

AFB 20 (2) Roadside Design Safety Subcommittee on International Research Activities



European Summer Workshop

Brussels, Belgium April 11, 2013

Use of Computational Mechanics Methods Within EN1317

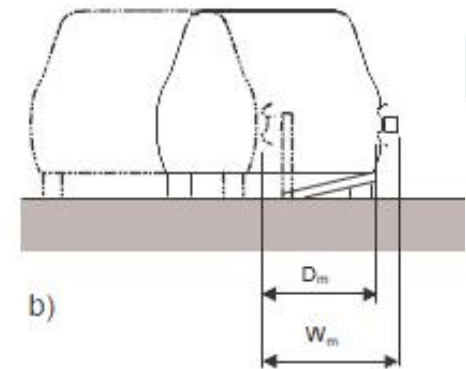
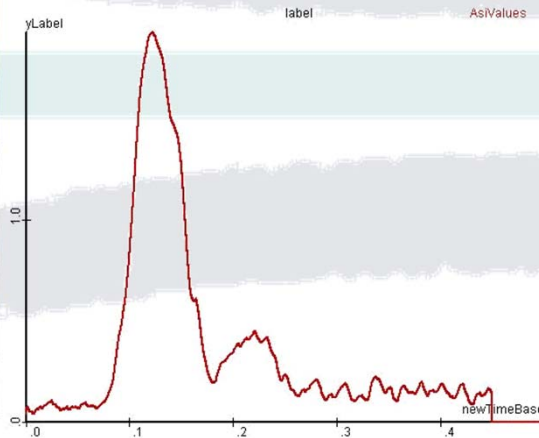
C. GOUBEL

