Coil End Design, Winding Test and End Parts Fabrication

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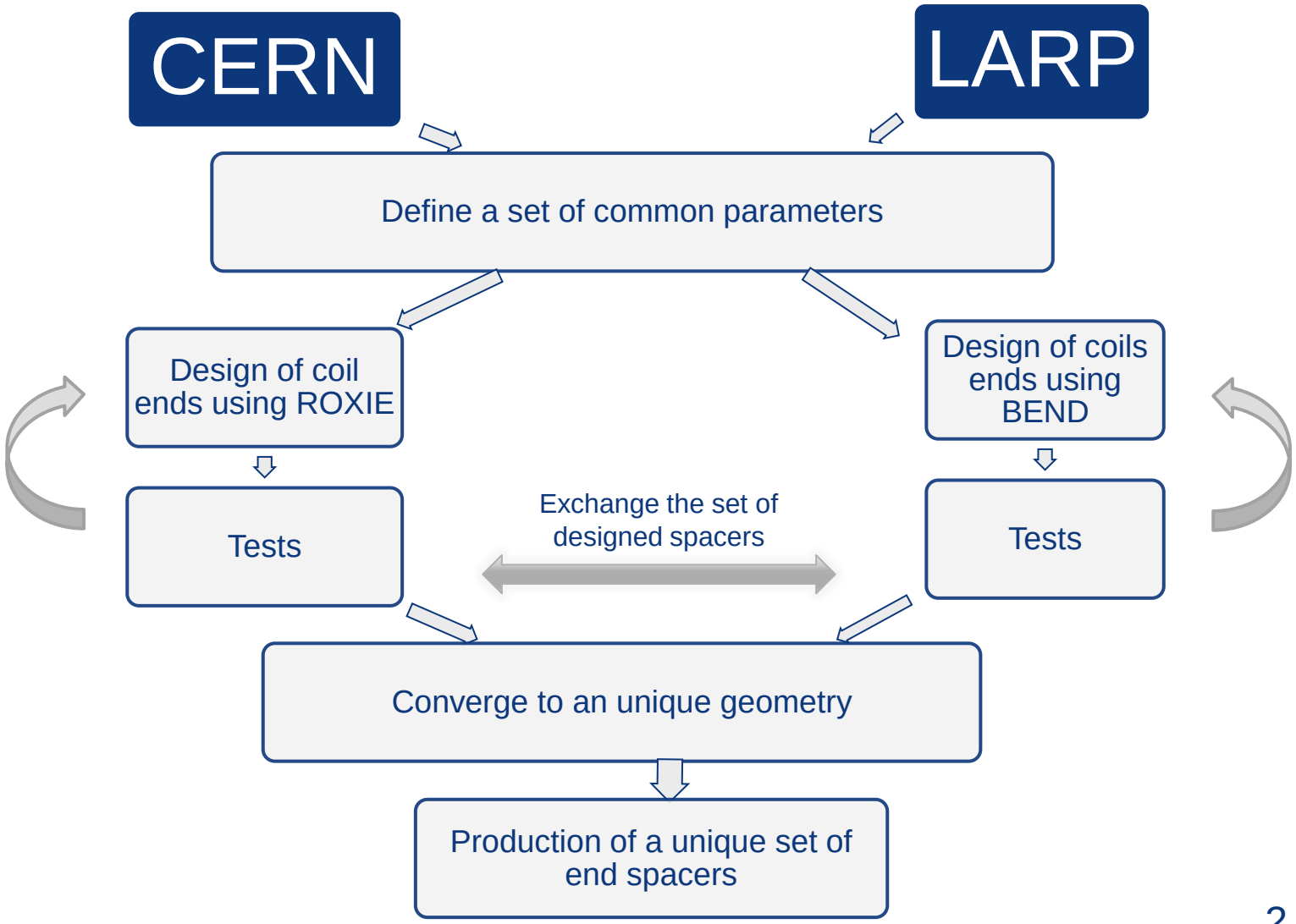
2nd Joint HiLumi LHC/LARP Annual Meeting

