

CARE Report-04-002-SRF





SECOND QUARTERLY REPORT OF THE SRF COLLABORATION

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CARE/JRA1 Quarter report 2/2004 version c

Research and Development on Superconducting Radio-Frequency Technology for Accelerator Application

Acronym: SRF

<u>Co-Coordinators</u>: D. Proch, DESY, T.Garvey, CNRS-Orsay

Institute (Participating number)	Acronym	Country	Coordinator	SRF Scientific Contact	Associated to
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WSK Mess- und Datentechnik GmbH	D	F. Schölz
E. ZANON SPA	Ι	G. Corniani
Henkel Lohnpoliertechnik GmbH	D	B. Henkel

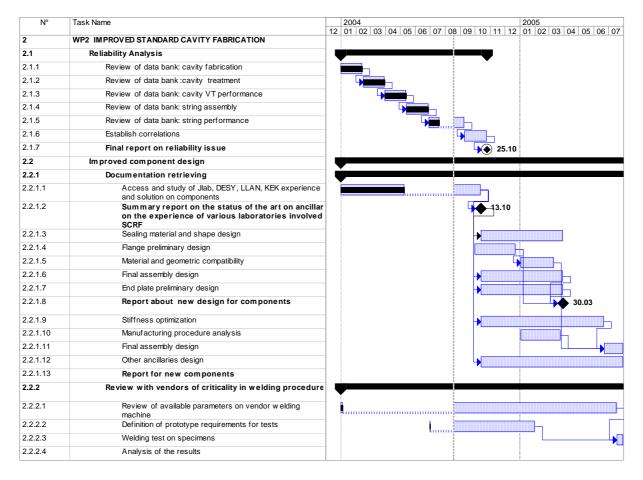
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JRA Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Activity yearly and/ or steering meeting											CARE 04; 26.Nov.	
Meeting WP1-	2123		24.;	7.; DESY		21., 22.;	26.,27.;		9.; Orsay			
WP11	Zeuthen		Telefone			Telefon	Telefone					
			conference			conference	conference					
Meeting WP's		WP3,5,7,8,10;	4.; WP1-11,			24						
-		3.Feb. Orsay	DESY			26.;WP8,						
			briefing			DESY						
Meeting WP's		WP 5,6;				22., WP1,		30.; WP1,				
0		12.Feb.				DESY		DESY				
		Legnaro				administratio		administrati				
						n		on				
Meeting WP's		WP8; 12.Feb.										
Joined meeting /					ELAN, 4							
workshop with					6.,							
other CARE					Frascati							
activities												
Joined meeting												
with other												
collaborations												
TESLA	2123.		1	68.;					68.;	1	1	
	Zeuten			DESY					Orsay			
Conferences &	1					2426.;	59,	1620.;	, í			
workshops with						IEEE	EPAC,	Linac,				
activity						Szczecin	Lucern	Lübeck				
contributions												

WP2 IMPROVED STANDARD CAVITY FABRICATION

Task 2.1: Reliability analysis, Task 2.2: Improved component design



Status of activity:

Task 2.1 is slightly delayed, but it is assumed that milestone 2.1.7 will be met in time. Subtask 2.2.1 has accumulated a certain delay due to the difficulty in hiring people as discussed in the past phone conference. We estimated a delay of about three months.

Subtask 2.2.2 foresees contacts and activities with industrial subcontractors, these will start in September.

Task 2.3: EB welding

N°	Task Name	2004 2005
		12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
2.3	EB welding	
2.3.1	Design tooling	
2.3.1.1	Tools for flange w elding	
2.3.1.2	Tools for pipe w elding	
2.3.1.3	Tools for stiffening rings	
2.3.1.4	Tools for single cell welding	
2.3.1.5	Tools for 9-cells	
2.3.1.6	Tools design finished	15.12
2.3.2	Tools production	
2.3.2.1	Tools for flange w elding	
2.3.2.2	Tools for pipe w elding	
2.3.2.3	Tools for stiffening rings	
2.3.2.4	Tools for single cell welding	
2.3.2.5	Tools for 9-cells	
2.3.2.6	Tools fabrication finished	11.03
2.3.3	Welding	
2.3.3.1	Commissioning welding machine	
2.3.3.2	Test w elding	
2.3.3.3	Start production welding	11.03
2.3.3.4	Single cell w elding	

Status of activity:

Task 2.3 is in line. At present the rotating welding table in the vacuum welding chamber is thoroughly cleaned from standard grease in order to meet the stringent vacuum requirement for welding high purity Niobium.

WP3 SEAMLESS CAVITY PRODUCTION

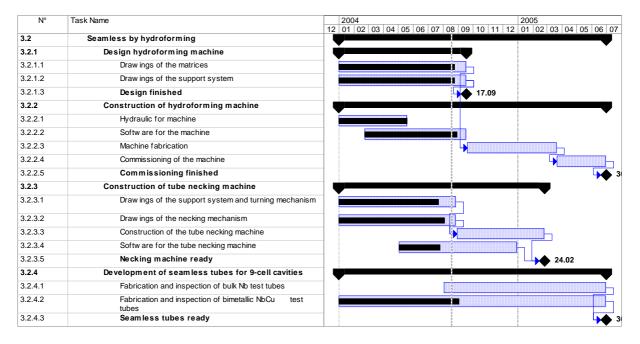
Task 3.1: Seamless by spinning

N°	Task Name	2004 2005
		12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
3	WP3 SEAMLESS CAVITY PRODUCTION	
3.1	Seamless by spinning	
3.1.1	Design spinning machine	i i i i i i i i i i i i i i i i i i i
3.1.1.1	Draw ings of the matrices	
3.1.1.2	Draw ings of the support system	
3.1.1.3	Design finished	17.09
3.1.2	Construction of spinning machine	
3.1.2.1	Fabrication of machine parts	
3.1.2.2	Softw are for the machine	
3.1.2.3	Assembly of machine	
3.1.2.4	Commissioning of the machine	

Status of activity:

Task 3.1 proceeds in time. It has been evaluated and chosen the solution of upgrading an existing spinning machine with a second tuttet, in order to industrialize the actual spinning procedure. The specifications for the new turret have been finally decided. We received a quotation from the firm. The order waits to be processed by our administration.

