Innovation that matters

HERNIA CARE

MESH
FIXATION
BIOLOGICS
DISSECTION

Ventral Hernia Repair
Patient customizated solutions

Palaiseau, July 2nd 2014

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COVIDIEN

VHR CLINICAL UNMET NEEDS

Innovation that matters

Clinical challenges

- **Recurrence (up to 20%)**
- **Pain**
- **Inconfort**

Remaining Questions

Mesh & Fixation
Shape ? Stiffness ?
Anisotropy ? Strength ?
Tack or /and sutures ?

Surgical technique
Fixation pattern ? Overlap ?

Patient parameters …

Our program

Application : impact of defect size, mesh overlap and fixation distribution

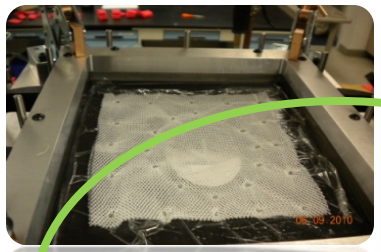
TECHNICAL PROGRAM

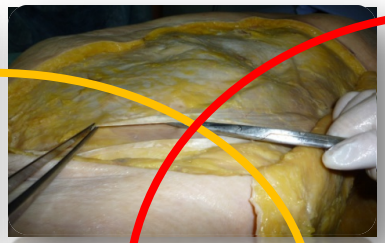
Innovation that matters

Characterizat° → Understanding → Evidence

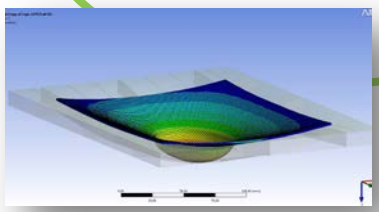
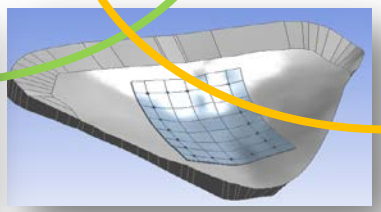
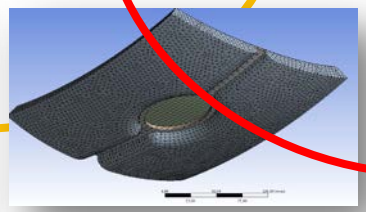
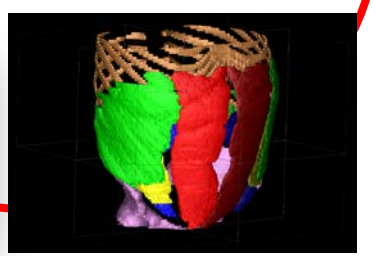
Model → Predict → Innovate

Synthetic media *Ex vivo animal* *Ex vivo human* *Volonteer/Patient*






Experiments + Numerical Simulations

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MESH MODELING : CALIBRATION

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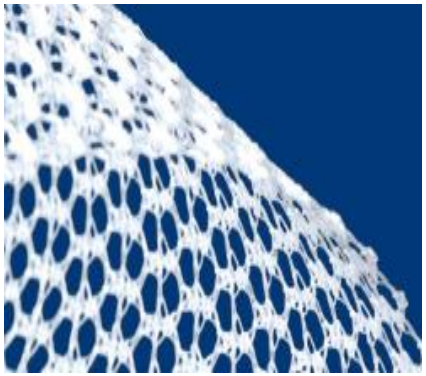