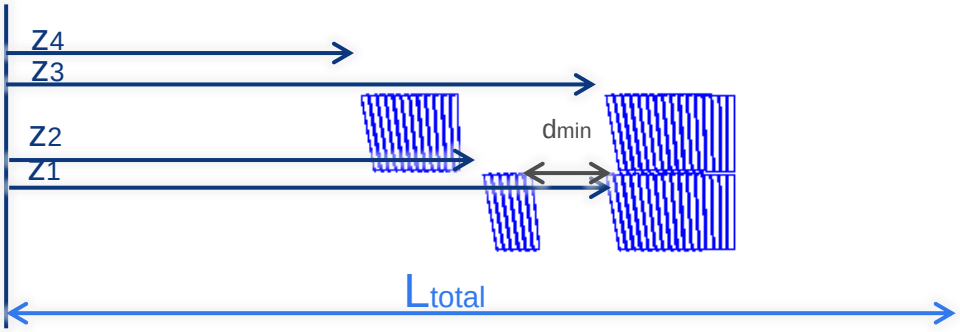
15/11/2011

Coil Ends Design Strategy



Common parameters

- Cable dimension
- Cross Section
- Number of Blocks on the coil ends
- Number of Turns per Block
- z-position of the first cable on each block, total length of the ends and min. length of the spacers



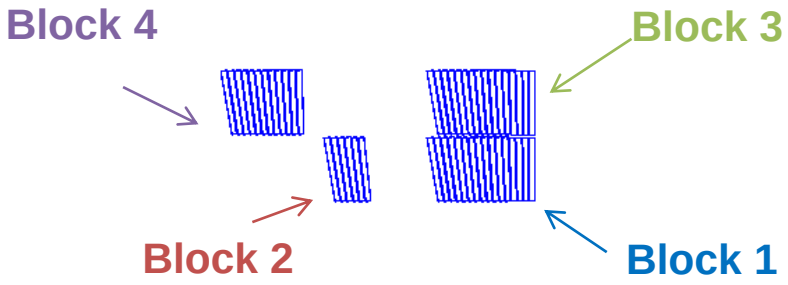
- Geometry of the layer jump

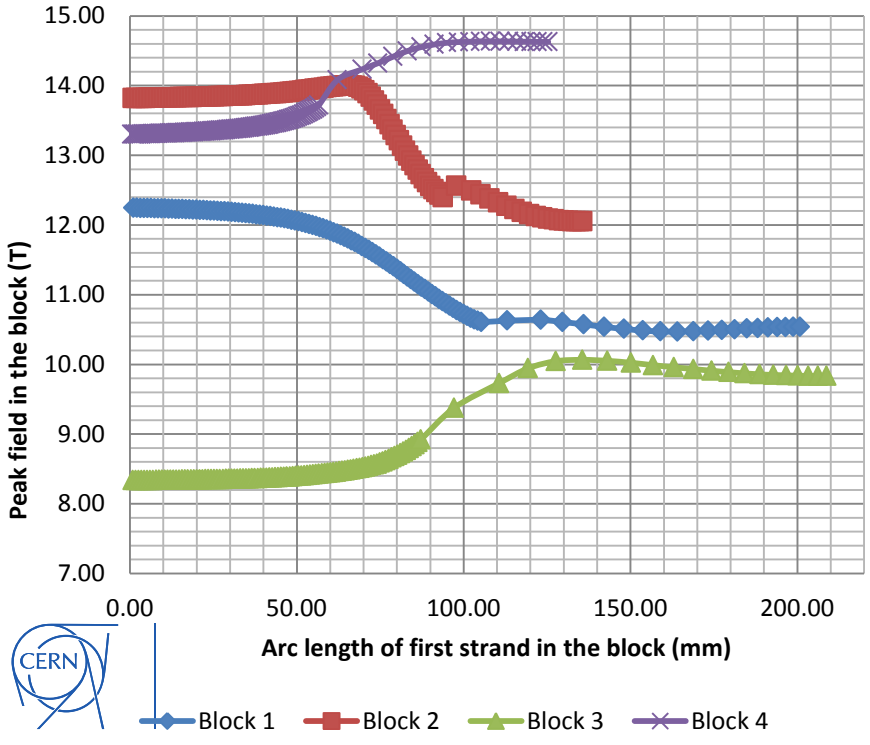
Coil Ends Design @ CERN

Based on CERN Xsec ROXIE

1st approach (as HQ):

