

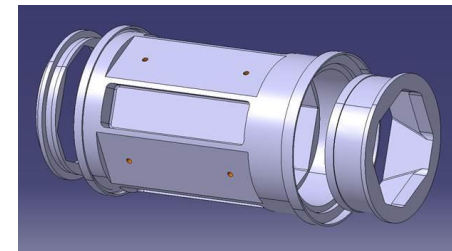
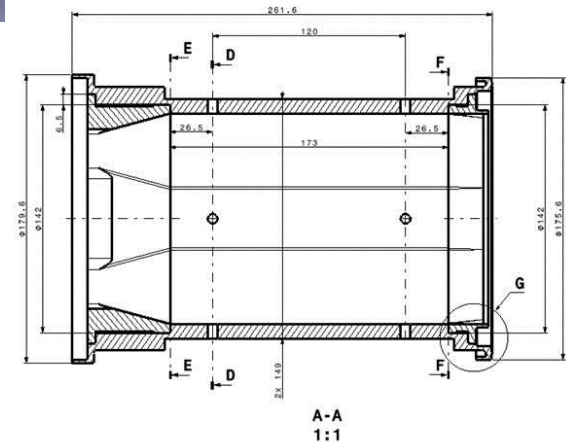
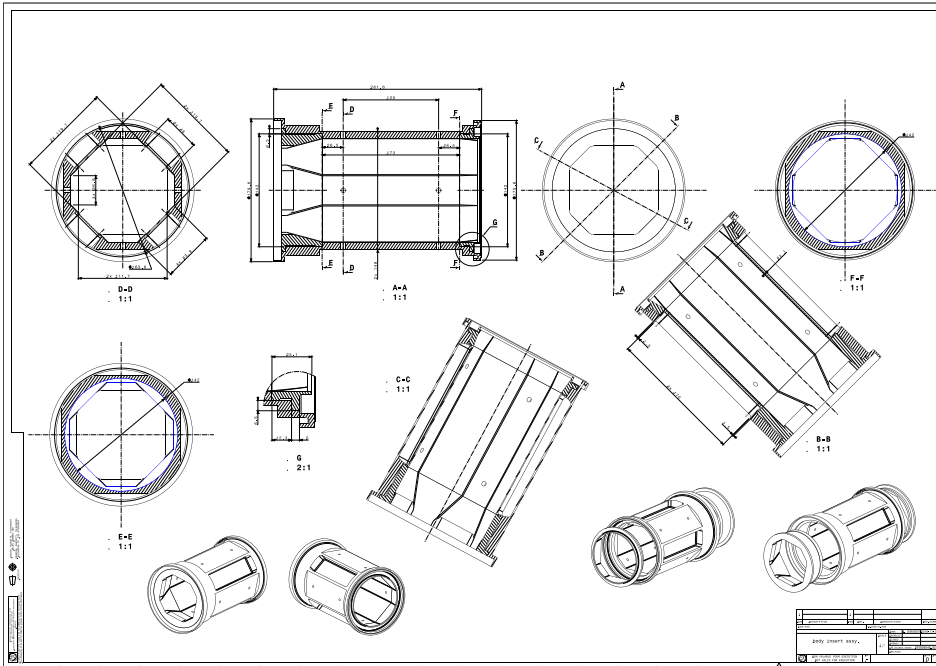
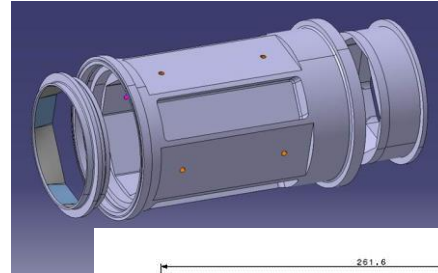


## **Update on IR BPM Costing**

T. Lefevre, M. Krupa, C. Boccard, R. Jones, G. Schneider BE/BI  
N. Chritin, A. Demougeot, EN/MME

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## Present BPM design and fabrication constrains



# WP13.4 budget profile

- Replacement of all 40 existing BPMs in Q1 to Q5 regions of LSS1 and LSS5
  - Modified to take into account changes in aperture and interfaces
- Addition of BPMs in all currently un-instrumented triplet interconnects
  - 3 additional BPMs per triplet compared to LHC
  - More robustness for orbit control & possibility for luminosity optimisation
- 3 BPM Types Identified
  - Tungsten Shielded Cryogenic Stripline BPMs, Warm stripline and button BPMs
- Development of dedicated electronics optimised for use with directional striplines

			2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
13.4	New BPMs Q1 to Q5	1820	0	0	0	50	50	200	410	410	160	100	100	180	160
	64063 HL-LHC : Interaction Region BPMs														
	1.1 BPM Production	1080													
	Design & Integration	150				50	50	50							
	BPM Body + electrodes + support	600						100	250	250					
	BPM Rad-Hard/Cryo Cables	330							110	110	110				
	1.2 BPM Electronics for LSS1 & LSS5	740													
	Design & prototyping	100						50	50						
	Electronic Production	320								50	50	100	100	20	
	Intallation & cabling	320												160	160

# BPM costing

- Budget of 600k for 40 BPMs : 15kCHF
- Recent Costing of Stripline BPM for ELENA : 48kCHF (x2 units)
  - *Design* 15k
  - Mechanics 22k
  - Feedthrough 5k
  - Cleaning and Coating 3k
- HL-LHC additional costs per BPM
  - Inermet absorbers 2k
  - Cooling channel 2k
  - Adaptation piece (taper) 2k
  - Higher precision (striplines/feedthrough) 4k
- Hilumi BPM cost estimated at 25kCHF : How much discount do we get for a production of 24 units ? 20% will bring it down to 20kCHF ?
- Building BPM out of Inermet not a valid option today
  - R&D would be needed Vacuum tightness and fabrication technique
    - Would be interesting to follow in synergy with FCC
  - Cost of raw material (x3), machining (x10) compared to 316LN : 80-100kCHF/BPM