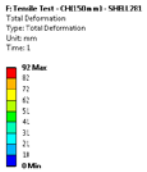

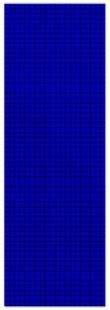

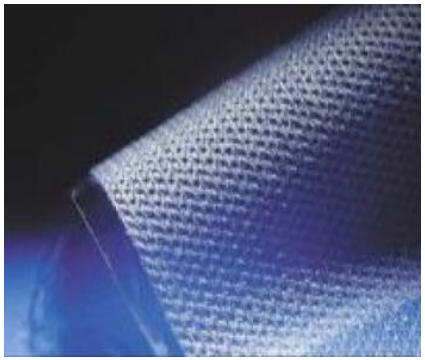

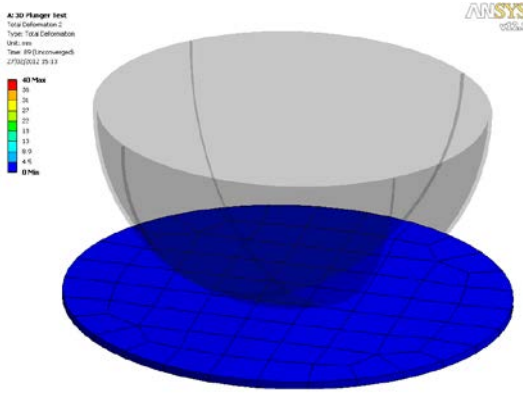

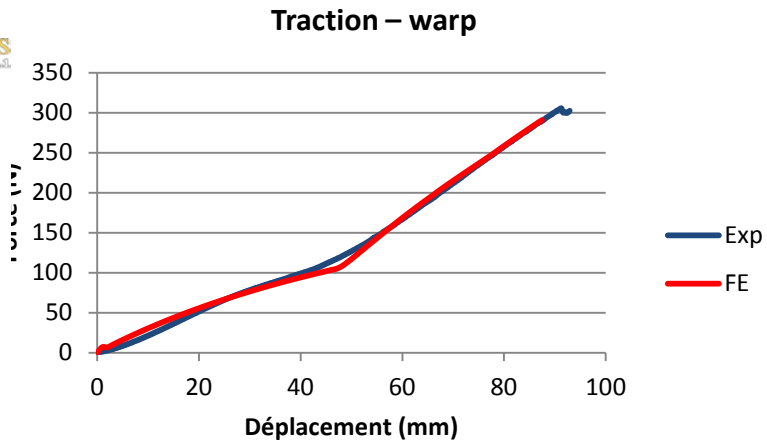

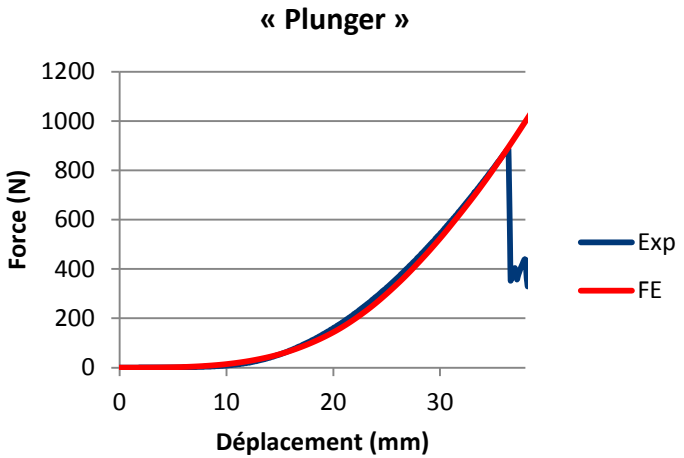

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FIXATION MODELING

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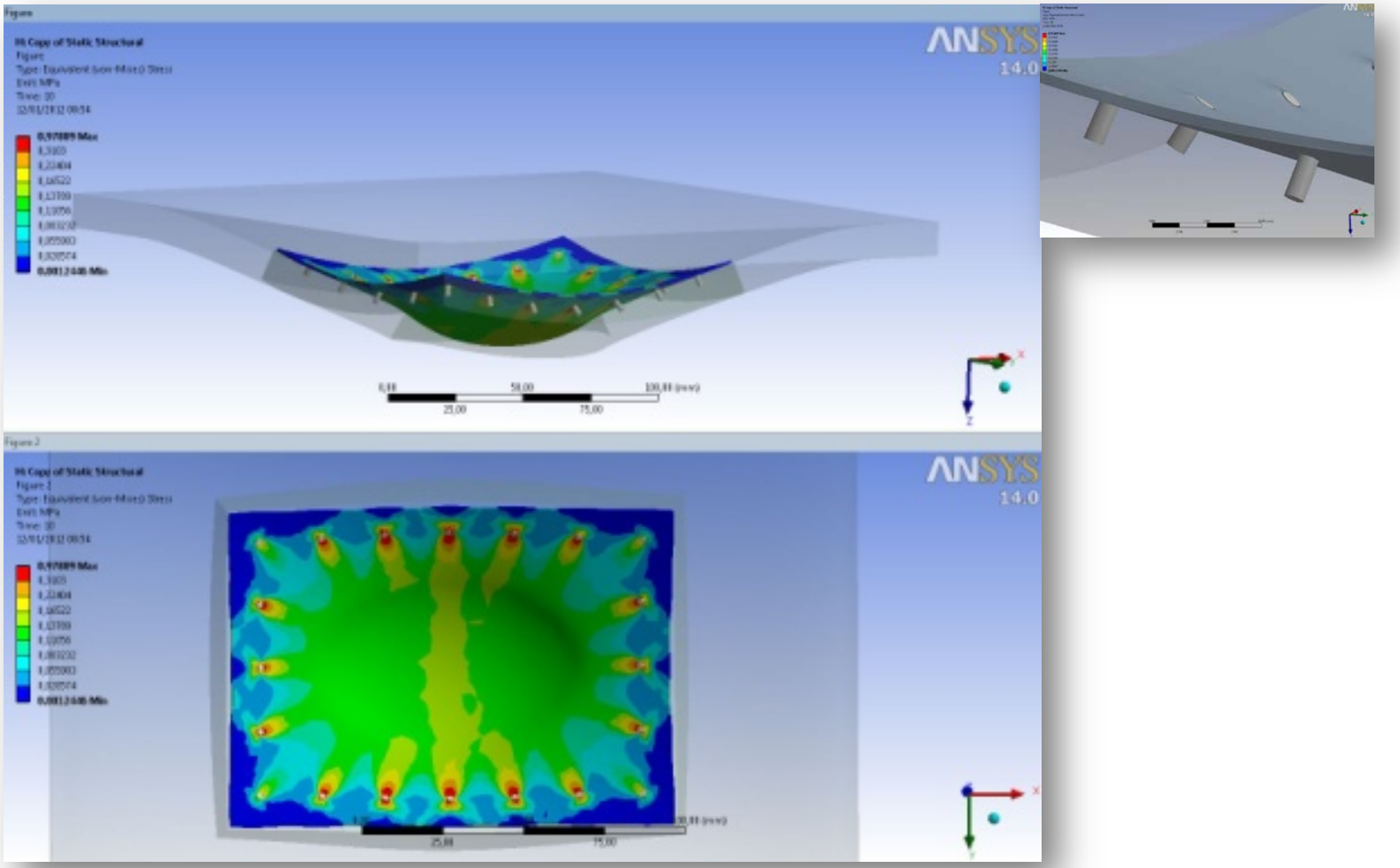

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AW MODELING : PARAMETRIC ANATOMY

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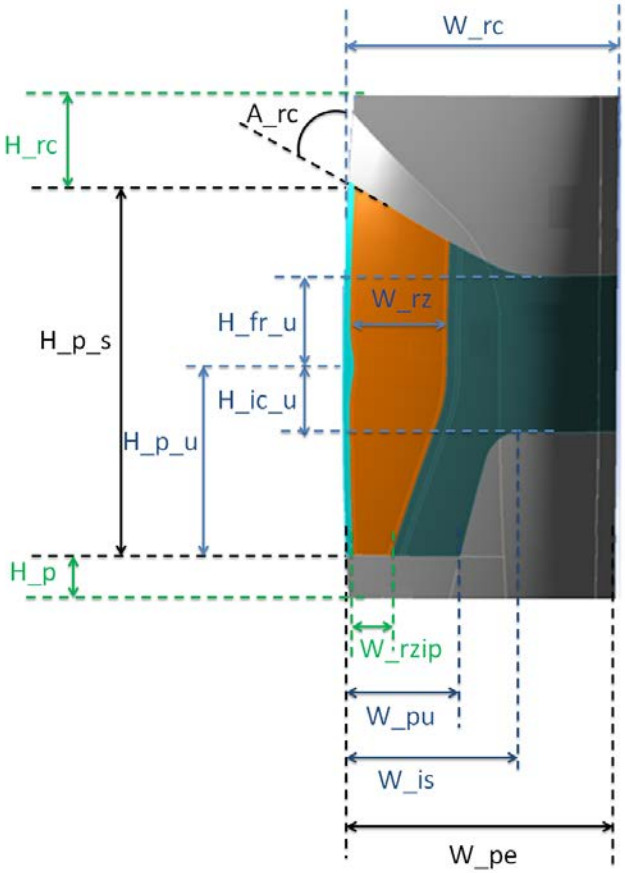

