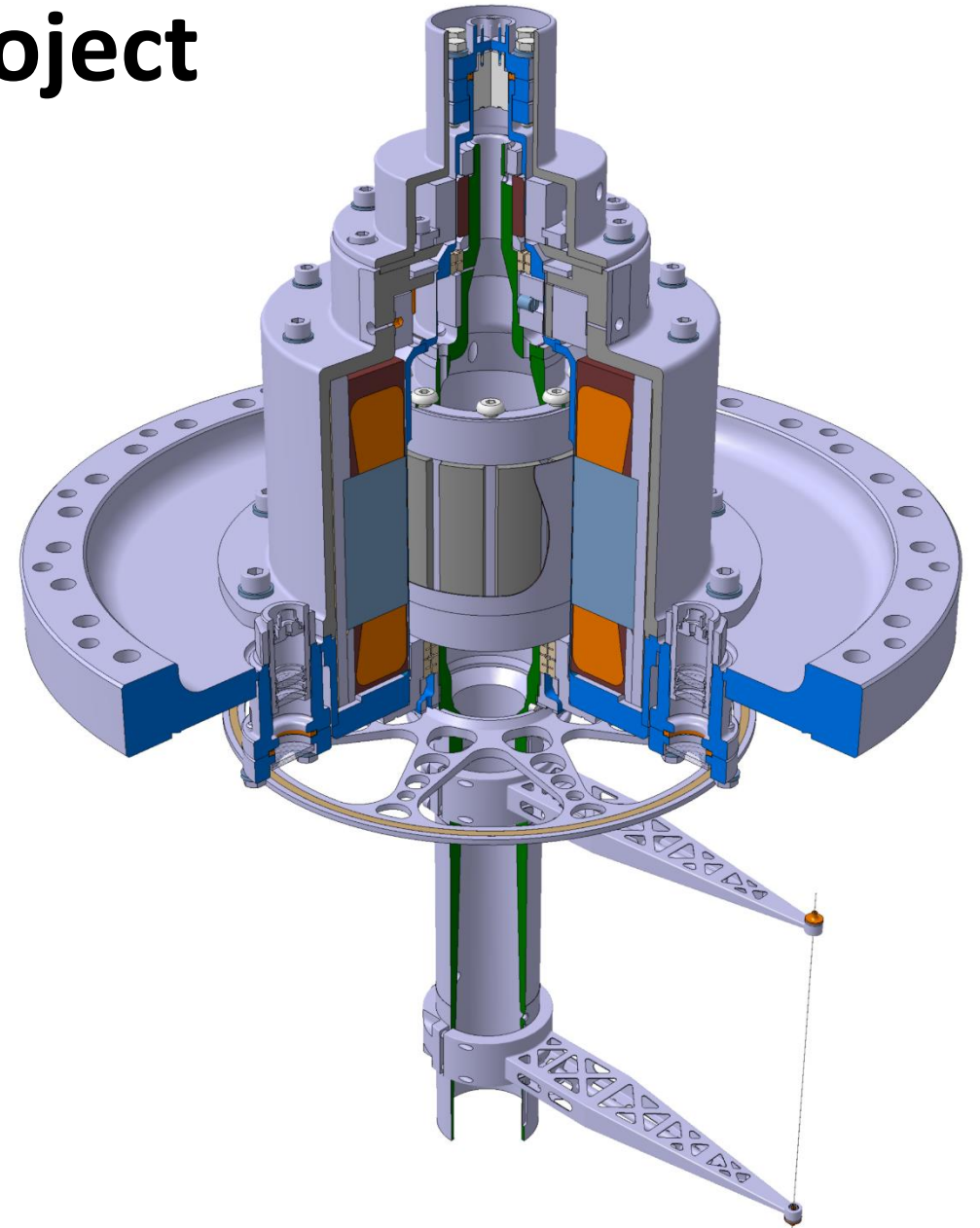


Beam Wire Scanners for LIU project

Status of series production



Outcome

- Vacuum tanks
- Stepped Chambers
- Precise mechanical components
- Other mechanical parts
- Commercial components
- Special components
- Summary