Task 3.2:	Seamless	bv	hydroforming
1 ubix 5.2.	Scamess	vj	ing at or or mining



Status of activity:

- At the moment we do not have any delay.
- Work on design of the hydroforming machine was continued. Drawings of the matrices and of the support system are in the final stage.
- Construction of the hydroforming machine is in work. Hydraulic for the machine is ready. Work on the software is in the final stage. Software will be based on the LabVIEW principles (company National Instruments).

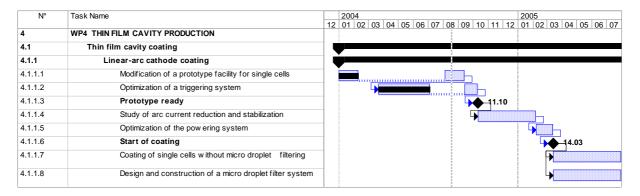
- Construction of the tube necking machine is in work. Drawings of necking mechanism, support system and turning mechanism are in the final stage. Concept for the software is developed and is in the implementation.
- A seam less bimetallic NbCu tube is ordered.

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel				
Consumables	14225		53000	67157
Manpower	9020		14.760	23780
Durable				
			Total sum	90937

Task 3.2: Status of money spending

WP4 THIN FILM CAVITY PRODUCTION

Task 4.1.1: Linear arc cathode coating



Status of activity:

Optimization of a triggering system has been finished. Two independent triggering systems are ready: HV trigger and modified mechanical trigger. Laser triggering has been tested with ruby laser. Nd YAG laser is ordered (delivery in September confirmed).

Modification of a prototype facility for single cells is delayed .This delay of about 2 month is caused by the 2-month delay in money transfer from the coordinator office. It was impossible to order a durable equipment (vacuum pumps, gauges and spectrometer) in proper time. New power supply has been bought only. On today, needed equipment is ordered and the delivery in August/September is confirmed.

Good candidate, young engineer has been found. Since September he should be employed in the frame of contract.

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	2.5		2.0	4.5
Consumables	5.5		15.0	20.5
Manpower		3.2	3.2	3.2
Durable	2.2	50.0	52.5	52.5
			Total sum	80.7

Task 4.1.1: Status of money spending

Publications and meetings

 "Super-conducting niobium films produced by means of ultra-high vacuum arc", J.Langner, M.J.Sadowski, K.Czaus, R.Mirowski, J.Witkowski, L.Catani, A.Cianchi, R.Russo, S.Tazzari, F.Tazzioli, D.Proch, N.N.Koval, Y.H.Akhmadeev, 21st SPPT in Prague, Czech Republic, published in Czech. J. Phys. Vol. 54 C (2004)

N°	Task Name		20	004													2	2005	;				
		12	0	1 0	2 03	3 (04	05	06	6 0	7	08	09	10	11	12	2 ()1 ()2	03	04	05	06 07
4.1.2	Planar-arc cathode coating		,																				
4.1.2.1	Modification of a planar-arc system																						
4.1.2.2	Optimization of the laser triggering system					C							5				1						
4.1.2.3	Prototype ready											K	9	3.09	9								
4.1.2.4	Characterization of samples coated at different conditions											5				┣							
4.1.2.5	Characterization of Nb-coated sapphire samples															4							
4.1.2.6	Characterization of Nb-coated copper samples																	4				_	7
4.1.2.7	Planar arc system fully tested																				[27.0
4.1.2.8	First investigation of the micro droplet problem																					- F	

Task 4.1.2: Planar arc cathode coating

Status of activity:

The status is summarised in the schedule above. Project start is when money was actually received. We are ahead of schedule on item 4.1.2.1 and partially ahead on item 4.1.2.2. Laser triggering works very well, the first shot reliably starting the arc every time.

Work on "New magnetic filtering system" is running late because we are in the process of upgrading the design, on the basis of recent experience, so as to make it capable of also depositing single cell like objects.

Large copper samples to be employed for task 4.1.2.6 are being prepared and should be delivered by end of August. We have also ordered a new cathode assembly.

Financial report

A. Committed so far:	Consumables	(<i>K</i> €) 5,5
<i>B</i> . Expected till end 2004: Person	Instrumentation inel,Temp.Contract (4 m)	25,0 14,0