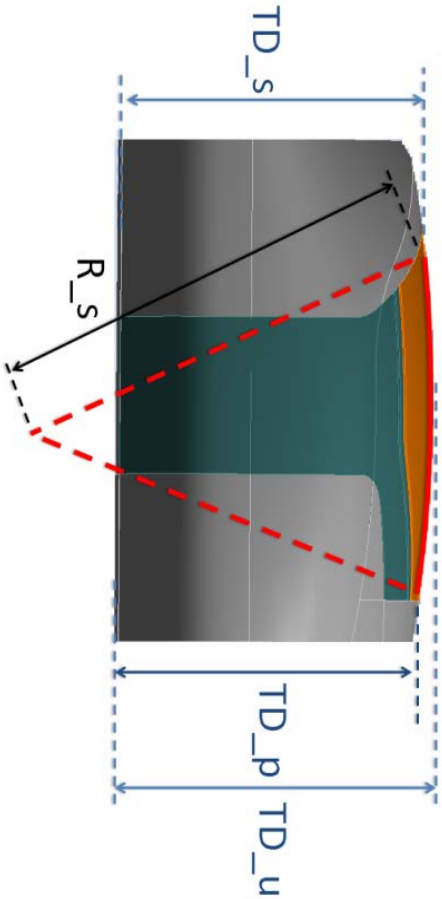

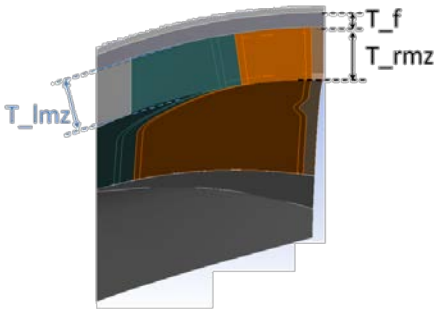

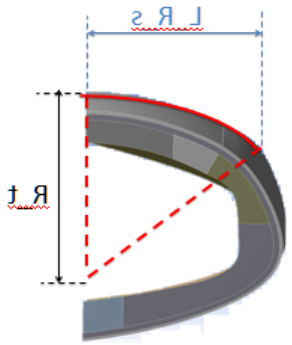

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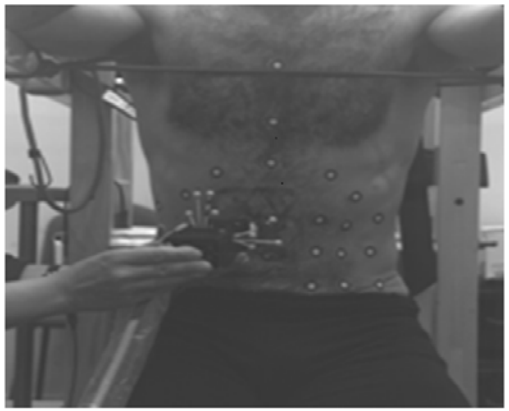
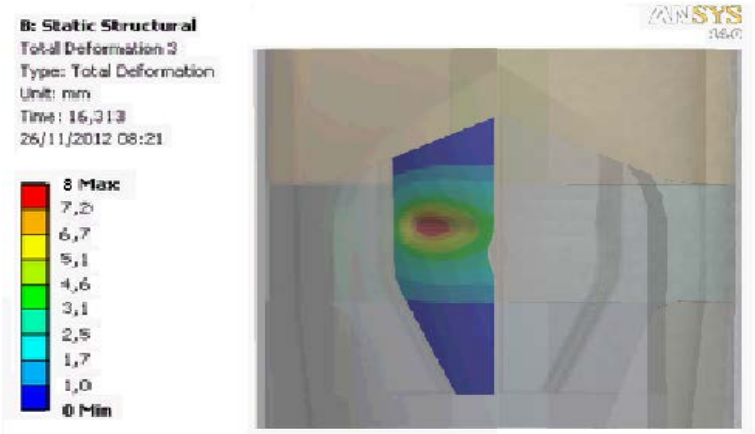
AW MODELING : TISSUE MATERIAL CALIBRATION