Computational Mechanics Department Manager

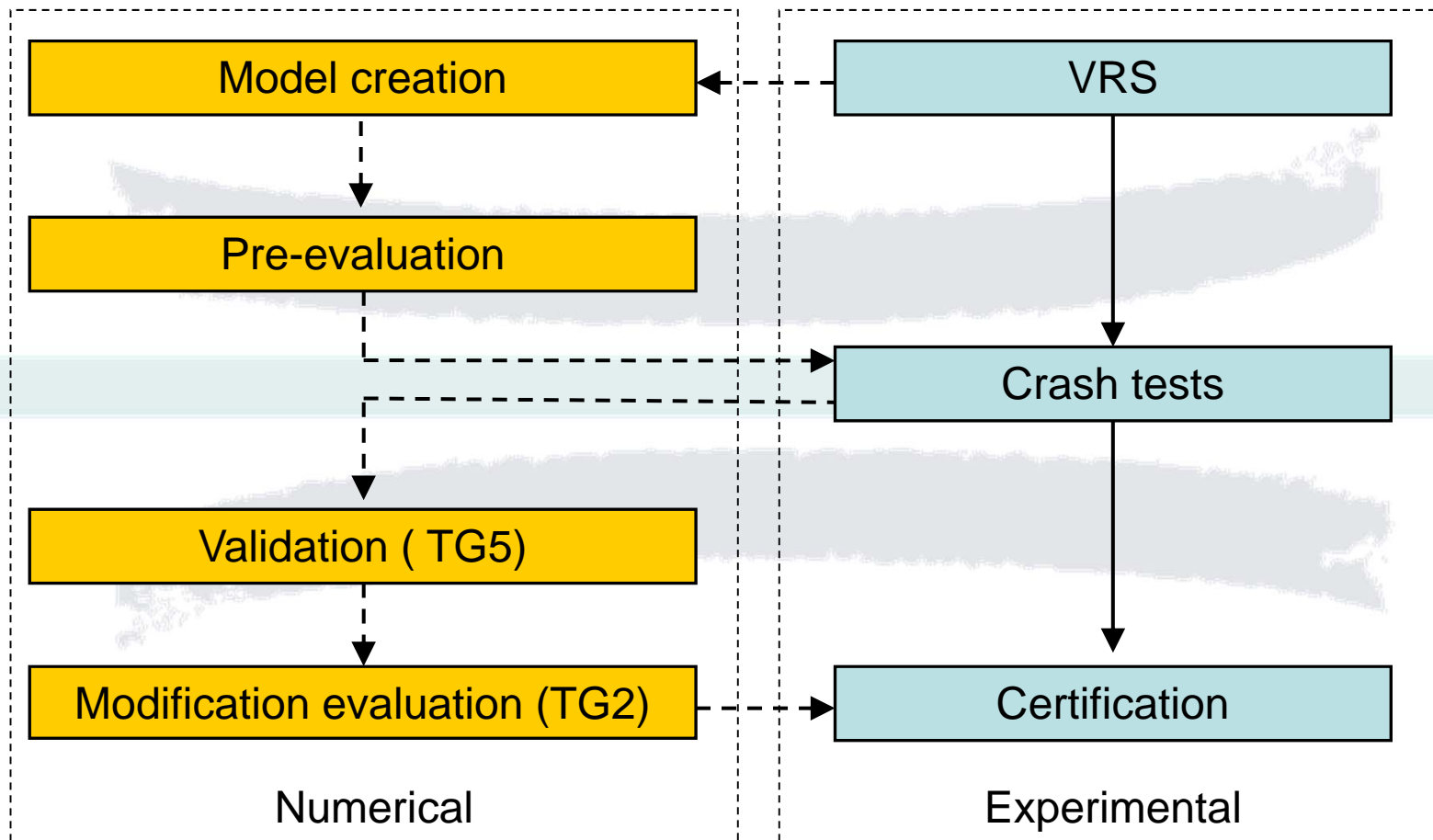
Vehicle Restraint System

- Classified by

Severity and Working width



Statement Of Work

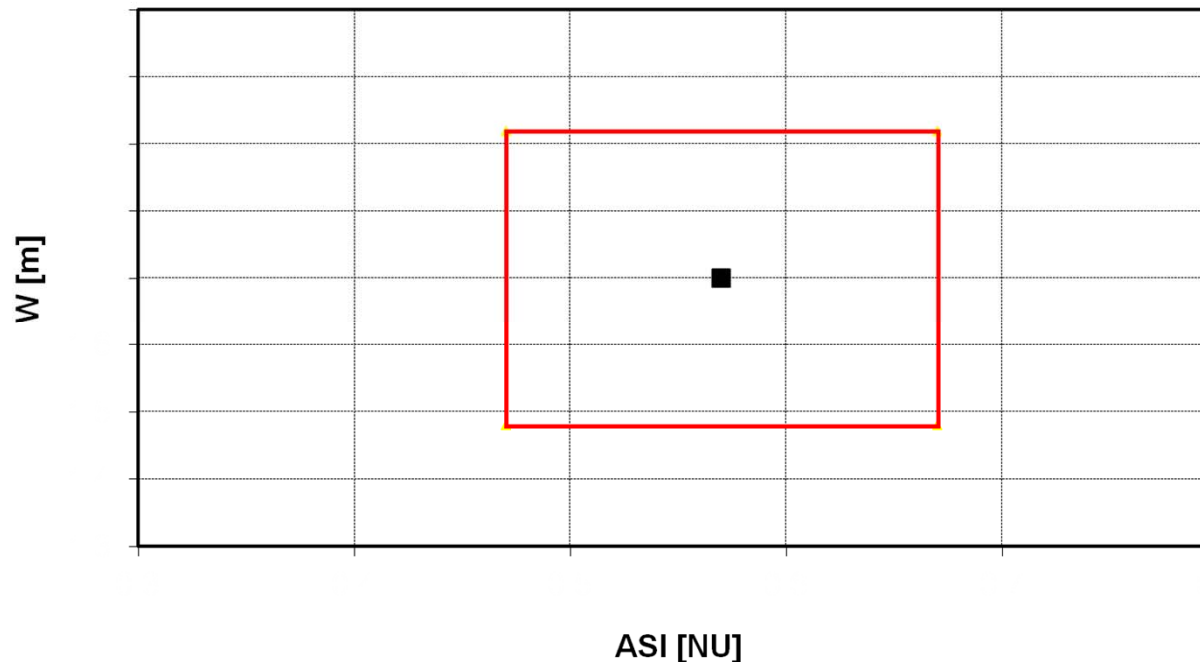


Presentation outline

- Statement of Work and current practices
 - Proposal for best use of Computational Mechanics
1. Numerical model validation
 2. Use of simulation for modified products