Consumables 10,0

TOTAL A+B 55,5

WP5 SURFACE PREPARATION

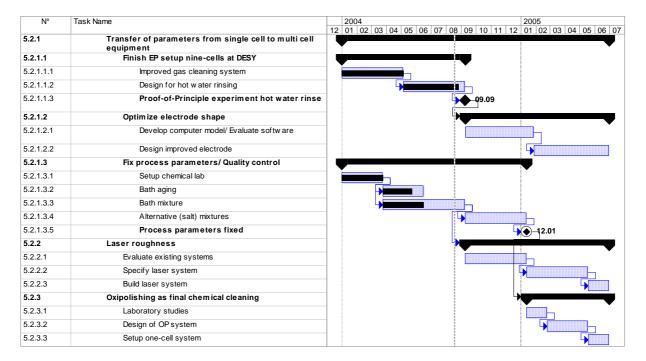
Task 5.1: EP on single cells

N°	Task Name		2004 2005
		12	2 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
5	WP5 SURFACE PREPARATION		
5.1	EP on single cells	- 1	
5.1.1	EP on samples	٦ (ý mana a se
5.1.1.1	Establishing method of surface characterization (roughness, reflectometry)		
5.1.1.2	Surface characterization fixed		28.05
5.1.1.3	Series of EP with samples for surface investigations		
5.1.1.4	Best EP parameters	_	31.12
5.1.2	Single cell cavities	- 1	VV
5.1.2.1	Order Nb and fabricate 3 cavities		
5.1.2.2	3 cavities fabricated	_	31.12
5.1.3	EP chemistry on single cells	٦ (
5.1.3.1	Design of EP set-up	_	
5.1.3.2	Fabrication of EP set-up	_	
5.1.3.3	Commissioning of EP set up	_	
5.1.3.4	First operation of EP set up	_	31.12
5.1.3.5	Operation of EP set-up		

Status of activity:

Milestone 5.1.1.2 has been met. A report on a method of surface characterization has been submitted. Due to a relocation of the service the activity is stopped until mid-September. This will have no serious effect to the schedule

Task 5.2: Multicell EP

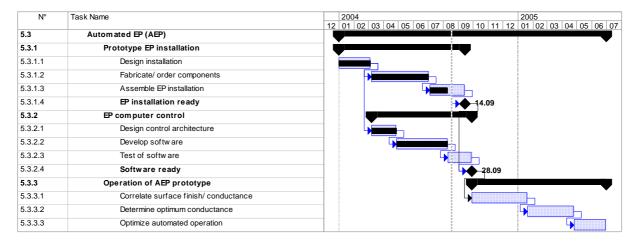


Status of activity:

The improved gas cleaning system is installed. Due to some problems with EP setup currently a delay of about a month has been accumulated. It still seems feasible to electropolish 10 cavities this year.

The hot water rinsing experiment on multi-cells is on hold as single cell cavity tests give no sufficient confidence that an improvement of cavity performance can be achieved. Preparation of the chemical lab is finished.

Task 5.3: Automated EP



Status of activity:

Also this activity proceedes in time. We decided to do the automation by means of a PLC programmed in labview. The software has been developed but not yet tested. The supply ordered on ESGARD budget has been not yet delivered, so we used an existing supply for the moment. The supply was however a current generator, so it was not suitable for the Automated EP process that must drive a voltage generator. The supply has been modified in order to be driven both in current and in voltage. The modify has been executed a few days ago. This supply can be used for testing, meanwhile we wait for the delivery of the new supply.

Task 5.4: Dry ice cleaning

N°	Task Name	2004 2005
		12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 0
5.4	Dry ice cleaning	
5.4.1	Installation of full system for 1-3 cell cavities	
5.4.1.1	Installation of CO2 piping	
5.4.1.2	Installation of motion system	
5.4.1.3	Installation of control system	
5.4.1.4	Commissioning	
5.4.1.5	Installation finished	28.12
5.4.2	Optimization of cleaning parameters	
5.4.2.1	Sample cleaning	
5.4.2.2	1-cell cavity cleaning	
5.4.2.3	Fix best cleaning parameters	
5.4.2.4	Cleaning parameters fixed	
5.4.3	VT 9-cell cleaning apparatus	
5.4.3.1	Design 9-cell apparatus VT	
5.4.3.2	Fabricate 9-cell apparatus	

Status of activity:

Main activity was the construction and test assembly of the motion system. The construction is ready, but due to some missing components (delay in fabrication) the further assembly is delayed by 6 weeks.

Furthermore additional tests with a prototype system were performed to determine a better parameter set for the upcoming commissioning and the order of the CO2 purifier/cooler unit.

The quotation for the CO2 purifier/cooler unit is available and the order will be placed in the next weeks.

Beginning from August, 1st a technician contract starts to support and accelerate the installation of the system. Therefore the delay will eliminated within the next months.

Status of milestones / deliverables for WP 5 in the second quarter:

The WP 3.1 and the WP 5.3 are on time. The WP 6.2 has some delay. No publications are yet available.

Financial report INFN in JRA1:

We have hired a mechanical technician for support, a material scientist working on Electropolishing and a Physicist that will take care of cavity characterization, then we have ordered a power supply for EP and we have submitted to the LNL administration the order for the turret to add on the spinning machine. The money for materials have been accounted, but not yet paied. For January 05 we would like to hire a second technician.

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel				
Consumables Manpower	€ 22,550 (WP5.3 and WP6.2 for Dr.	€ 3,468 (WP5.3 for the EP supply) € 33,406.00 (WP5.3 for Dr Stack)	€41.300 (WP3.1 for spinning turret, not yet paied)	
Durabla	Rampazzo) € 16,900 (WP 3.1, WP5.3 and WP6.2 for Mr. Varotto)	Dr.Stark)		
Durable		-		T-(-10117624
			Total sum	<i>Total</i> € 117,624

Financial report of subtasks in WP 5

	Single-cells	Multi-cells	Automated	Dry-ice
Spend money	5.1.	5.2.	5.3.	5.4.
Travel				5000
Consumables		6300		41900
Manpower			39450	10000
Durable				

New contracts	5.1.	5.2.	5.3.	5.4.	
Travel					
Consumables					
Manpower		15	000	33406	
Durable					

Expected spending	5.1.	5.2.	5.3.	5.4.
Travel				
Consumables			3468	
Manpower				
Durable				

Sum

Travel	0	0	0	5000
Consumables	0	6300	3468	41900
Manpower	0	15000	72856	10000
Durable	0	0	0	0

IV Publications and meetings

A short overview of the activities can be found in the proceedings of the 1^{st} ELAN Workshop in Frascati (<u>http://elan.desy.de</u>).