Innovation that matters



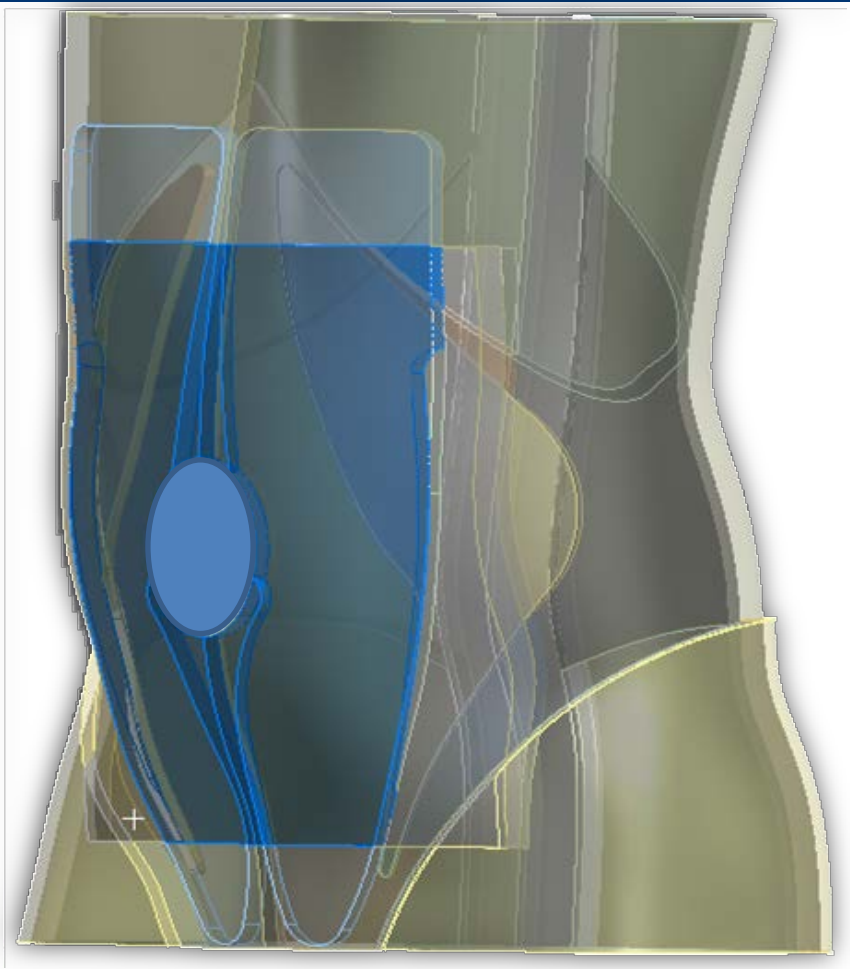


Our program

Application : impact of defect size, mesh overlap and fixation distribution

APPLICATION

Innovation that matters



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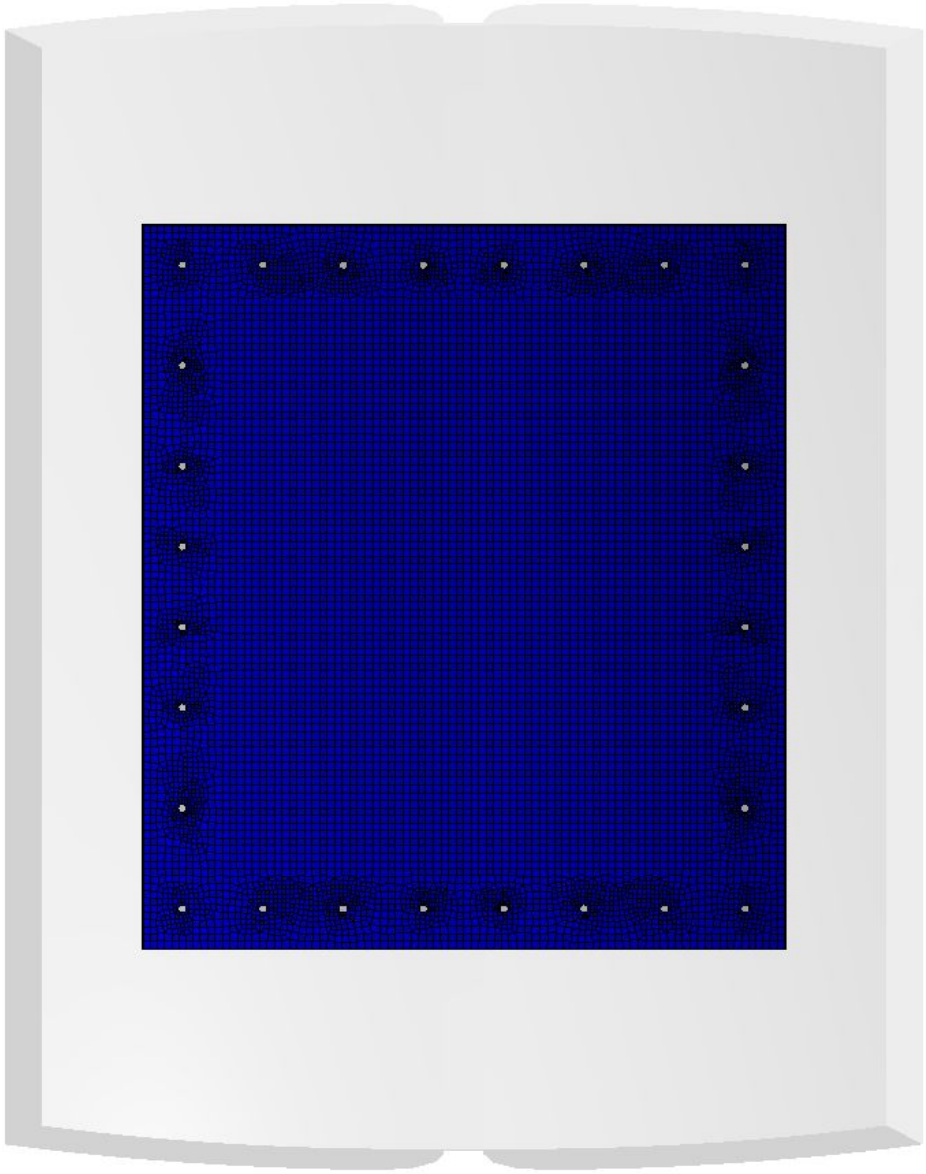

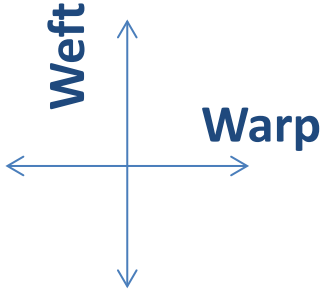

ACUTE FIXATION

PARAMETRIC STUDY : DEFECT SIZE

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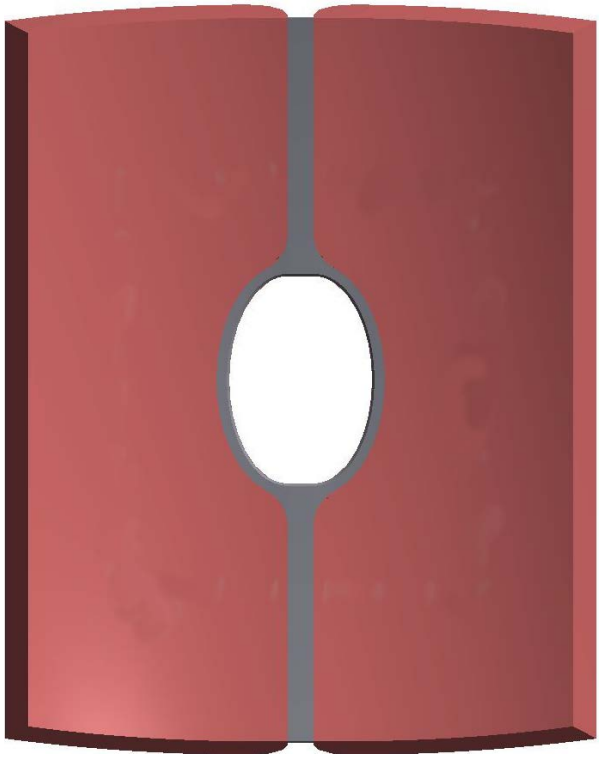
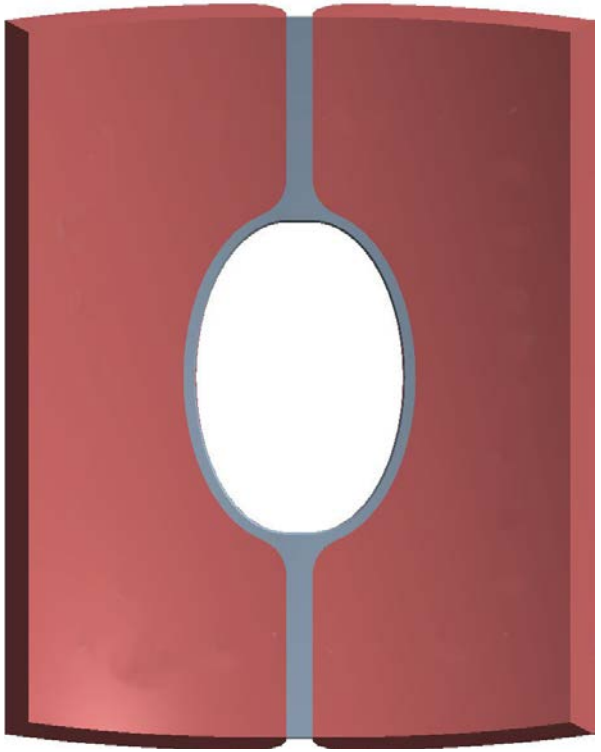