Validation proposed by TG5

- Definition of tolerances for validation centered on IT results



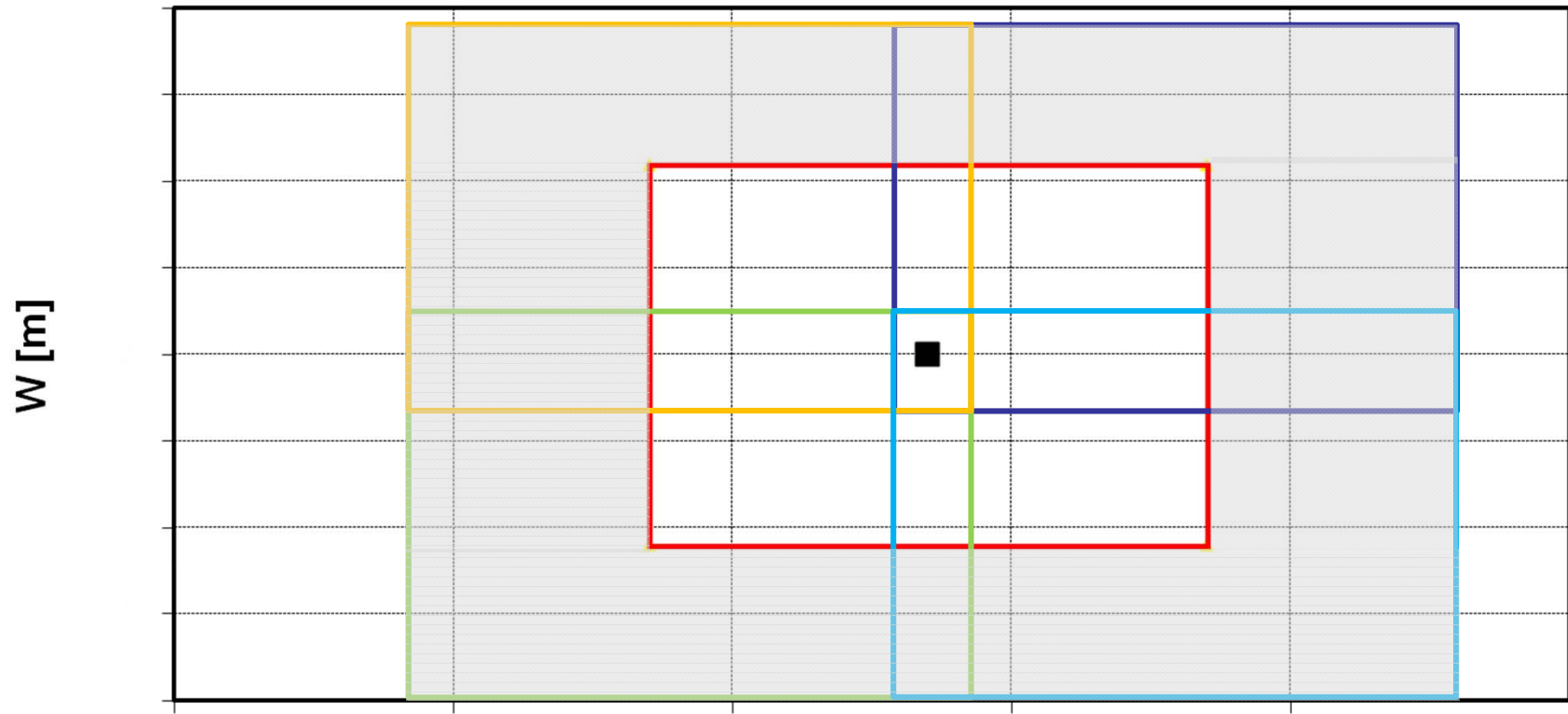
Analyse

Need to admit that

- One test equals one result
- N tests equal N results

Thus

- Tolerances centered on test mean that one test is representative of an average !