WP6 MATERIAL ANALYSIS

Task 6.1 SQUID SCANNING

N°	Task Name		12	2004											200	5				
		12	2 (01 02	03	04	05	06	07	08	09	9 10	11	12	01	02	03 0	04 0	5 06	3 07
6	WP6 MATERIAL ANALYSIS																			
6.1	SQUID scanning		Ý							-										V
6.1.1	Produce calibration defects		ý							Ý										•
6.1.1.1	Production of surface defects		-							Ĭ										
6.1.1.2	Production of bulk defects		555							D+	1									
6.1.1.3	Calibration defects finished								4	4	12	.08								
6.1.2	Design components of SQUID scanner		ý							Ň										
6.1.2.1	Design of the scanning table and support								H					•						
6.1.2.2	Design of the SQUID cooling system		-											Ь						
6.1.2.3	Design Scanner finished													3	80.11					
6.1.3	Construction of scanning apparatus													ÿ-	-					
6.1.3.1	Fabrication of the SQUID													- -	:					•
6.1.3.2	Fabrication and purchase of components for SQUID scanner														:					
6.1.3.3	Softw are for the SQUID scanner																			0

Status of activity:

Production of Nb sheets with artificially prepared surface defects is finished. Production of Nb sheets with artificially prepared bulk defects is in the final stage. Pure tantalum is chosen for foreign material inclusions. Some tantalum particles with smallest size of ca. 50 μ m are implanted in niobium sheet.

Design of components of the SQUID scanner is in work. One of the possible solutions for the scanning table design is finished.

II Status of milestones / deliverables in this quarter

No milestones / deliverables in this quarter

III Financial report

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel				
Consumables			55300	55300
Manpower	6150		1230	7380
Durable				
			Total sum	62680

N°	Task Name	2004 2005
		12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
6.2	Flux gate magnetometry	
6.2.1	Produce calibration defects	
6.2.1.1	Production of surface defects	
6.2.1.2	Production of bulk defects	
6.2.1.3	Calibration defects finished	09.11
6.2.2	Design components of flux gate head	
6.2.2.1	Design electronics	
6.2.2.2	Design of flux gate head	
6.2.2.3	Design of operations softw are	
6.2.2.4	Design flux gate head finished	01.03
6.2.3	Fabrication of flux gate detector	
6.2.3.1	Fabrication of flux gate head	
6.2.3.2	Fabrication of mechanics	
6.2.3.3	Implementation of softw are	
6.2.3.4	Commissioning of flux gate detector	
6.2.3.5	Calibration of flux gate detector	
6.2.3.6	Flux gate detector operational	

Task 6.2 Flux gate magnetometry

Status of activity

We are in delay. The reason is that because of late arrival of money added to the long time needed by INFN for people recruitment, the mechanical technician that was supposed to fabricate the electrolytic cells for magnetometry was hired with delay, so as soon as he arrived he was busy for the activity of spinning seamless cavity. This has delayed the construction of magnetometry tools. The delay however will be fully recovered in the second part of the year.

N°	Task Name	2004 2005
		12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
6.3	DC field emission studies of Nb samples	
6.3.1	Quality control scans	ýý
6.3.1.1	Modification of Scanning apparatus	
6.3.1.2	Calibration of Scanning apparatus	
6.3.1.3	Start scanning activity	44.06
6.3.1.4	BCP and HPR samples	
6.3.1.5	EP and HPR samples	
6.3.1.6	BCP/EP and DIC samples	
6.3.1.7	First report on BCP/EP and DIC surface	10.

Status of activities:

Beginning from July, 1st 2004 the work is supported by a new scientic co-worker financed by CARE money.

A dedicated specimen holder for high pressure rinsing experiments is under construction. The status of the existing samples is ascertained.

WP7 COUPLERS

Task 7.1: New prototype coupler Task 7.2: Fabrication of TiN coating system

Task Name	2004 2005
	12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
WP7 COUPLERS	
New prototype coupler	
RF simulation of coupler	
Report on simulation	92.07
Detailed engineering draw ings	
Engineering complete	31.12
Call for tenders	
Start prototype fabrication	01.04
Fabrication of TiN coating system	
Mechanical design of vacuum chamber	
Mechanical design finished	29.04
	WP7 COUPLERS New prototype coupler RF simulation of coupler Report on simulation Detailed engineering drawings Engineering complete Call for tenders Start prototype fabrication Fabrication of TiN coating system Mechanical design of vacuum chamber

Status of activity:

Design of new prototype couplers: There are two designs for the new prototype couplers (see last quarter report): TTF5 with cylindrical windows and TW60 with planar windows. RF simulations are already done (task 7.1.1, see last quarter report).

Mechanical design (task 7.1.2) is done for TTF5 coupler, and should be finished for TW60 coupler in September.

A call for tenders (task 7.1.3) for TTF5 couplers is on the way of publishing. Another call for tenders will be launched after this first one for some TW60 couplers. So for task 7.1 we are on schedule.

The design of the TiN coating device (task 7.2) will begin probably in October 2004 with a little ahead on schedule (CARE schedule: 1st January 2005)

Exploring new processing methods: we start this activity and we have good results (processing in less than 44,6 hrs, internal report)

Status of milestones / deliverables in this quarter

All milestones for this quarter report are on schedule.