Small
5,5 cm x 8 cm



Medium
8 cm x 12 cm

PARAMETRIC STUDY : MESH OVERLAP

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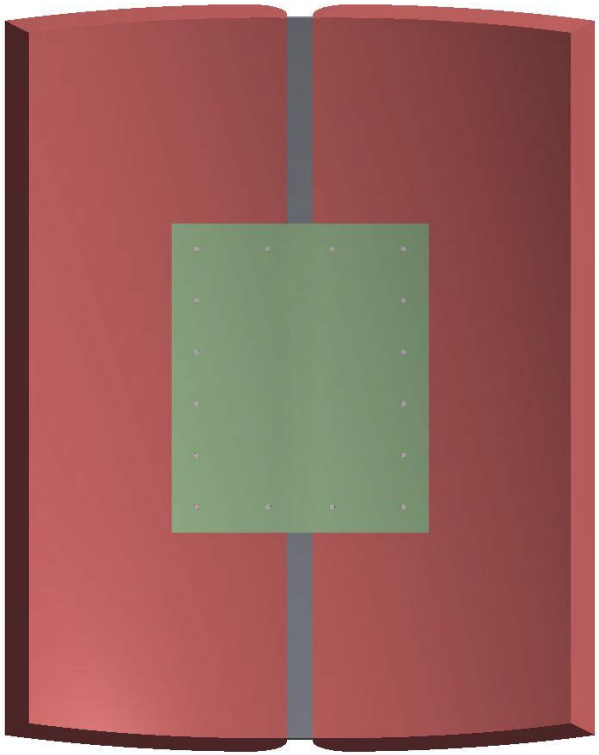

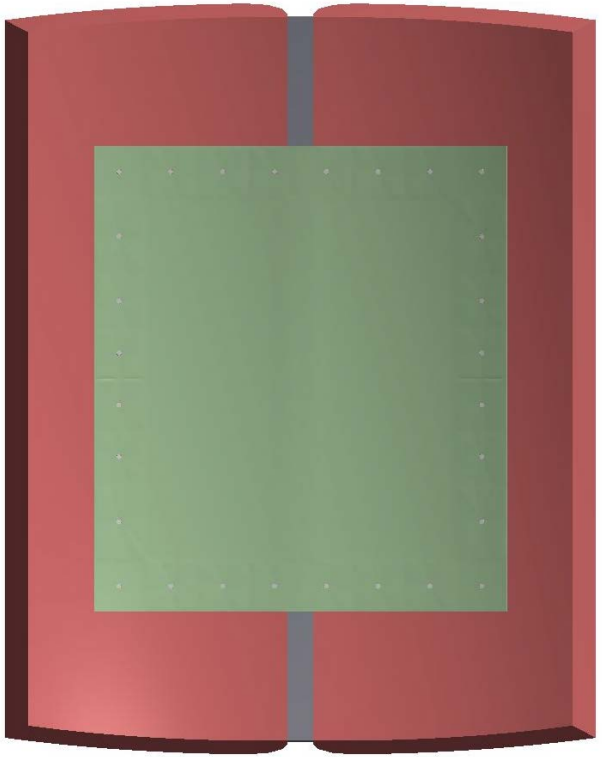

2 cm **5 cm**

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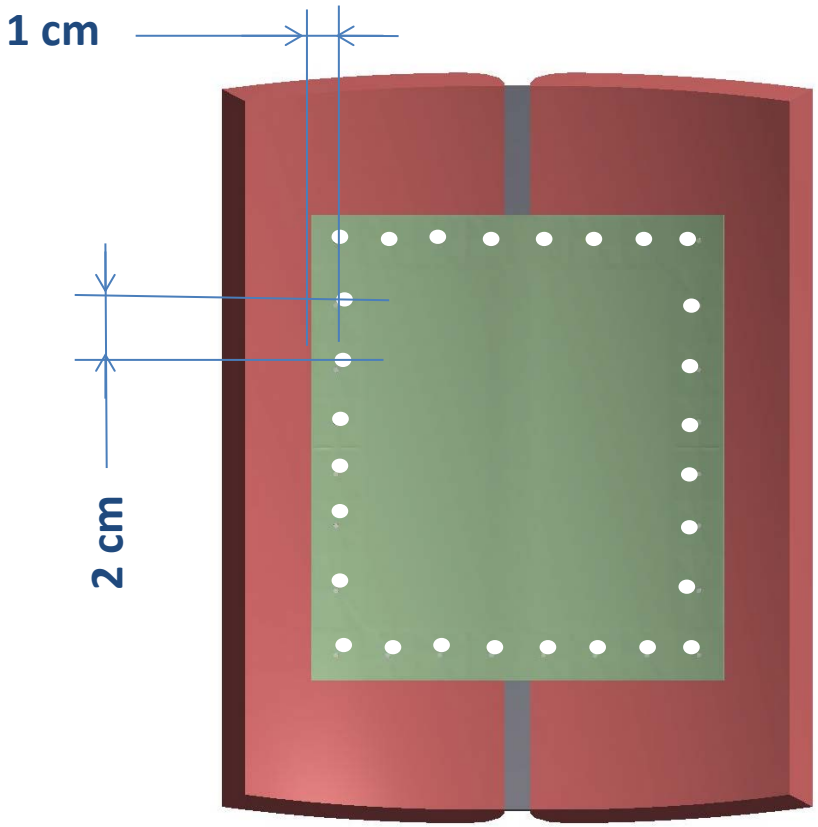
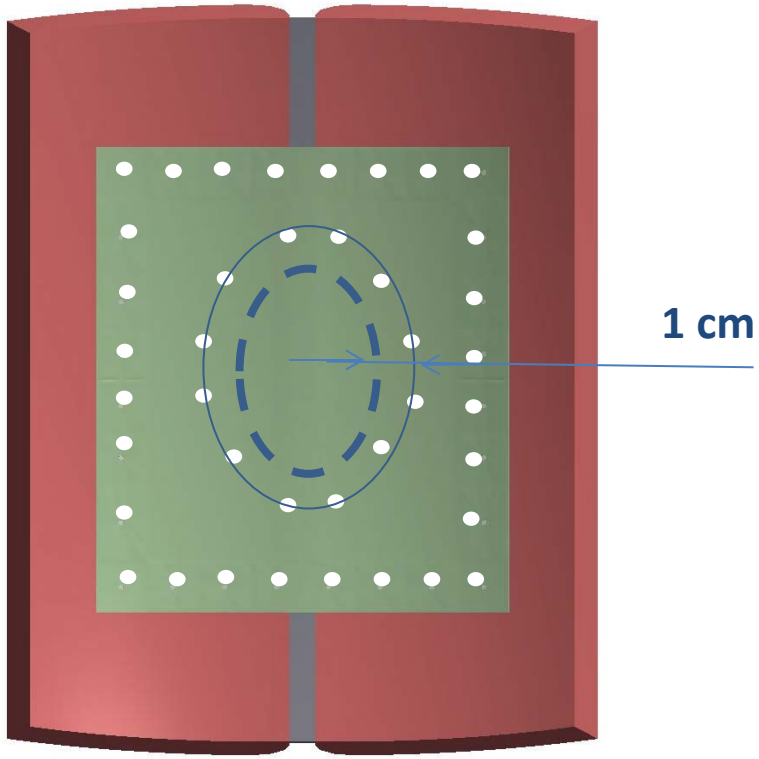
PARAMETRIC STUDY : FIXATION DISTRIBUTION