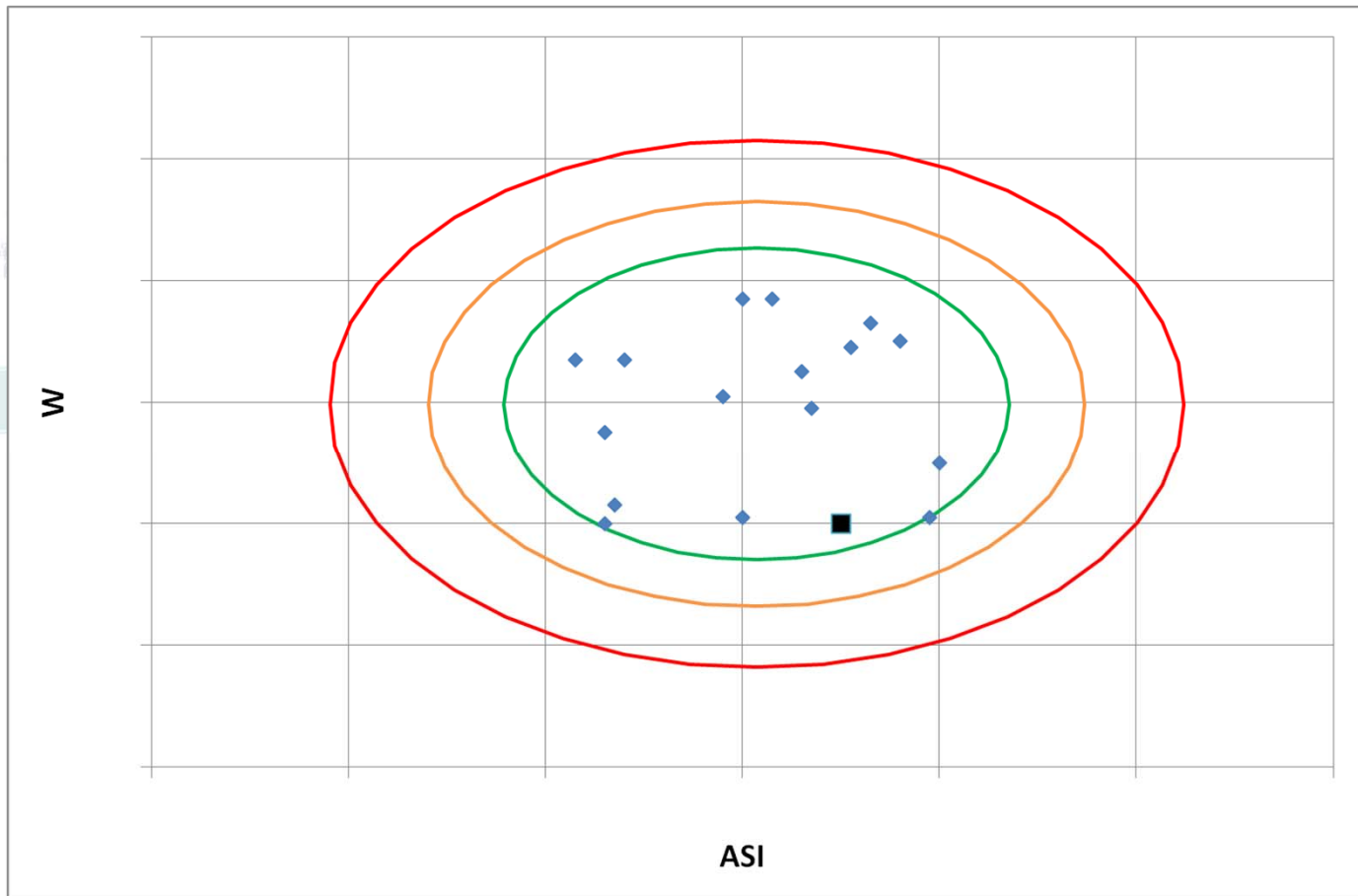
Potential validated simulations excluded with current validation process

