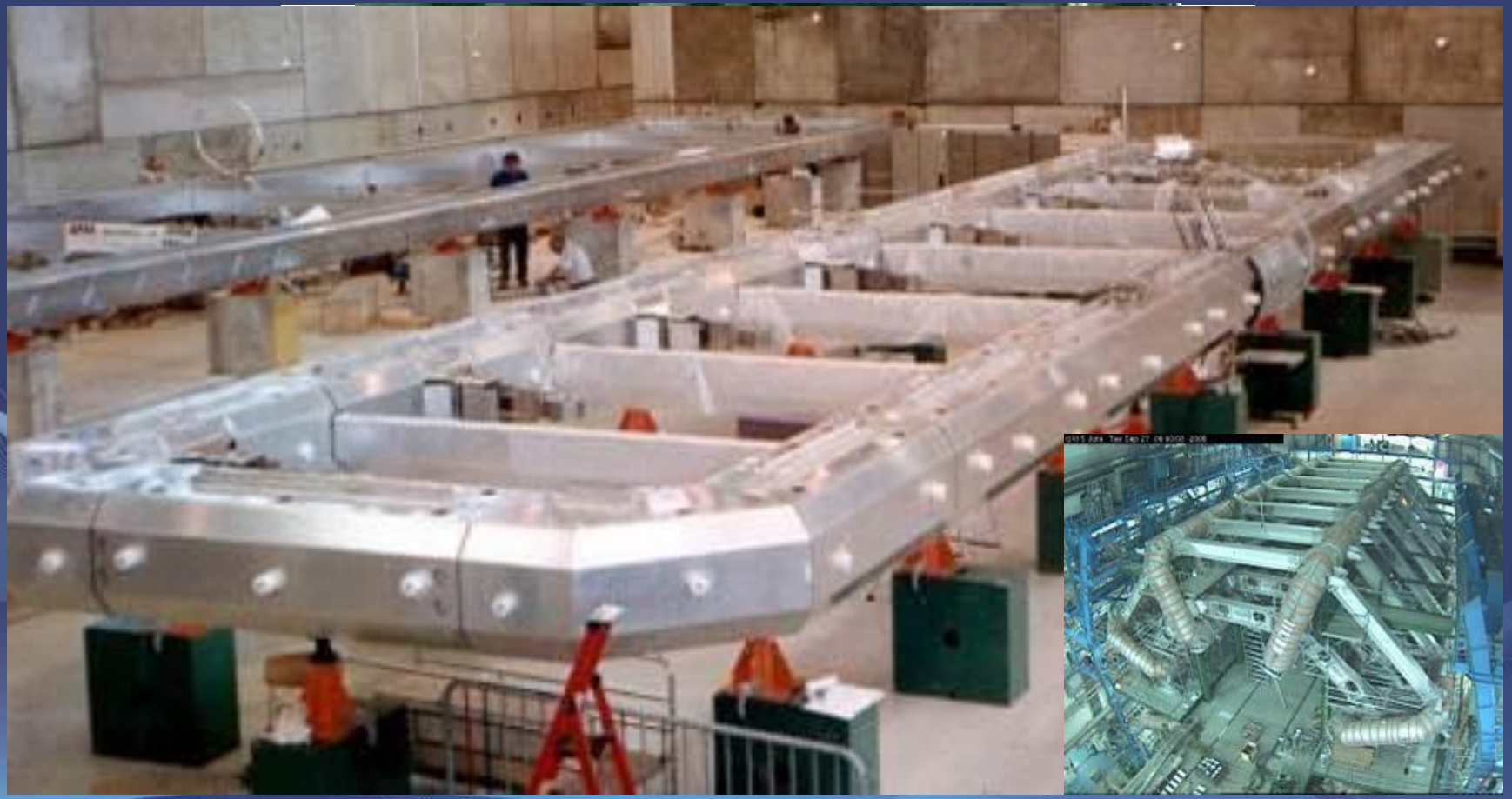
R3B Glad Thermal Shields
CEA

ITER Spider facility at RFX PD

E. ZANON

Some typycal production

Research institutes , laboratory , experiments
I.N.F.N. CERN DESY CEA JET ITER



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SC cavities production at E. Zanon

Ettore Zanon s.p.a among the wide range of components supplied to laboratory , research , international experiments has since more than 25 Years begun to collaborate , develop and manufacture RF SC bulk niobium caviites.