Innovation that matters



Single Crown

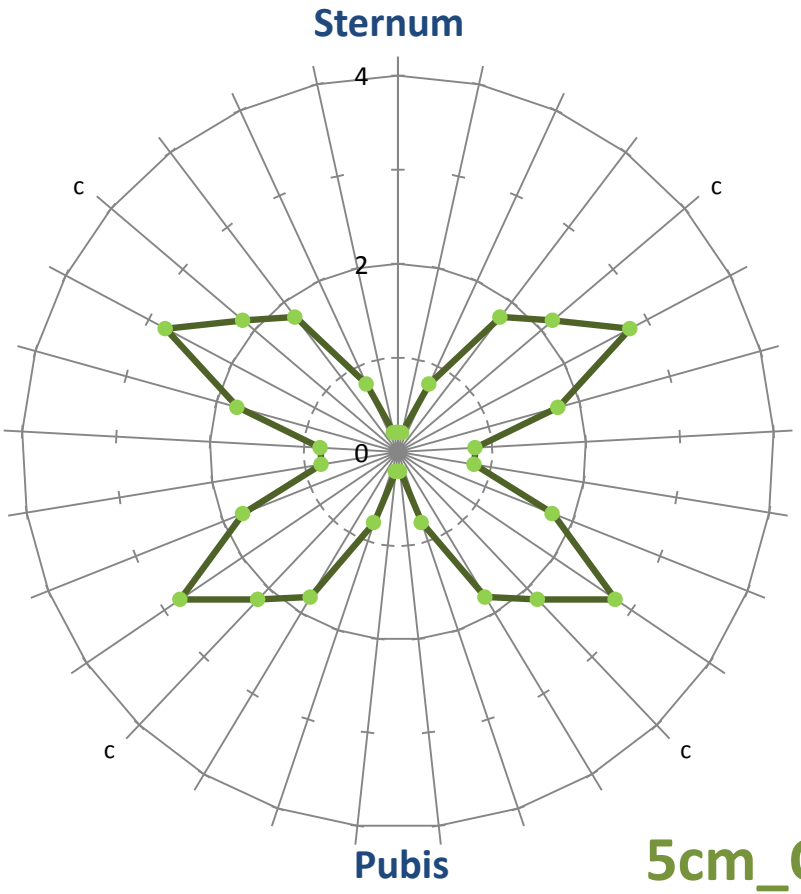


Double Crown

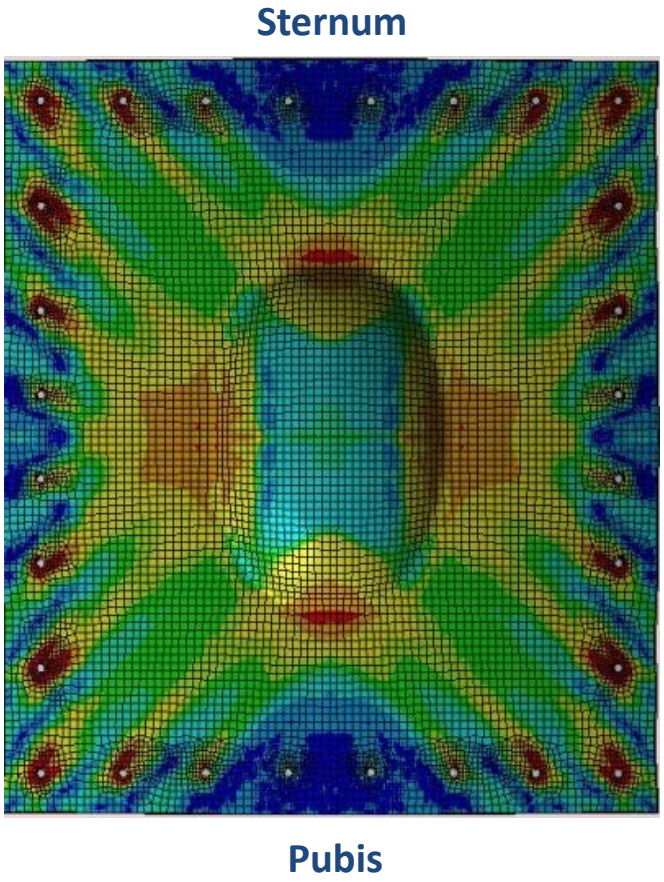
Small defect - Single crown - Valsalva (60 mmHg)

Innovation that matters

Shear Magnitude @ Fixat° (N)



Bulging

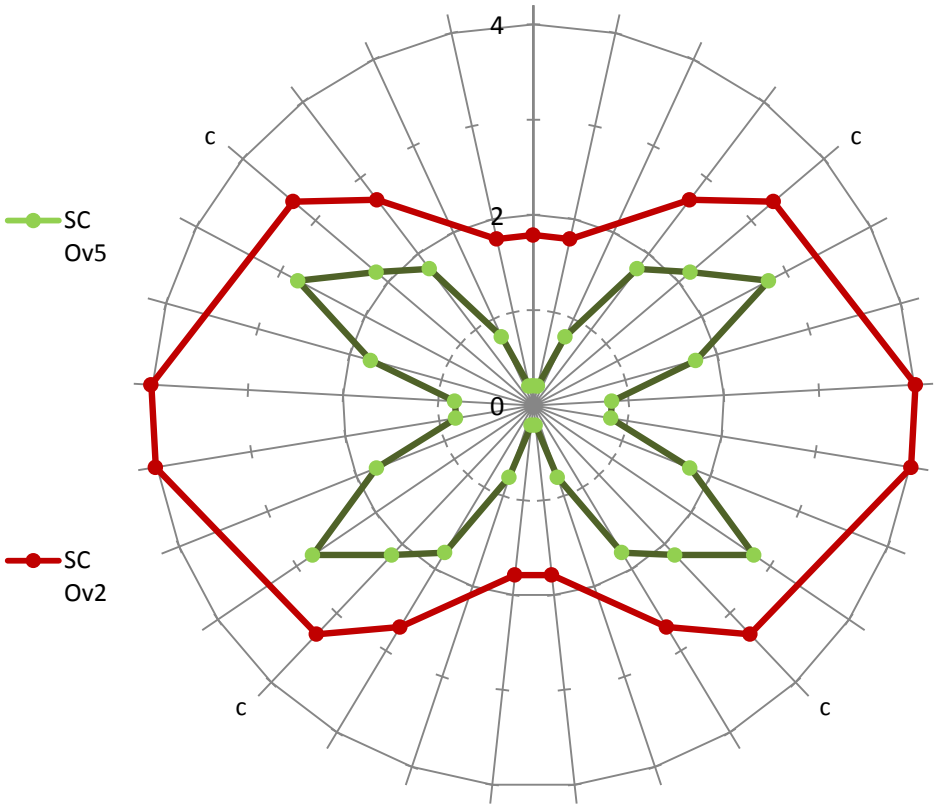


5cm_Overlap

Small defect - Single crown - Valsalva (60 mmHg)