z-position of the blocks optimized to min. peak field and opt. harmonics

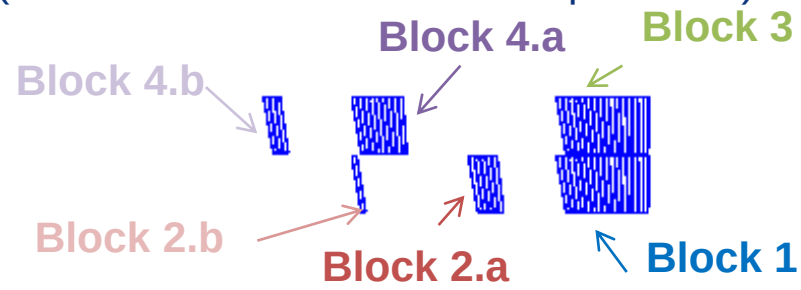


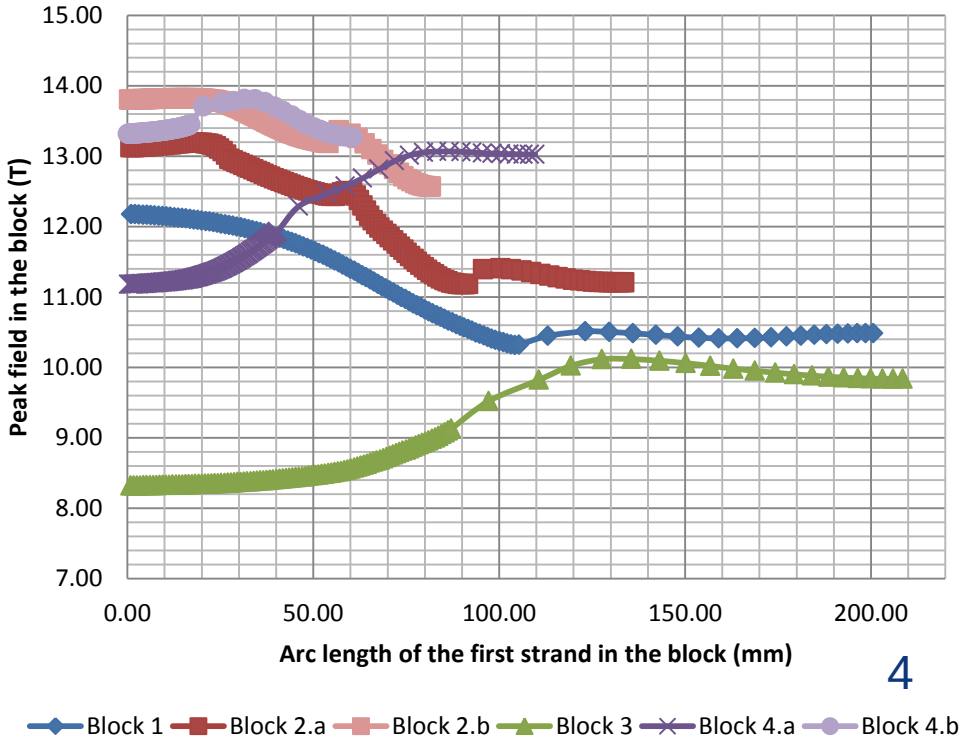


2nd approach:

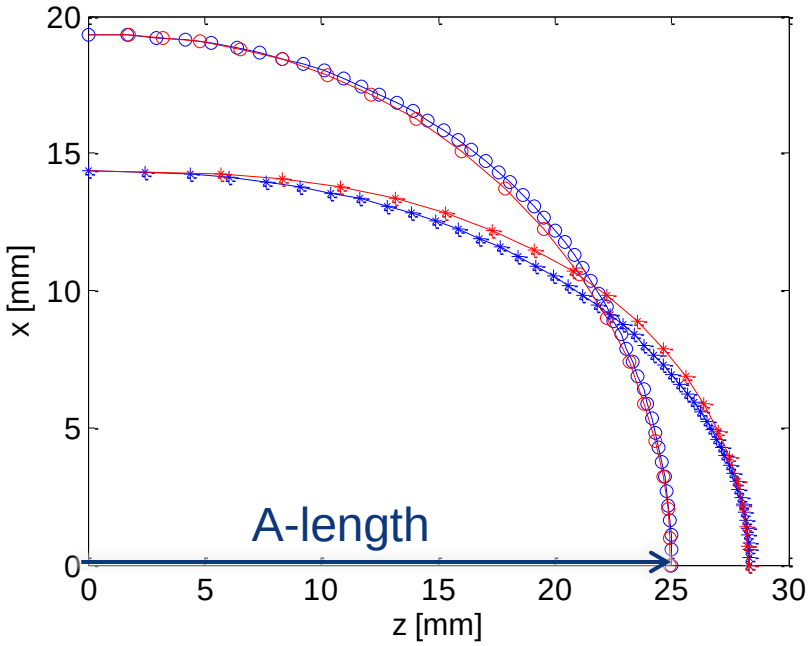
Redistribute the conductors in three blocks per layer

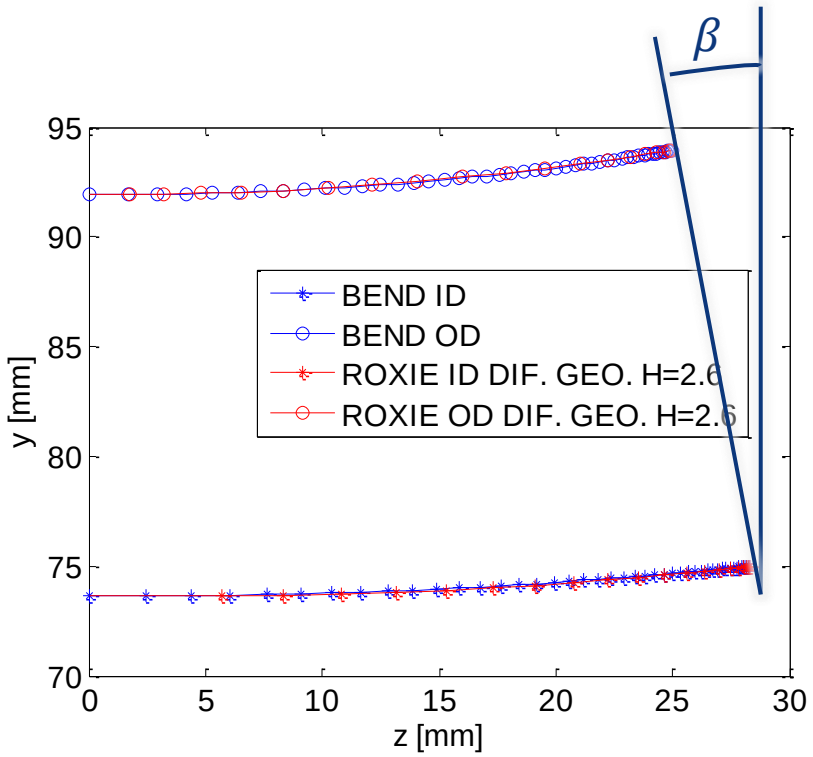
(not much more than 10 turns per block)