Proposal

Use of CM in addition to real test:

- Replacement of normalized value (No sense due to existence of thresholds)
- Evaluation of device robustness
 - Impact conditions (Mass, Velocity, Angle)
 - And/or material characteristics
- Definition of Areas for validation and robustness classes

Example of parametric approach



Evaluation of modification (TG2)

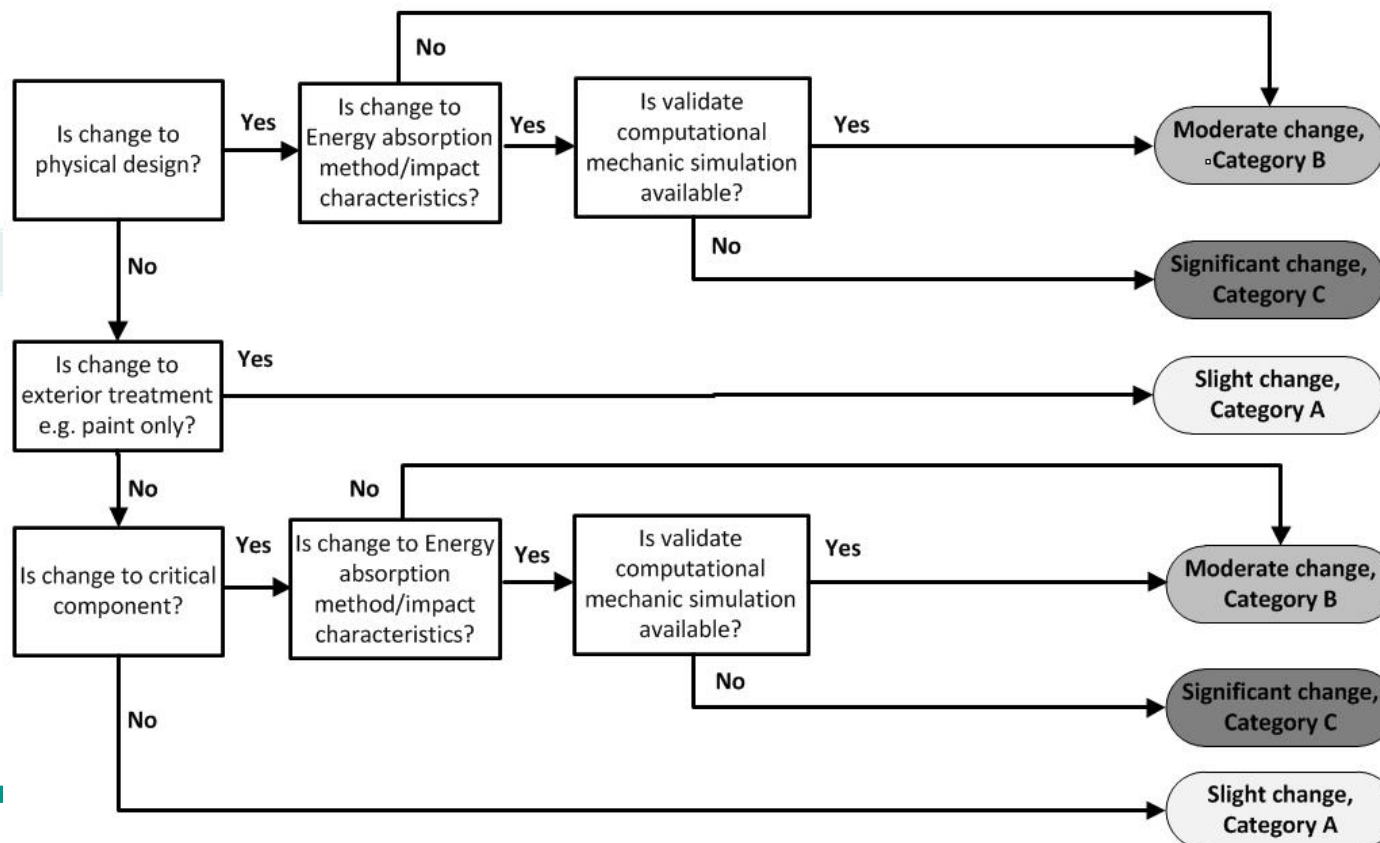
Current status

- Assessment using CM for modifications that “can be assessed by dynamical analysis”
- List of examples:
 - Change of ending treatment
 - Anchorages if not supposed to fail
 - Increase of rail length
 - ~~Change of steel grade~~