Innovation that matters

Shear Magnitude @ Fixat° (N)



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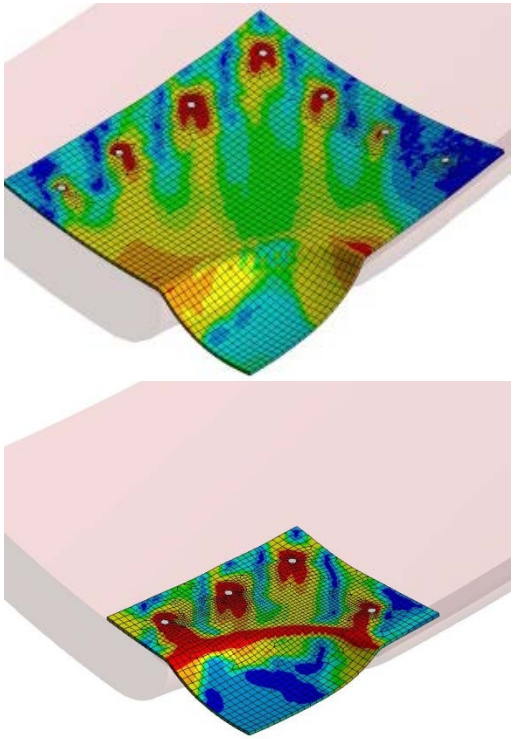

2cm_Overlap
= 1,4 X 5cm_Overlap

2cm_Overlap
= 0,7 X 5cm_Overlap

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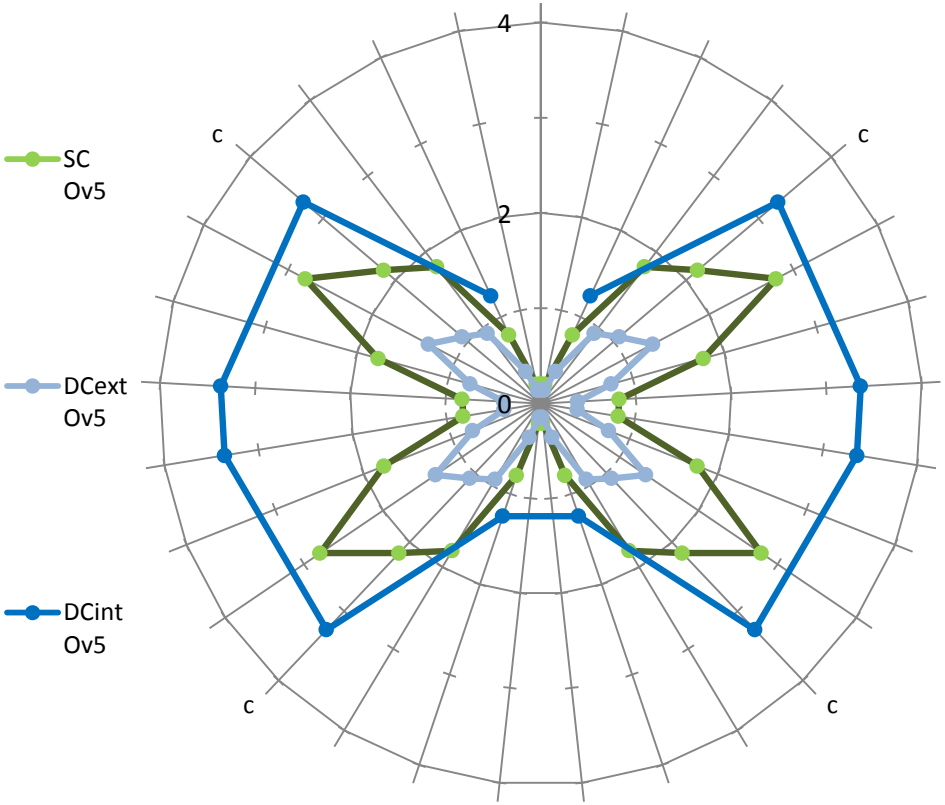
Small defect – 5 cm overlap- Valsalva (60 mmHg)

Innovation that matters

Shear Magnitude @ Fixat° (N)



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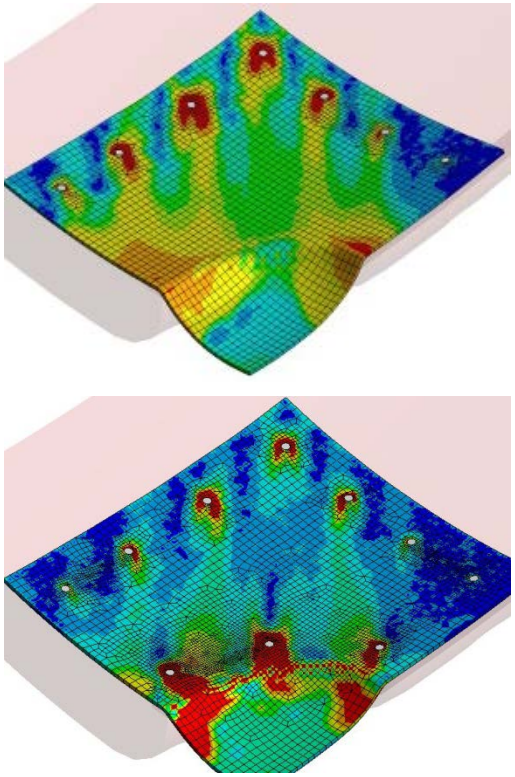