Experience with RF SC niobium cavities started in the early 90's and has continued and continues without interruption .

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SC cavities collaboration's follow up

- Ettore Zanon s.pa. continous engagement into SC cavities , presence and collaboration with "clients" made us a reliable manufacturer to be considered and involved for challenging projects

- In view of the SC cavities market development and expectation Ettore Zanon s.p.a. Studied , prepared and anticipated investements and resources for these scopes

EXFEL

- Years 2007-2010: DESY launched the realization of EXFEL , the 2Km linear accelerator based on the 1.3GHz superconductiing cavities technology
- EXFEL is an European project with partecipation of European laboratory
- Italian participation and collaboration by I.N.F.N.

- Year 2011 : Ettore Zanon s.pa. Was awarded of SC cavities production for the EXFEL linac under DESY and I.N.F.N. supervision

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Involvement to the EXFEL project

SC cavities

A) Manufacture and final treatement of 420 units of the 9 cells 1,3GHz SC cavities

B) Manufacture and treatment of 20 units of 9cells 3,9Ghz (EXFEL injector)

Scope of work includes :

- Manufacture of the cavities / Manufacture of their Titanium Helium tanks
- Cavities Integration into the Ti tank /Treatments and Surface cleaning treatments
- Certification according to PED (Presssure Equipment Directive)

Others equipments

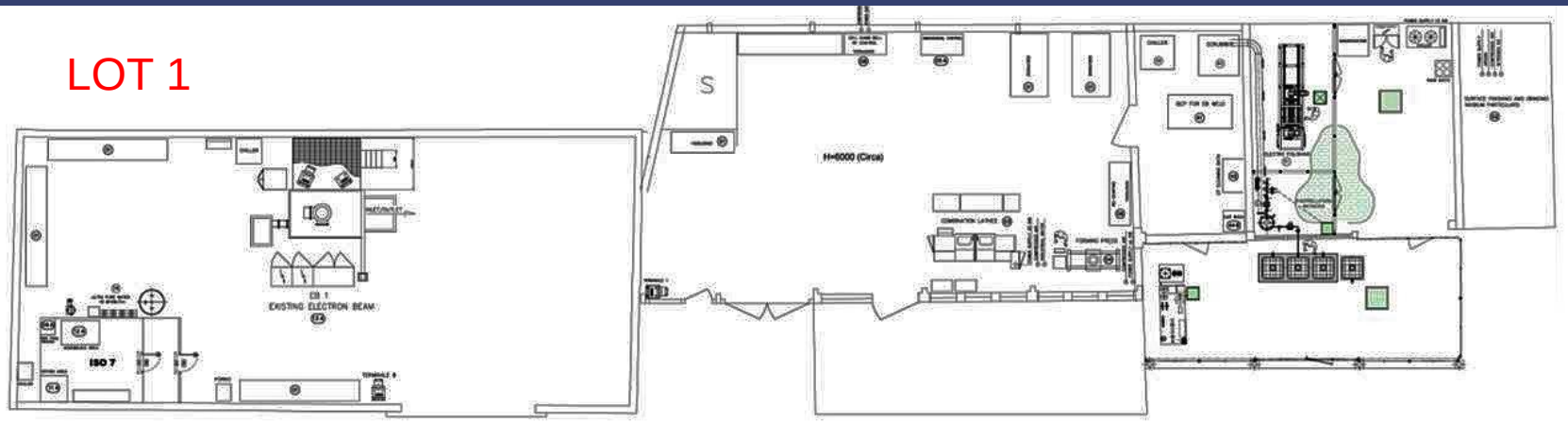
A) Manufacture and testing of 146 units of Titanium Helium tanks