Vacuum tanks

Machine	Quantity	CDD	Supplier	Delivery expected on:	Price
PSB-H	3	PSBBWSRA0006	<u>Vacuum Project (ES)</u>	pre-series (x1)	15.02.2018
PSB-V	5	PSBBWSRA0061		series	10.08.2018
PS	4	PS_BWSRB0002			
SPS	5	SPSBWSRC0003			
ESS	6	CRNBWSRG0001			
Total	23				

- Average price for 1 tank is ~ **6060 CHF**
- Order sent CW46
- Raw material sent CW46
- **Visit next 2 weeks (Ray, Emilien)**
- **Visit to EBW subcontractor Listemann took place in Dec-17 (MME EBW Experts).**

Stepped chambers and shafts

STEPPED CHAMBER PROTOTYPE	DRAWING	QUANTITY	DAI	SUPPLIER	PRICE	DELIVERY
Stepped chamber DN273 FLANGE	PSBBWSRA0027	5	6980837	PFEIFFER (CH)	6233	15.01.2018
TUBE FOR OPTICAL DEVICE	PSBBWSRA0029	20	6980837	PFEIFFER (CH)		15.01.2018
Main Stepped Ring	PSBBWSRA0026	5	6993664	CINEL (IT)	4159.5	15.01.2018
Stepped Chamber End	PSBBWSRA0028	5	6993664	CINEL (IT)		15.01.2018
STEPPED CHAMBER SERIES						
Stepped chamber DN273 FLANGE	PSBBWSRA0027	23	6980837	PFEIFFER (CH)	15755	28.02.2018
TUBE FOR OPTICAL DEVICE	PSBBWSRA0029	90	6980837	PFEIFFER (CH)		28.02.2018
Main Stepped Ring	PSBBWSRA0026	23	6993664	CINEL (IT)	16407.7	28.02.2018
Stepped Chamber End	PSBBWSRA0028	23	6993664	CINEL (IT)		28.02.2018
TOTAL					42555.2	
Electron-beam welding (estimated)					20000	

- Price for 1 stepped chamber is ~ **1520 CHF (Machining) + 750 (EBW) = 2270 CHF**
- Raw material for prototype sent
- EBW of 5 x chambers (pre-series) are ready
- EBW of remaining chambers in March (after the delivery of parts).

Precise mechanical components

PART	DRAWING	QUANTITY	DAI	SUPPLIER	PRICE	DELIVERY
SHAFT	PSBBWSRA0010	20	7007958	ETS YVON BOYER S.A.S (FR)	20645	15.03.2018
		8	7007993	FMI HIGHTECH SOLUTIONS B.V. (NO)	29716	08.02.2018
SHAFT END	PSBBWSRA0011	28	6981786	HMR MIKROMEKANIKK (NO)	17400	08.02.2018
INNER SHOULDERED HUB	PSBBWSRA0013	28	6981786	HMR MIKROMEKANIKK (NO)		
BACK SUPPORT	PSBBWSRA0012	26	6981786	HMR MIKROMEKANIKK (NO)		
BREAK ROTOR	PSBBWSRA0017	28	6981786	HMR MIKROMEKANIKK (NO)		
BRAKE STATOR RING	PSBBWSRA0037	28	6981786	HMR MIKROMEKANIKK (NO)		
TOTAL					67761	

Under metrology control

Other mechanical parts

PART	DRAWING	QUANTITY	DAI	SUPPLIER	PRICE	DELIVERY
OPTICAL DISC PROTECTION	PSBBWSRA0014	50				15.01.2018
NUT FOR OPTICAL DISC						15.01.2018
BLOCKING WASHER						15.01.2018
SPECIAL NUT						15.01.2018
BEARINGS SPECIAL NUT						15.01.2018
WASHER SHIM FOR BEARINGS						15.01.2018
FEEDTROUGH COVER						15.01.2018
MODIFIED ROTATABLE RING DN16						15.01.2018
DN16 HALF-RING WITH THREADED HOLES					18400	15.01.2018
WASHER						15.01.2018
BEARING EXTERNAL RING						15.01.2018
RESOLVER STOPPER						15.01.2018
ADJUSTABLE FOCUS TUBE						15.01.2018
SPECIAL NUT						15.01.2018
THIN NUT 0.5d M16X1						15.01.2018
RING Ø20.2/Ø28/4.8mm						15.01.2018
SPECIAL TAB WASHER						15.01.2018
Pad						15.01.2018
PATCH PANEL						15.01.2018
TOTAL						18400