Double_Crown
= 1,2 X Single_Crown

Double_Crown
= 0,75 X Single_Crown

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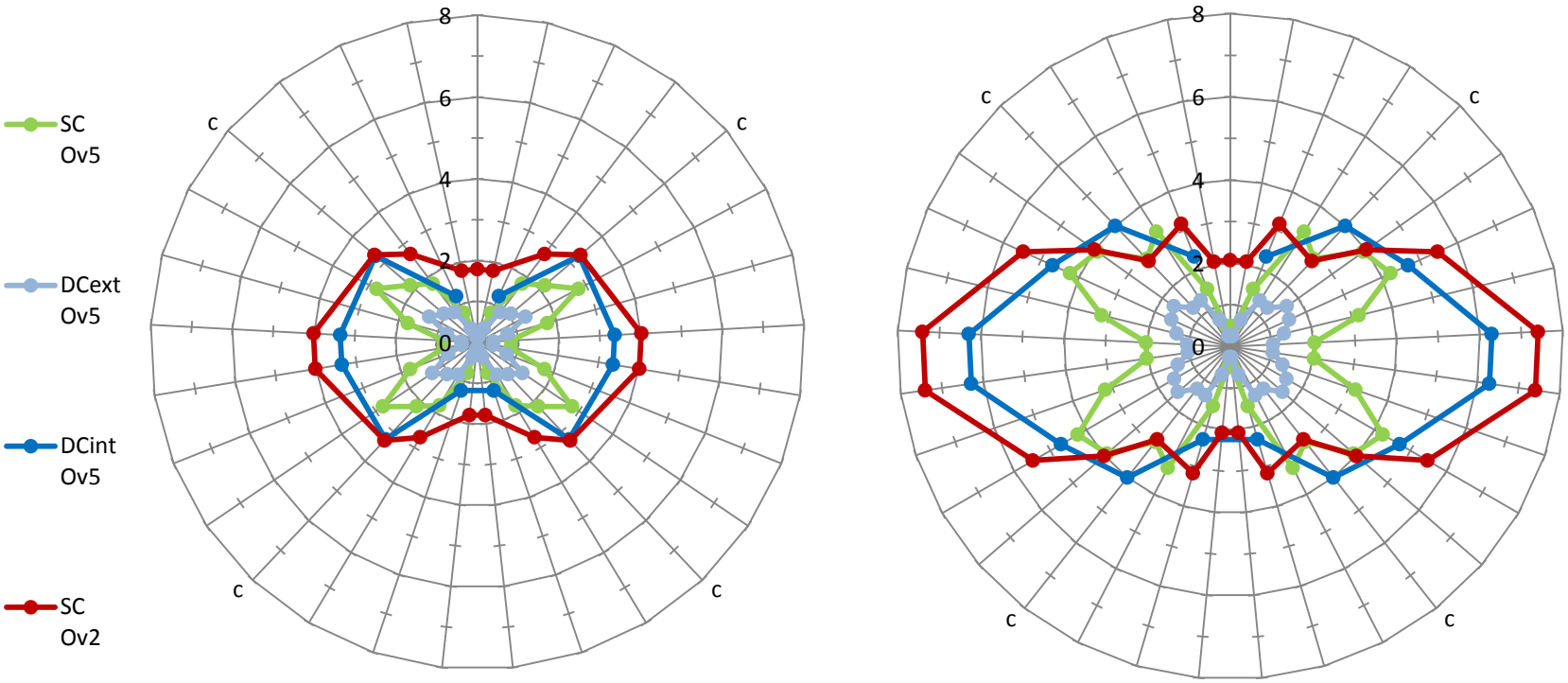
Shear Magnitude (N) @ Fixat° - Valsalva (60 mmHg)

Innovation that matters



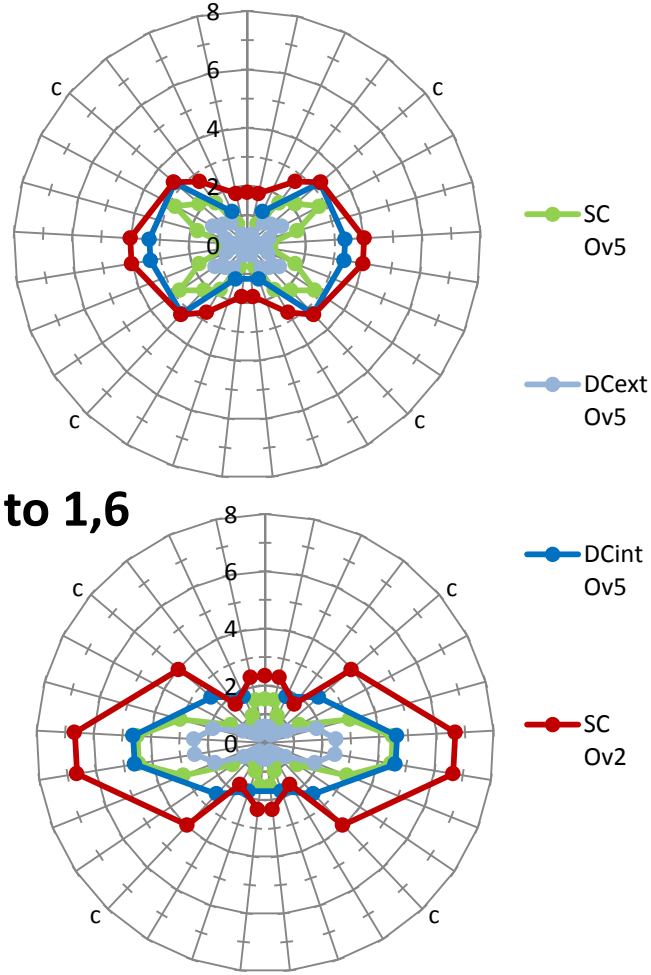
Area X 2,2

Small Defect ⟹ **Medium Defect**

Valsalva (60 mmHg)

Innovation that matters

Shear Magnitude @ Fixat° (N)

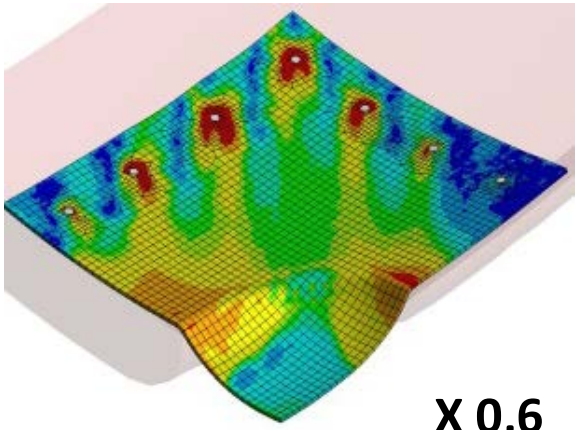


X 1,4 to 1,6

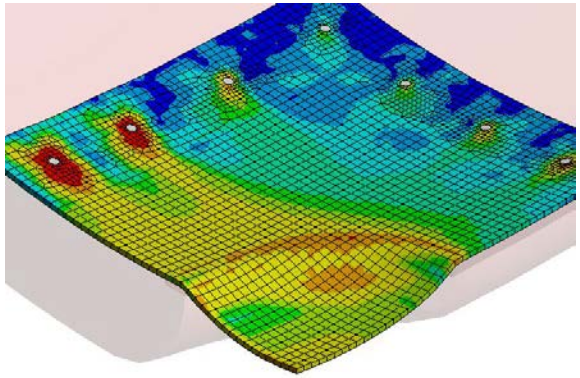
Mesh A

Mesh B

Bulging



X 0,6



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CONCLUSION

Innovation that matters

Defect size,

Mesh Overlap

Mesh type

} **ALL VERY INFLUENTIAL**

Double Crown vs Single Crown **DEPENDS ON MESH TYPE**

AWR BIOMECHANICS

Non homogeneous, non isotropic, non linear phenomena

↓

PATIENT CUSTOMIZED SOLUTIONS

THANK YOU

Innovation that matters

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