Financial report

For travel the spent money is for the moment supported by LAL

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	*			
Consumables	6166.20€		**250 k€	256166.20€
Manpower				
Durable	6964.27€			6964.27€
			Total sum	

* For travel the spent money is for the moment supported by LAL ** Ordering of 4 couplers TTF 5 expected end of 2004

Publications and meetings

Publications are internals reports and notes only.

WP 8 TUNER

Task 8.1 UMI tuner

N°	Task Name		20	04											2005				
		12	01	02	03	04	05	06	07	08	09	10	11	12	01 02	03	04 05	06	07
8	WP8 TUNERS																		
8.1	UMI tuner		_							-									
8.1.1	Develop control electronics								_								•		
8.1.2	Mechanical design of tuner								4	T.			_						
8.1.3	Study leverage system/motor											4							
8.1.4	Integration of piezo design									n in									
8.1.5	Choice of transducer / actuator													[
8.1.6	Report on UMI tuner															[27.04	

Status of activity:

A prototype DSP board for piezo control is now working.

The new cryogenic load cells are arrived and will be tested in the near future. Several new piezos will be bought in near future to perform more tests at LHe.

There is a 6 months of delay in the tuner design report that I think will be kept.

The mechanical engineer has been hired.

Task 8.2: Magneto-strictive tuner

N°	Task Name		20	04										2	005				
		12	01	02	03	04	05	06	07	08	09	10	11 1	2 0	1 02	2 03	04	05	06 07
8.2	Magneto-strictive tuner		- رز							-									
8.2.1	Complete specification			-															
8.2.2	Conceptional design		C																
8.2.3	Prototype and performance				5			.		Ú	Ь								
8.2.4	Finalize drive electronics									C				<u> </u>	1				
8.2.5	Installation and test of tuner													4					

Status of activity:

The technical specification and conceptional design were performed. The sample of magnetostrictive tuner is available. The electronic driver for the magnetostrictive element is designing and will be tested in the beginning of September. Initially two different type of amplifier will be evaluated - PWM and continuous ones.

Task 8.3 CEA tuner

N°	Task Name		20	04											200)5				
		12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03 (0 40	5 06	6 07
8.3	CEA tuner		7-							ļ										
8.3.1	Design piezo tuning system								-								•			
8.3.2	Fabrication of prototype							4		1					h					
8.3.3	Installation of driver electronics													q			_	1		
8.3.4	CEA tuner ready for experiment																	28.0	3	

Status of activity:

The pre studies of the piezo tuner were finished and final drawings for realization are going to be sub contracted. They shall be delivered mid of October. The components will be realized following this delivery. We hope to have the possibility to mount them before the end of the year, in less than 2 months.

The piezo support is designed to mount two lengths of piezo: 30 and 36 mm. The 12 NOLIAC piezo actuators 30mm long were bought and they should be delivered before the end of September. The PI piezoelements will be taken from IPN Orsay for tests. Several NOLIAC piezoelements will be sent to IPN for low temperature characterization and radiation tests.

Task 8.4 In2P3 activities

N°	Task Name		2004 2005
		12	12 01 02 03 04 05 06 07 08 09 10 11 12 01 02 03 04 05 06 07
8.4	IN2P3 activities		
8.4.1	Characterize actuator/piezo sensor		
8.4.2	Report on actuator/piezo sensor		
8.4.3	Test radiation hardness		
8.4.4	Report on radiation hardness tests		18.04
8.4.5	Integration of piezo and cold tuner		A
8.4.6	Cryostat tests		
8.4.7	Ready for pulsed RF test		

Status of activities:

The task of CNRS-IN2P3-Orsay institute is characterization of piezoelectric actuators at low temperature, radiation hardness tests of these components with fast neutrons at low temperature (liquid helium temperature = 4.2 K), contribute to the study of their integration in a piezo-tuner and participate to the tests of the final device inside horizontal cryostat in collaboration with CEA/DSM/DAPNIA institute.

Equipment, which is necessary for piezoelement characterization like a dedicated testchamber, temperature sensors, liquid helium level gauge, etc, was recently delivered to IPN Osray and assembling of elements is started. The thermometers were already calibrated in the temperature range 1.6 K-300K at the IPN Orsay facility. The low temperature full characterization of piezoelement from PIEZOSYSTEM JENA was continued and preliminary room temperature tests of a new experiment (piezoelement as force sensor) were performed. The new prototypes of piezostacks from PI Company have been also delivered. The NOLIAC piezostacks will be taken from CEA Saclay. The first technical report on low temperature characterization of piezostacks is expected before end of October.

The preparation for an irradiation hardness experiment is well in progress: the detailed drawings of the irradiation test-chamber are finished, the calculation concerning material activation are started, order for the electronics dedicated to these tests were placed and the item delivery is expected by end of July. According to the agreement with CERI laboratory (the host lab for irradiation test) the first experiments with neutron beam might be performed after January 2005. The exact date will be defined before December 2004. As a consequence, the corresponding technical report will not be available before end of April 2005. From the beginning of September a research assistant will be hired.

Status of milestones / deliverables of WP8 in the second quarter

8.1 A delay of 6 months in milestones 8.1.5.1 Tuner Design Report is expected (it was initially foreseen for 15 Apr 2005),

8.2 At this moment no delay is foreseen for the technical report,

8.3 The pre study was longer than expected, and the time scheduled for the tests will be shortened. However we are still on time for the delivery in March 2005 of the piezo tuners.

8.4 A delay of 4 months in milestones 8.4.2 Report on actuator/sensor piezo and 8.4.3 Report on radiation hardness test is expected. It is mainly due to the delay of European financial support and delay in delivery of the piezo components from Physic Instrument.