Commercial components

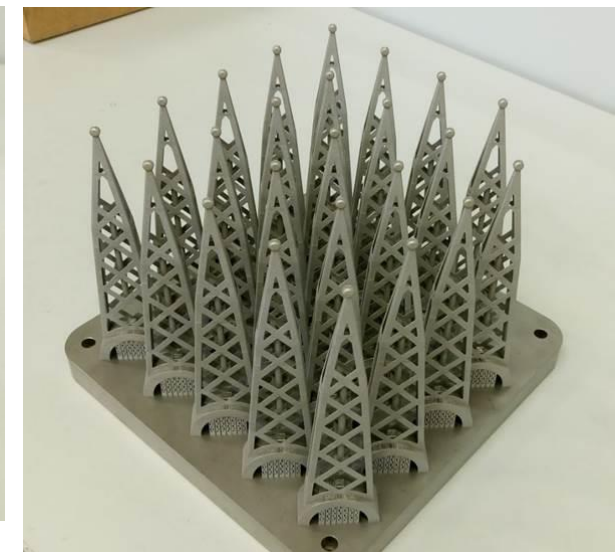
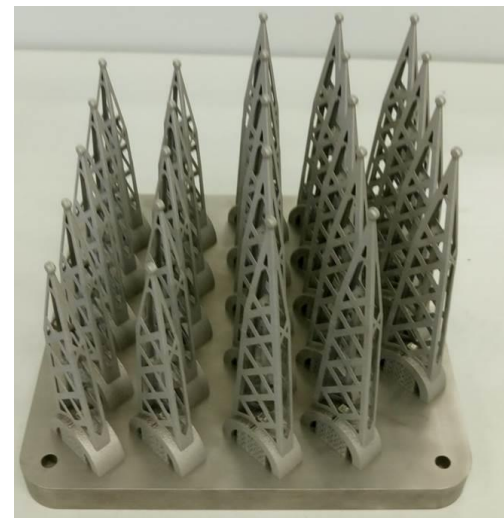
Component	Reference	Quantity per instrument	Total quantity	Spares	Supplier	Status	DAI	Price (CHF)	Delivery
Degassing CHC Drilled Screw M6x10	VFC-610-250	8	250	50	Vacom	delivered	7011696	1732.00	15.12.2017
Degassing CHC Drilled Screw M4x8	VFC-48-250	8	250	50	Vacom	delivered			
Degassing CHC Drilled Screw M3x10	VFC-310-50	1	50	25	Vacom	delivered			
Degassing CHC Drilled Screw M5x10	VFBU-510-250	8	250	50	Vacom	delivered			
Washer vented with groove M4	VFFWV-04-700	24	650	50	Vacom	delivered			
Motors		1	31	6	Alxion	delivered	6845885	70686.00	17.11.2017
BEARING Ø65-Ø50-7		2	70	20	CeramicSpeed	delivered		8400	
BEARING Ø37-Ø25-7		1	40	15	CeramicSpeed	delivered		2800	
Feedthrough	H100010	1	28	3	Hositrad	ordered		24945.29	20.12.2017
Connector	100150	1	28	3	Hositrad	ordered			
Resolver	ROTASYN RO5032-452	1	28	3	ADMOTEC	10 ordered, 18 to be ordered after test		23240.00	30.01.2018
BRAKE MAGNET		1	30	5	HKCM ENGINEERING E.K.	ordered		2342.00	
Carbon Wire		1	76	51	-	-			
SM05 TO FC/APC FIBER ADAPTER	SM05FCA	4	114	14	THORLABS	ordered		1666	
Nut	SM05RR	16	416	16	THORLABS	ordered		504	
LENS	A12-25LPX	8	208	8	ASPHERICON	ordered		10752	
Viewport	VPCF16DUVQ-L	4	114	14	TORR	to be ordered		47936	
Feedthrough		1	28	3	PMB	ordered		18494.00	01.03.2018
REFERENCE SOCKET CUP	LHCGIMSA0003	2	50	0	CERN Store	to be ordered			
VIEWPORT DN100		1	31	6	TORR	to be ordered		12000	
Vacuum pump VACION PLUS 75		1	16	0	VARIAN	ordered	6897396	33115.32	15.12.2017
METAL SEAL UHV FLANGE DN100	SCEM: 18.60.55.860.4	2	62	12	CERN Store	received	7013699	1302	
METAL SEAL UHV FLANGE DN273-272	SCEM: 18.60.55.890.8	1	36	11	CERN Store	received		4320	
METAL SEAL UHV FLANGE DN40-36.8	SCEM: 18.60.55.850.6	1	36	11	CERN Store	received		298.8	
METAL SEAL FOR UHV FLANGE DN16	SCEM: 18.60.55.840.8	5	150	25	CERN Store	received		750	
TOTAL								265283	