B) Manufacture and testing of 45 units of XFEL Cryomodules (1,3GHz cavities)

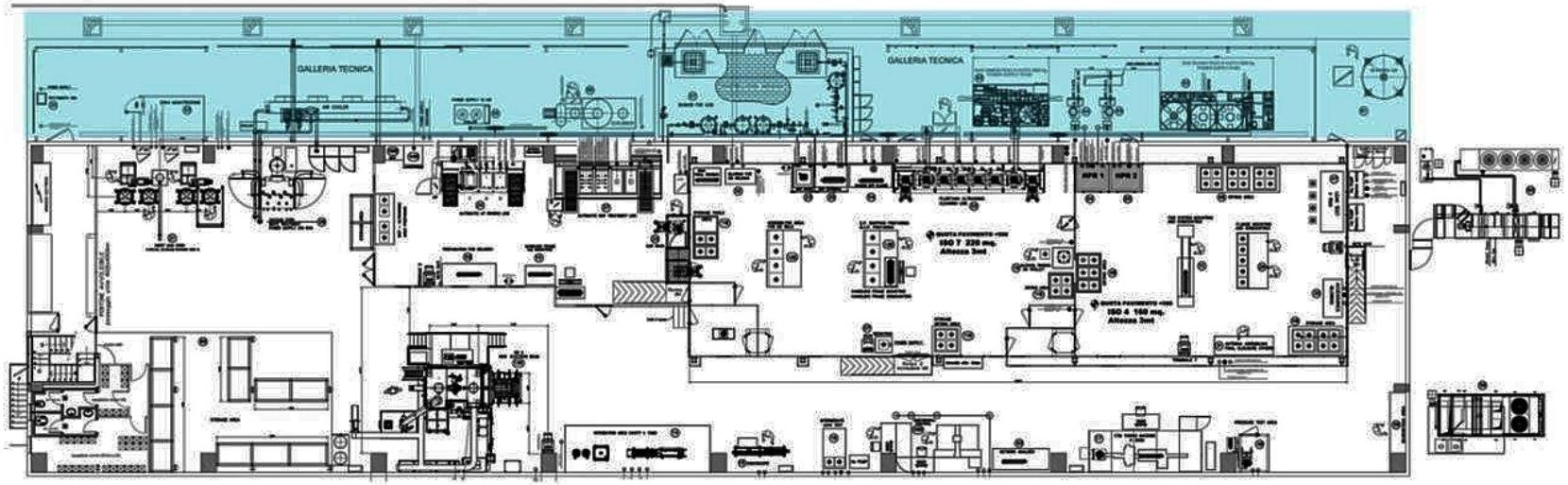
C) Manufactur and testing of 2 units of cryomodule (Injector , 3,9GHz cavities)

EXFEL Cavities
Serial production lay-out and infrastructures

LOT 1



LOT IV



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EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

- EB welding : Refurbishment of existing EBW1 machine
  Installation, commissioning of a new EBW2 machine

Dedicate 200T forming press and CNC turning lathe

EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

New semi-automatic U.T. cleaning lines and chemical etching lines

Acid storage and distribution area

EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

New Electro-Polishing facility dedicated to SC cavities

Dedicted Heat Treatment Vacuum Oven

EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

New ULTRA-PURE-WATER production plant

Plant production up to 5m^3/h of ultra pure water at 12 MΩcm/sec or 18 MMΩcm/sec to feed all the different treatment equipments

EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

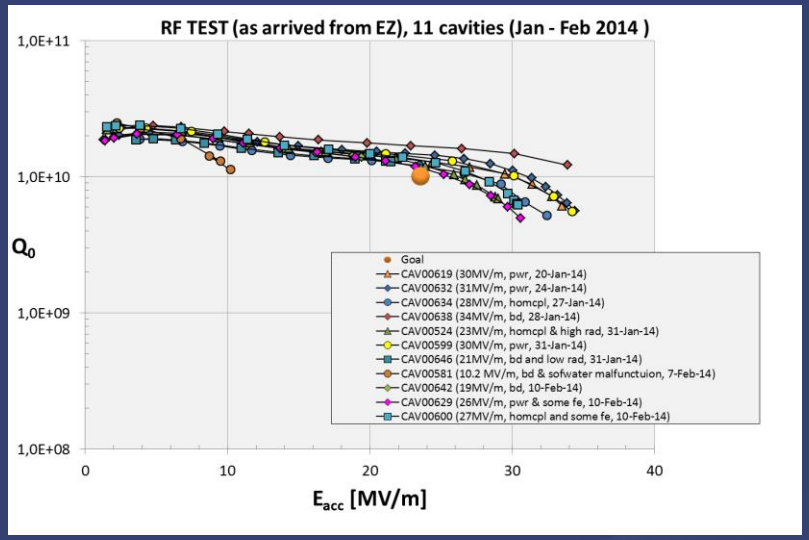
450 m^2 of customized clean room – ISO7 and ISO4 level

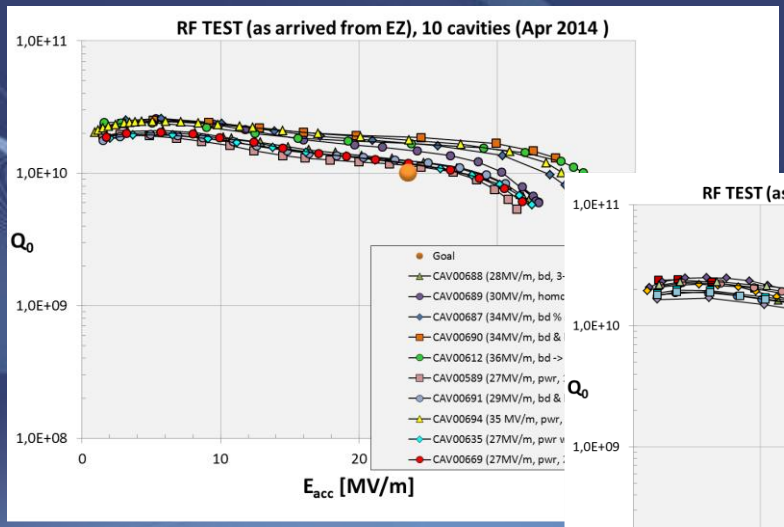
EXFEL Cavities
New infrastructures – Equipments- investments
(overview)