Financial report WP8

Tables for each task are presented below. The last one shows the total cost of whole work package.

8.1.UMI tuner

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	0	0	5	5
Consumables	0	0	15	15
Manpower	0.8	0	18	18.8
Durable	0	0	0	0
			Total sum	38.8

8.2. Magnetostrictive tuner

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	0.7		4	4.7
Consumables	2.8		20	22.8
Manpower	1.7		2	3.7
Durable				
			Total sum	31.2

The values presented above might be slightly different due to the exchange rate.

8.3. CEA tuner

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	~ 0.27		~0.54	~0.81
Consumables		6.264 (actuators)		
Manpower				
Durable			~20 (tuners)	~20
			Total sum	~27

8.4 IN2P3 activities

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	1.350		4.0	5.35
Consumables	11.384	27.3	27.3	38.684
Manpower	0	0	12	12
Durable	0	0	0	
			Total sum	56.034

Total sum of 8th WP

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	2.320	0.000	13.540	15.860
Consumables	14.184	33.564	62.300	76.484
Manpower	2.500	0.000	32.000	34.500
Durable	0.000	0.000	20.000	20.000
				146.844
			Total sum	

Publications and meetings

Meetings:

Kick-off Meeting, Work Package #8, Hamburg, Geramny, February 12th, 2004 1st Workshop of ELAN Meeting, Frascati, Italy, 4-6 May 2004

Papers:

[1] "Lorentz Force Detuning Compensation System for Accelerating Field Gradients up to 35 MV/m for Superconducting XFEL and Tesla Nine-Cell Cavities", P. Sekalski, S. Simrock, L. Lilje, C. Albrecht, MIXDES 2004, Poland,

Web sites:

http://tesla.desy.de/~sekalski

WP9 LOW LEVEL RF (LLRF)

Subtask 9.1.1: Transient detector

N°	Task Name		12	2004										1	2005				
		12	2 (01 02	03	04	05	06	07	08	09	10	11 1	12	01 02	2 03	04 0	15	06 07
9.1	Operability and technical performance	1								ļ									
9.1.1	Transient detector		Ŭ							ļ									÷.
9.1.1.1	Define requirements		Ì																•
9.1.1.2	Electronics design				_														
9.1.1.3	Build prototype and evaluate			- 5						_									
9.1.1.4	Final design of detector								4			Ь							
9.1.1.5	Installation and commissioning										q				Ь				
9.1.1.6	Test with beam													Ľ					

Status of activities

Progress is in line with schedule.

Studied prototype of single bunch electronics with beam at TTFII. Difficulties encountered include electromagnetic noise from the environment, phase changes of individual cavities during the flat-top portion of the vector-sum, and direct pick-up of the signal by the bunch itsself. Systematic studies with varying beam phase showed that direct crosstalk from the beam dominated the measurement. Studies will resume in September following the shutdwon of the accelerator.

Subtask 9.1.2: LLRF Automation

N°	Task Name		2004												2005				
		12	01	02 0	03	04	05	06	07	08	09	10	11	12	01 0	02 03	3 04	05	06 07
9.1.2	LLRF Automation		_																-
9.1.2.1	Dialogue with industrial experts				1														•
9.1.2.2	Develop full specification			4	-	-													
9.1.2.3	Implement FMS for subsystems				5								Ь						
9.1.2.4	Test and evaluation	_										G							
9.1.2.5	Implement improvements	_																	
9.1.2.6	Evaluation and acceptance by operators	_														[

Status of activities

Progress is in line with schedule.

The recognition of power supply subsystem and initial design al the application (Finite State Machine). Main interest was a single RF power station which consists of klystron, "modulator", waveguides and all auxiliary facilities which make this all those things working. The requirement analysis have been worked out and discussed. The new XML based method for preparation configuration files has been worked out. The WEB application for generation and edition of those files is under development. The software design has been started using Harel's finite state machine diagrams. Some discussions have been performed with the programmers working on device drivers of the hardware equipment. The prototype model of the FSM is being developed in the Matlab (Stateflow toolbox).

Subtask 9.1.3: Control optimisation

N°	Task Name		200	4											200	5				
		12	01	02 0)3	04	05	06	07	08	09	10	11	12	01	02	03	04 0	5 0	6 07
9.1.3	Control optimization		_																	
9.1.3.1	Specification of system					_														•
9.1.3.2	Conceptual design of controller				4		7													
9.1.3.3	Performance simulation					4					_									
9.1.3.4	Implementation in DSP hardw are									4										
9.1.3.5	Implementation and tests on TTF													4						

Status of activities

Progress is in line with schedule

Subtask 9.1.4: Exception handling routines

N°	Task Name		200)4											2005	5				
		12	01	02	03	04	05	06	07	08	09	10	11	12	01	02 0	3 0	4 05	06	07
9.1.4	Exceptional handling routines		,-																	
9.1.4.1	Specification		İ																	
9.1.4.2	Design of exceptional handler		4							min]					
9.1.4.3	Implementation and test on TTF													шŰ						

Status of activities

Delay of 6 month because of difficulties in hiring a competent person. The expert is just hired now, it is assumed that the delay can partially be made up.

Subtask 9.2.1: Cost and reliability study

N°	Task Name		20	04											200	5			
		12	01	02	03	04	1 05	5 06	6 0	7 0	8 0)9 1	0 11	12	01	02 03	3 04	1 05	06 07
9.2.1	Cost and reliability study		7								-				:				
9.2.1.1	Identify cost drivers of present LLRF		İ.,										h						
9.2.1.2	Develop cost reduction ideas			C	1														
9.2.1.3	Build prototypes and evaluate				[N													
9.2.1.4	Final design of LLRF system																		

Status of activities

Delay of 6 month because of difficulties in hiring a competent person. The expert is just hired now, it is assumed that the delay can partially be made up.