Special components

estimated

Component	CDD	Quantity per instrument	Total quantity	Spares	Status	DAI	Supplier	Price (CHF)
FORK L182.5	PS_BWSRB0016	2	34	4	In production		CERN	15000
FORK L150	PSBBWSRA0069	2	20	4	In production		CERN	
FORK BACK HALF CLAMP	PSBBWSRA0047	2	54	8	In production		MME (Yann)	8000
OPTICAL DISC	PSBBWSRA0041	1	31	6	to be ordered after tests		VDL/LT Ultra	50000
Sleeve	PSBBWSRA0046	2	150	100	received		MME (Yann)	6000
Sleeve	PSBBWSRA0045	2	150	100	In production		MME (Yann)	6000
TOTAL								85000

3D printing of the forks is under way now, post-machining is scheduled with MME (J-M Gaisser)



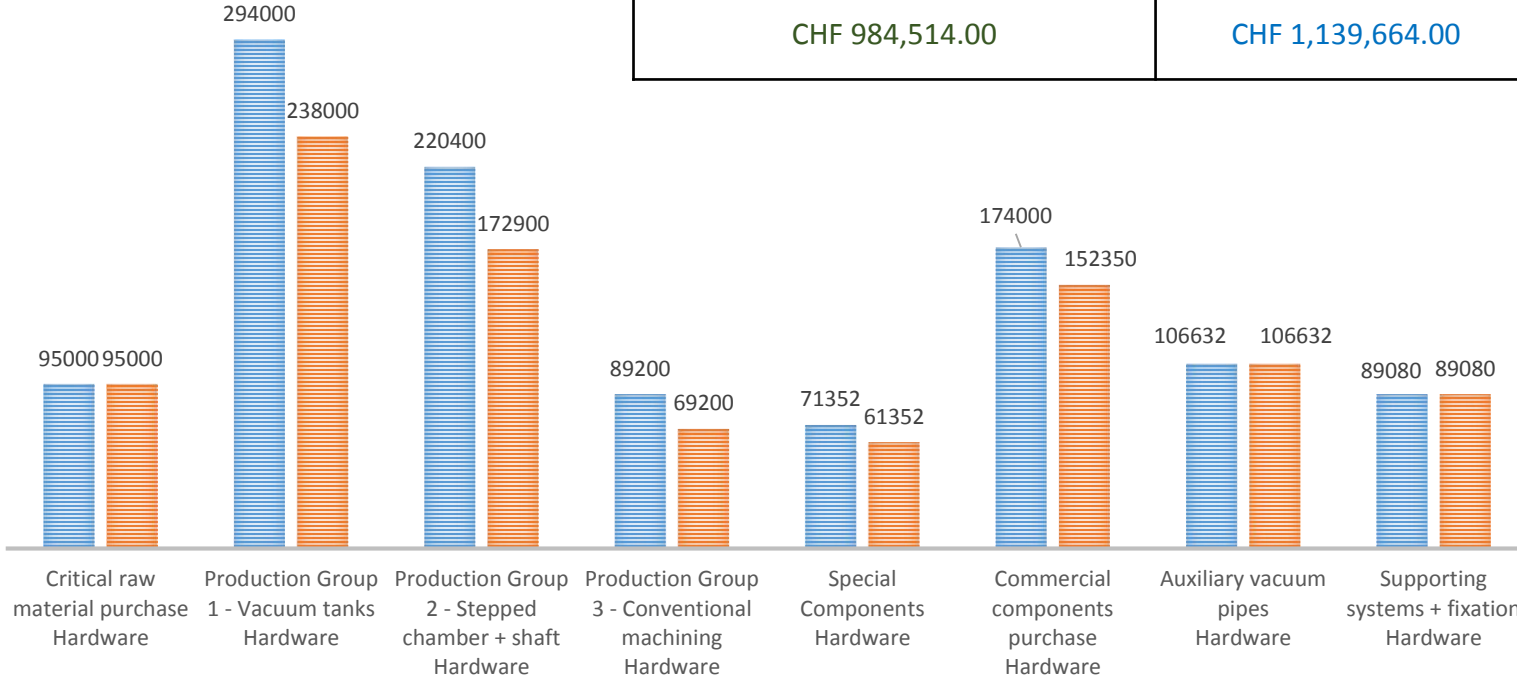
Summary

Components Group	Cost, CHF
Vacuum tanks	139375
Stepped chambers	42555
Precise components	67761
Other components	18400
Commercial components	265283
Special components	85000
Fasteners	8976
Raw material	131698
Other expences	
Cleaning	
Metrology	20000
Administrative fees	600
Transport	
Total (tanks not included)	640274
1 kinematic unit	25611
Per tank	6060
Per instrument	31671

Supporting structures and beam pipes are not included.

BWS series for LIU. Cost estimate

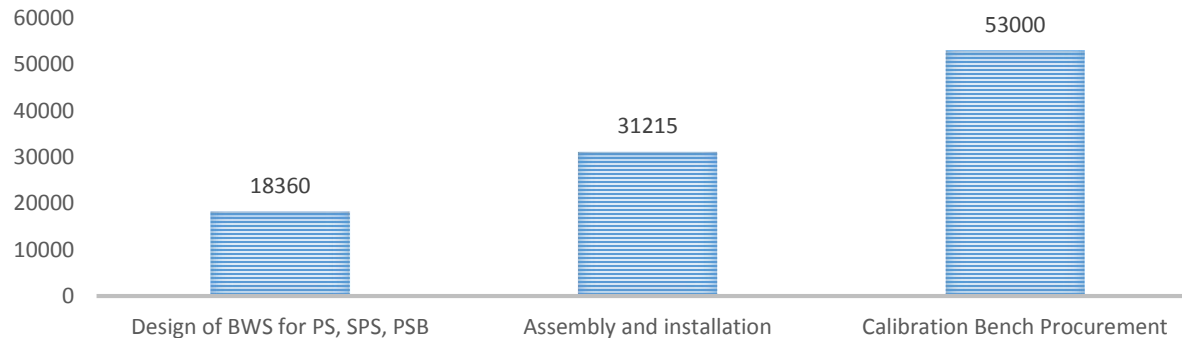
Hardware



Hardware Cost (17 tanks+17 instruments, no spares)	Hardware Cost (21 tanks + 22 instruments)