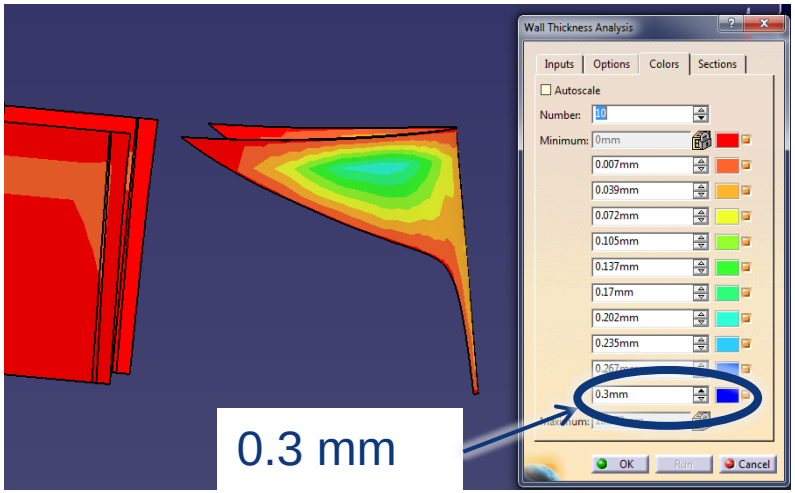


Reproduction of a geometry defined by BEND in ROXIE



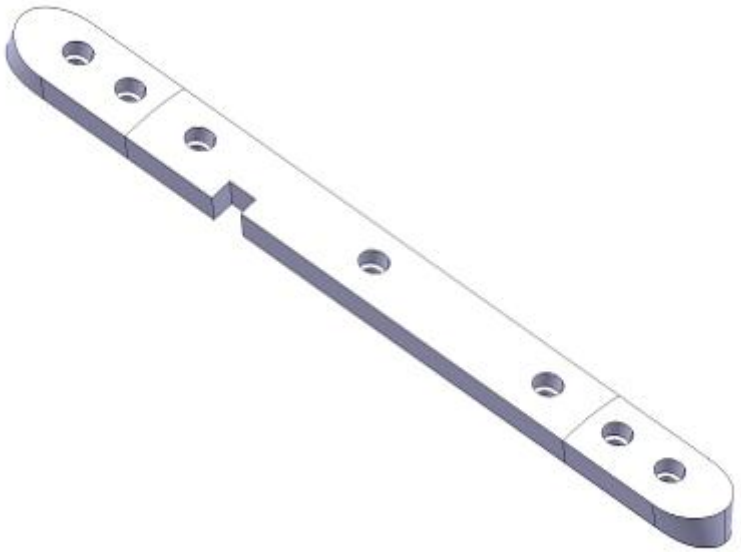


For a given A-length and winding angle, very close geometries can be found for the “male” surface of the spacer.



Winding Test

AIM: Determine the mechanical stability of the cable



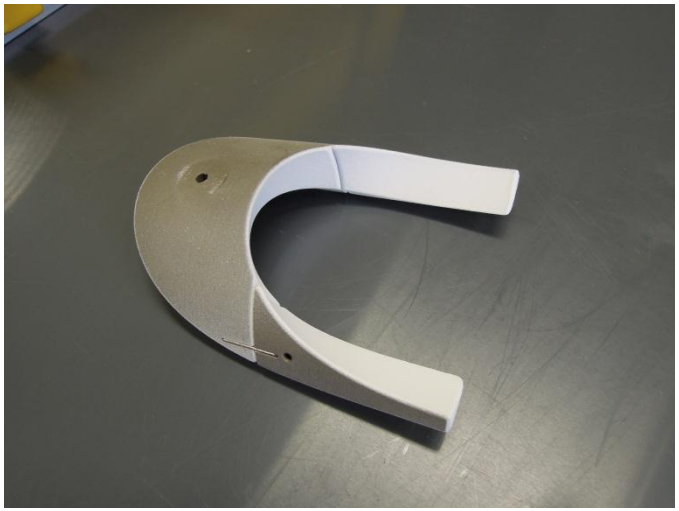
- Based on MQXF3_v0 Cross-Section.
- Return End + Lead End pole pieces, inner layer.
- 3D Plastic printer.
- Winding mandrel in Aluminium.