Subtask 9.2.2: Radiation damage study

N°	Task Name		200	04									200	5			
		12	2 01	02 (03	04 0	5	06 07	08	09	10	11 1	2 01	02 03	3 04	05	06 07
9.2.2	Radiation damage study		-														
9.2.2.1	Identify critical electronics issues				٦												-
9.2.2.2	Evaluate TESLA radiation					_											
9.2.2.3	Develop tests for components				4			1									
9.2.2.4	Procure and assemble test set up					(٦								
9.2.2.5	Data acquisition from radiation tests											_					
9.2.2.6	Analyze results and develop countermeasures										- 5		Ľ-				
9.2.2.7	Implement countermeasures and verify																

Status of activities

Progress is in line with schedule.

The investigations focus on application of SRAM memories to detection and measurements of radiation level. The experiments done in previous months have proven that SRAM memory can be used for that purpose, however accelerator environment is so radiated and noisy that it is necessary to use special hardware and communication channels. The specialized computer based on two synchronously operating processors has been build and installed in Linac II tunnel. It is able to detect SEUs in SRAM memory and to measure supply current in the memory. Both parameters are collected in database accessible through www interface. The data are collected during normal Linac II operation and will be used for further analysis. Other boards will be installed in TTF2 tunnel when accelerator will be under operation.

Subtask 9.3.1: Multichannel down converter

N°	Task Name		200)4											200)5				
		12	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04 0	5 0	6 07
9.3.1.1	Study and compare technologies																			
9.3.1.2	Select optimum PCB design						1													
9.3.1.3	Build prototype and evaluate	1																		
9.3.1.4	Finalize multichannel dow nconverter	1						4												
9.3.1.5	Determine characteristics	1								5										

Status of activities

The activity is in line with the schedule

The 81 MHz downconverter board has been designed an will be produced within the next month. A reference frequency system allowing tests at Chechi is under construction.

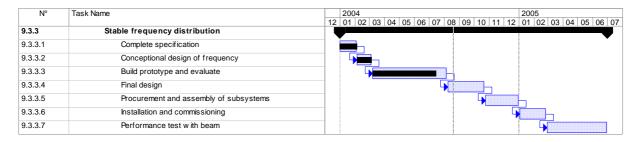
N°	Task Name		20	04											2005					
		12	01	02	03	04	05	06	07	08	09	10	11	12	01 0	2 03	04	05	06	07
9.3.2	Third generation RF control	1	-																	
9.3.2.1	Integrate system generator with VHDL																-			
9.3.2.2	Complete specification		C																	
9.3.2.3	Demonstrate simulator				4															
9.3.2.4	Final design of RF electronic board						Ľ							T-	_					
9.3.2.5	Evaluate performance																1			

Status of activities

The activity is in line with the schedule.

The FPGA based feedback has been tested at Chechia. Performance has been limited by offset in the vector-modulator and the Small signal levels from the downconverter. Identification of QL and detuning has been demonstrated. Following improvements of the vector modulator and downconverter the testing at Chechia will resume.

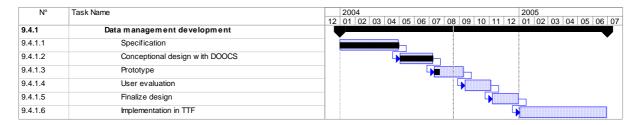
Subtask 9.3.3: Stable frequency distribution



Status of activities.

The activity is in line with the schedule.

Stability of the stabilized fiber optic distribution system has been evaluted to be better than 1 ps (over 60 sec) and better than 5 ps for several hours. Main problem of the regulation is the long time constant of the fiber optic phase shifter. A fast phase shifter (motorized length control) is procured and will provide better regulation.



Status of activities:

Until now the investigation of existing environment (DOOCS system) was made and the possibilities of implementation of database functionality to the DOOCS system was

considered. The necessary changes in both server and client libraries of DOOCS system were analyzed and discussed with peoples developing DOOCS system

Subtask 9.4.2: RF gun control

N°	Task Name		20	004															20	05					
		12	2 0	1 0	2 0	3	04	0	5	06	0	7	80	09) 1	0	11	12	01	02	03	04	05	06	6 07
9.4.2	RF gun control		V																						
9.4.2.1	Write specification																								•
9.4.2.2	Design of controller		П					Н																	
9.4.2.3	Procurement and assembly	1					4						D.												
9.4.2.4	Installation and test																								

Status of activity:

The task is in line with the schedule

Financial report

ΤL	Ľ

	Spent	Value of new	Expected	Sum of
	money	orders/	spending of new	column 2 &
K€		contracts	orders/contracts	4
			until end 2004	
Travel	0.7	0	2	2.7
Consumables	10	0	20	30
Manpower	3	0	18	21
Durable	0	0	0	0
			Total sum	53.7

WUT-ISE

	Spent money	Value of new orders/	Expected spending of new	Sum of column 2 &
K€	money	contracts	orders/contracts	4
			until end 2004	
Travel	0,3	0	1	1,3
Consumables	10	0	50	60
Manpower	2	0	10	12
Durable	0	0	0	0
			Total sum	73,3

201				
	Spent	Value of new	Expected	Sum of
	money	orders/	spending of new	column 2 &
K€		contracts	orders/contracts	4
			until end 2004	
Travel	0.8	0	2	2.8
Consumables	0	0	30	30
Manpower		0	15	15
Durable	0	0	0	0
			Total sum	47.5