CHF 984,514.00	CHF 1,139,664.00

	Hardware Cost (17 tanks+17 instruments, no spares)	Hardware Cost (21 tanks + 22 instruments)
Critical raw material purchase	CHF 95,000.00	CHF 95,000.00
Production Group 1 - Vacuum tanks	CHF 238,000.00	CHF 294,000.00
Production Group 2 - Stepped chamber + shaft	CHF 172,900.00	CHF 220,400.00
Production Group 3 - Conventional machining	CHF 69,200.00	CHF 89,200.00
Special Components	CHF 61,352.00	CHF 71,352.00
Commercial components purchase	CHF 152,350.00	CHF 174,000.00
Auxiliary vacuum pipes	CHF 106,632.00	CHF 106,632.00
Supporting systems + fixation	CHF 89,080.00	CHF 89,080.00

BWS Common cost for design, assembly and spares



*1 x Vacuum tank = 14000 CHF

**1 x Stepped chamber + shaft = 9500 CHF

	Cost
Design of BWS for PS, SPS, PSB	CHF 18,360.00
Assembly and installation	CHF 31,215.00
Calibration Bench Procurement	CHF 53,000.00

Metal disks status and plans

4 disks (RSA6061) from VDL received: 1 engraved and installed, 3 to be checked (Jose)

3 disks (RSA905) are in production by LT-Ultra (expected delivery CW10). In case of successful test series will be launched.

Engraving of 4 disks is scheduled CW12..13 (LaserTec)

Machining	Engraving	Material	SN
VDL	LaserTec	RSA6061	
LT-Ultra	Dundee	RSA905	
CERN			

The disk installed in PSB: **V-L-6061-1**