ESTIMATED DATE FOR FIRST WINDING TEST AT CERN: END-NOVEMBER 2012
(depending on cable availability)

End Parts Fabrication

Parts	Manufacturing method	Manufacturing time
Winding tests & First Copper coil	Plastic rapid prototyping	< 3 weeks
Practice coils & First coils with	Stainless Steel Laser Sintering	3 weeks
Final parts	Machining	3 months

Insulation: Plasma coating + layer of fibre glass.



11T, J. Mazet

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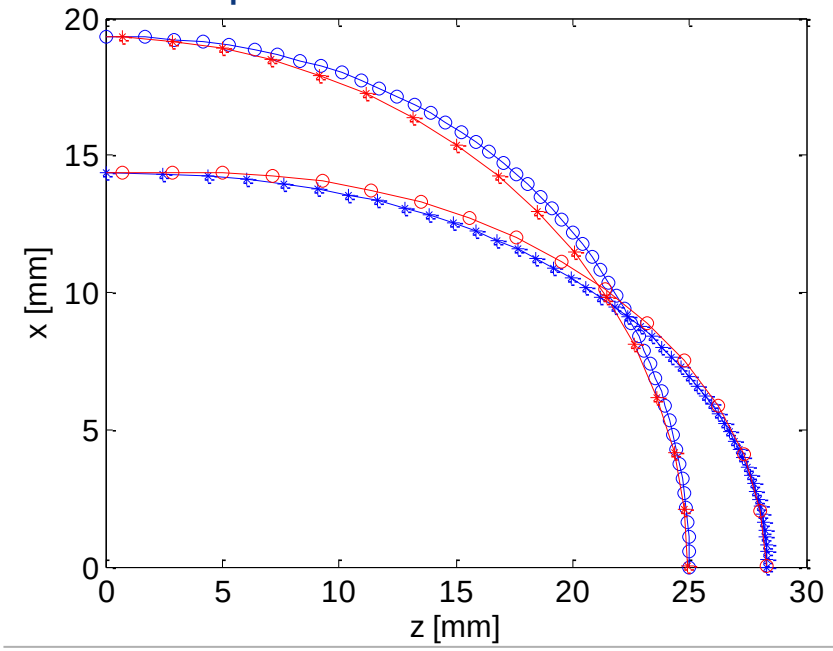
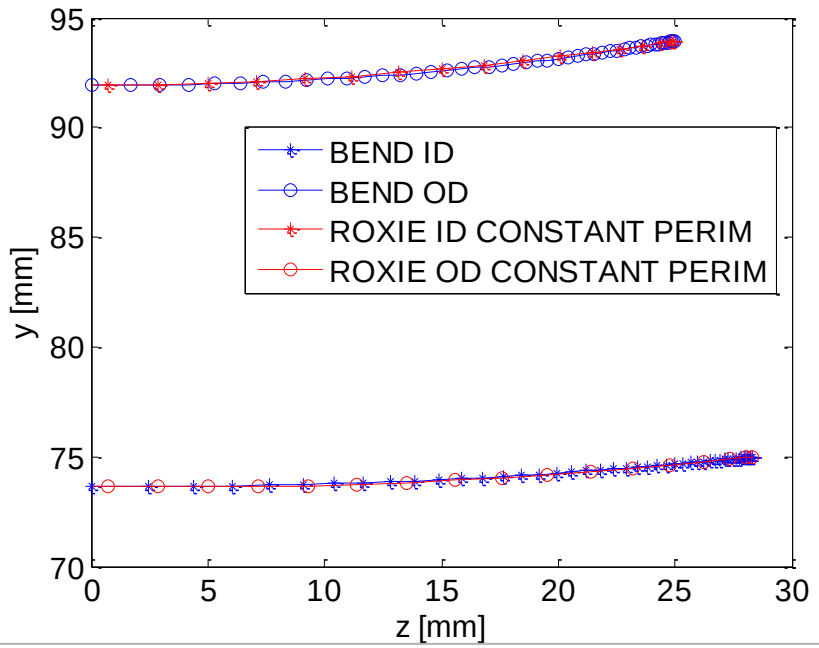
Additional slides

Constant perimeter vs. Bend





Differential Geometry Ends vs. Bend