IV Publications and meetings

[1] Makowski D, Grecki M. Jabłoński G.: "Application of A Genetic Algorithm to design of Radiation Tolerant Programmable devices", 11th MIXDES Conference, Szczecin 2004, pp. 463-467

WP10 CRYOSTAT INTEGRATION TESTS

N°	Task Name		20	04											2005				
		12	01	02	03	04	05	06	07	08	09	10	11	12	01 0	2 0	3 04	05	06 0
10	WP10 CRYOSTAT INTEGRATION TESTS																		
10.1	Displace CRYHOLAB										/					T	٦		
10.1.1	Move CRYHOLAB, commissioning															Ť-			
10.1.2	Report on intended integration tests in CRYHOLAB														Ľ	•	04.C)3	
10.2	Integration tests in cryostat																		
10.2.1	First experiment in CRYHOLAB																		- q 1.0
10.2.2	Test 1																	-9	Ī

Status of activities

The activity is in line with the schedule.

Modifications are necessary to ensure the right positioning of the 9-cell cavity inside CryHoLab for the RF test.

By comparison with to the previous drawings, shown during the ELAN meeting, the cavity will be necessarily shifted out off the main cryostat axis: the reason being the easier connection between the coupler and the RF waveguide.

The final drawings were completed in June. After call for tenders, two manufacturers have been selected from among four of them. The dead line for mechanical realization is planned for mid-September according to the previous schedu

€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	1668.54		2000.00	3668.54
Consumables				
Manpower				
Durable	5657.00		5000.00	10657.00
	1662.00			1662.00
	1594.00			1594.00
			Total sum	17581.54

Financial report

Publications and meetings

ELAN Meeting (Frascati)

http://elan.desy.de/e150/upload/upload_file/Meetings/Frascati_2004/WP10.pdf

WP11 BEAM DIAGNOSTICS

Task 11.1: Beam position monitor

N°	Task Name		200)4											20	05				
		12	01	02 03	3 0	4 0	5 06	6 C	7	08	09	10	11	12	01	02	03	04	05	06 0
11	WP11 BEAM DIAGNOSTICS																			
11.1	Beam position monitors		_							ġ.										
11.1.1	Present BPM installed in TTF							٠	-30	.06										•
11.1.2	Cryogenic measurements on BPM						C													
11.1.3	Beam tests of BPM on TTF								5]									
11.1.4	Design of BPM cavity											_								
11.1.5	Design of BPM cavity ready										4	•	1.1	0						
11.1.6	Fabrication of BPM cavity										5							Ь		
11.1.7	BPM cavity ready																4	0	1.04	
11.1.8	Development of new hybrid and electronics									Ó										
11.1.9	Design of digital signal processing																			

Status of activity

The activity is in line with the schedule. Milestone 11.1.1 has been met.

The reentrant BPM (Beam Position Monitor) built in 2003 is now installed inside the first cryomodule of the linac. This monitor is similar to the units that were used on the TTF1 linac in warm sections. The new feature is the functioning under more restrictive conditions inside a cryostat and close to a superconducting cavity. This represents the achievement of milestone 11.1.1. No leak or anomalous heat dissipation have been reported during cooling down. In the first measurements with beam the BPM signals look clean. These preliminary measurements were made by connecting an oscilloscope directly to the cables .

Financial report

No EU Money has yet been spent.

As soon as possible there will be orders for the main components of the BPM prototype #1, which is a deliverable. They consist in:

feedthroughs	15 kEuros
cavity mechanics	10 kEuros

Sum: 25 kEuros

The travel costs are not mentioned and should be added.

Publications and meetings

Meeting at DESY, 04/08/04 : Diskussion on the mechanical design of the cold reentrant cavity BPM (R. Bandelmann , H. Brück, MKS, M. Jablonka, CEA, D. Nölle, MPY, M. Wendt , MDI, K. Wittenburg, MDI, K. Zapfe, MVP), minutes taken by D. Nölle.

Task 11.2: Beam emittance monitors

N°	Task Name		2004											2005					
		12	01 0	2 03	04	05	06	07	08	09	10	11 1:	2 0	0 10	2 03	3 04	05	06	07
11.2	Beam emittance monitors		/															-	Γ
11.2.1	Slit with simulations																	•	
11.2.2	Slit design			F															
11.2.3	Optics simulation			L			-	-											
11.2.4	Optics appropriation											1							
11.2.5	System assembly and tests											,	i						
11.2.6	Mechanical assembly at TTF															-			
11.2.7	Optical assembly at TTF																		
11.2.8	Integration of controls into TTF																	5	

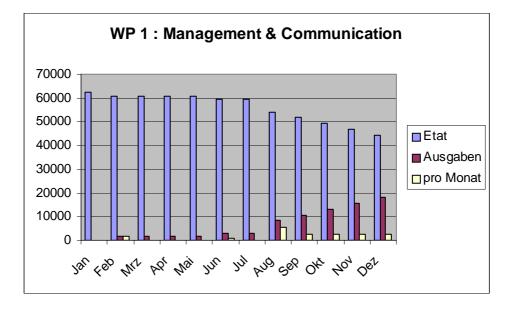
Status of activities

Simulations of the Diffraction Radiation for different conditions of beam parameters are going on.

We have a delay in the recruitment of additional manpower, with small effect in the simulation conclusions. No real effect is aspected for the whole project

Financial report

K€	Spent money	Value of new orders/ contracts	Expected spending of new orders/contracts until end 2004	Sum of column 2 & 4
Travel	0		4	4
Consumables	0		5	5
Manpower	0		5	5
Durable	0		0	0
			Total sum	14



12 Months Spending Profile DESY in JRA1 Status 1.September 2004