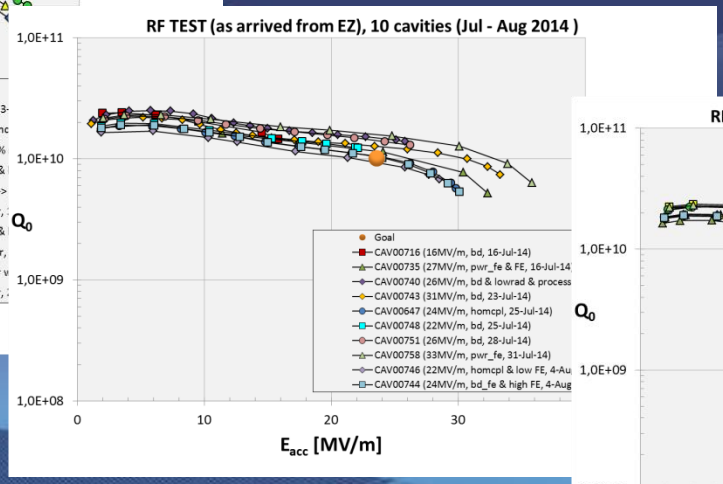
Operations into the clean room

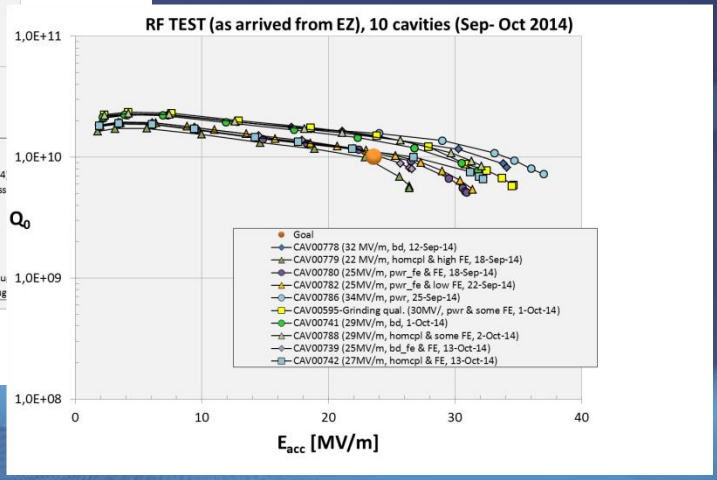
EXFEL Cavities - Production feed-back

- To guarantee SC cavities performances all the production steps were carefully monitored and controlled
- Cryogenic test results (Vertical test) were given as regular feed-back by DESY and I.N.F.N.









EXFEL Cavities – Some data

ETTORE ZANON s.p.a. EXFEL partecipation main data			
Welded –treated cavities 1,3GHz	Tot.	422 units	
Cavity's performance	Accelerating field	Up to 41 MV/m	
	Q_0	Up to 2,93 10^{10}	
	Titanium tank manufactured	>560 units	
	Cryomodule 12 meter long -1,3GHz cavities	45 units	
3,9GHz cavity	Tot.	20 units	
	Cr Cryomodule 6 meter long -3,9GHz cavities	2 units	
	Production end	November 2015	
	Production duration	About 3 years	Infrastructure qualification excluded
	Personnel involved	Average of about 50 technicians full time	
	Infrastructure investements	>10 Million €	

Program and technicals targets succesfully reached by DESY I.N.F.N. and Ettore Zanon s.p.a

RF SC CAVITIES –a story

Some simple conclusions

•Ettore Zanon s.p.a activities and collaborations with laboratories began long time ago

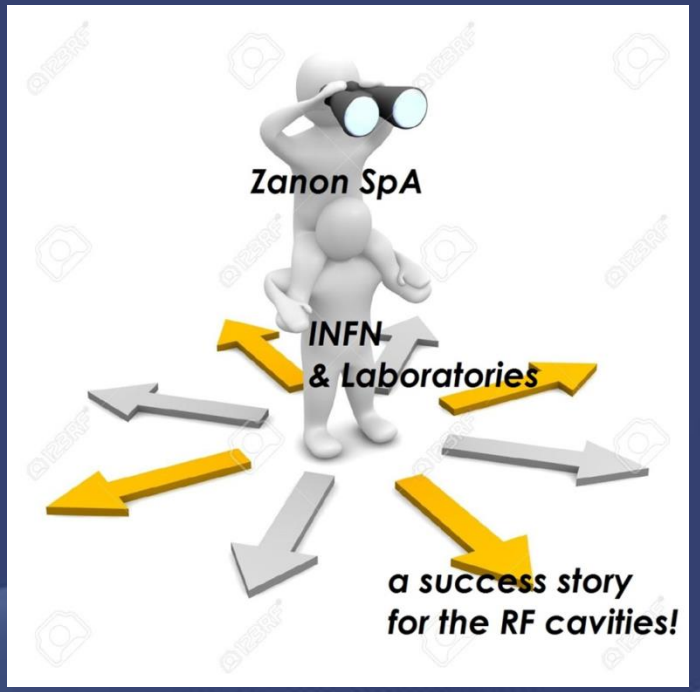
•Challenging technical knowledge and collaborations grew in the years

•Trust to complete successfully new coming projects grew in parallel

EXFEL results is our evidence

- Importance of the collaborations and good relationships
- Importance to be present and believe in a market segment

Probably lucky…but Zanon's sailors know where to go and found the favourable wind



There is no favourable wind for the sailor who does not know where to go

END

THANK FOR YOUR ATTENTION