Evaluation of modification (TG2)

ongoing discussion

- Replace examples by flow chart:



THE question is...

- What can we expect from a numerical model?

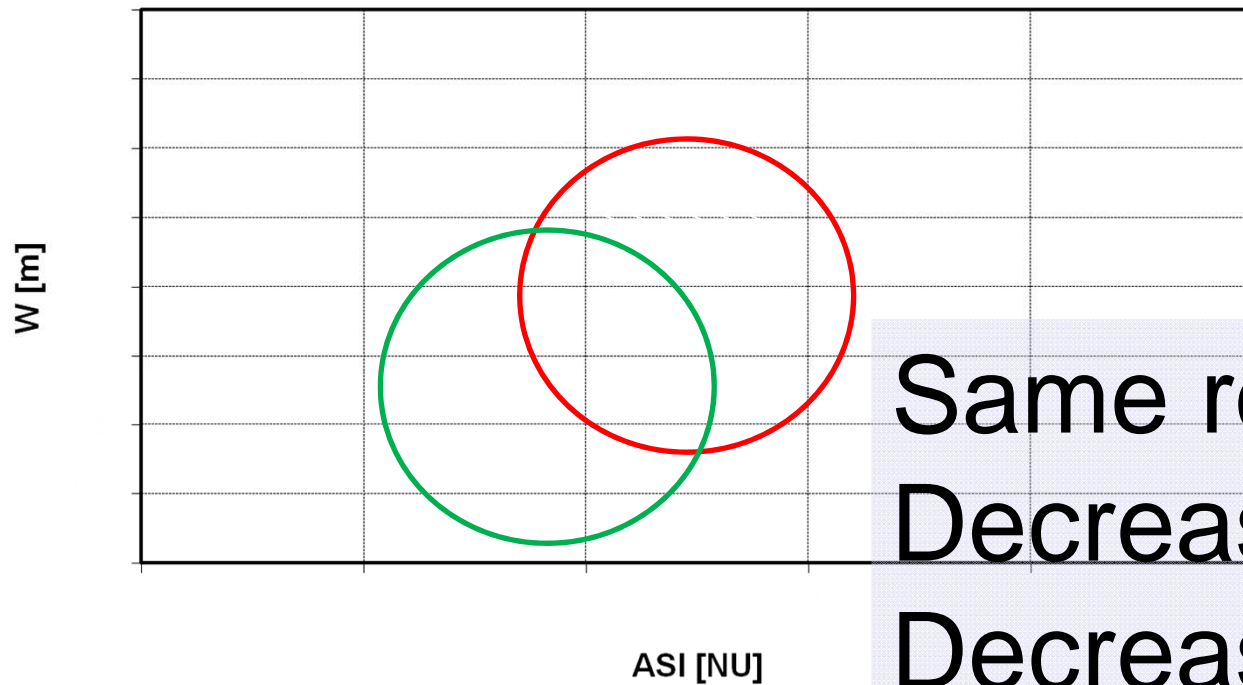
Knowing that:

- Everything can be modeled (most of LIER customers perform CM studies before crash tests)
- Risks will always be remaining

Proposal

- Comparison of parametric studies results for ITT and modified product
- Comparison of “clouds” instead of point to point
- Numerous criterions can be defined

Illustration #1



- Initial design
- Modified design

Same robustness
 Decrease of severity
 Decrease of W
 Overlapping

Illustration #2

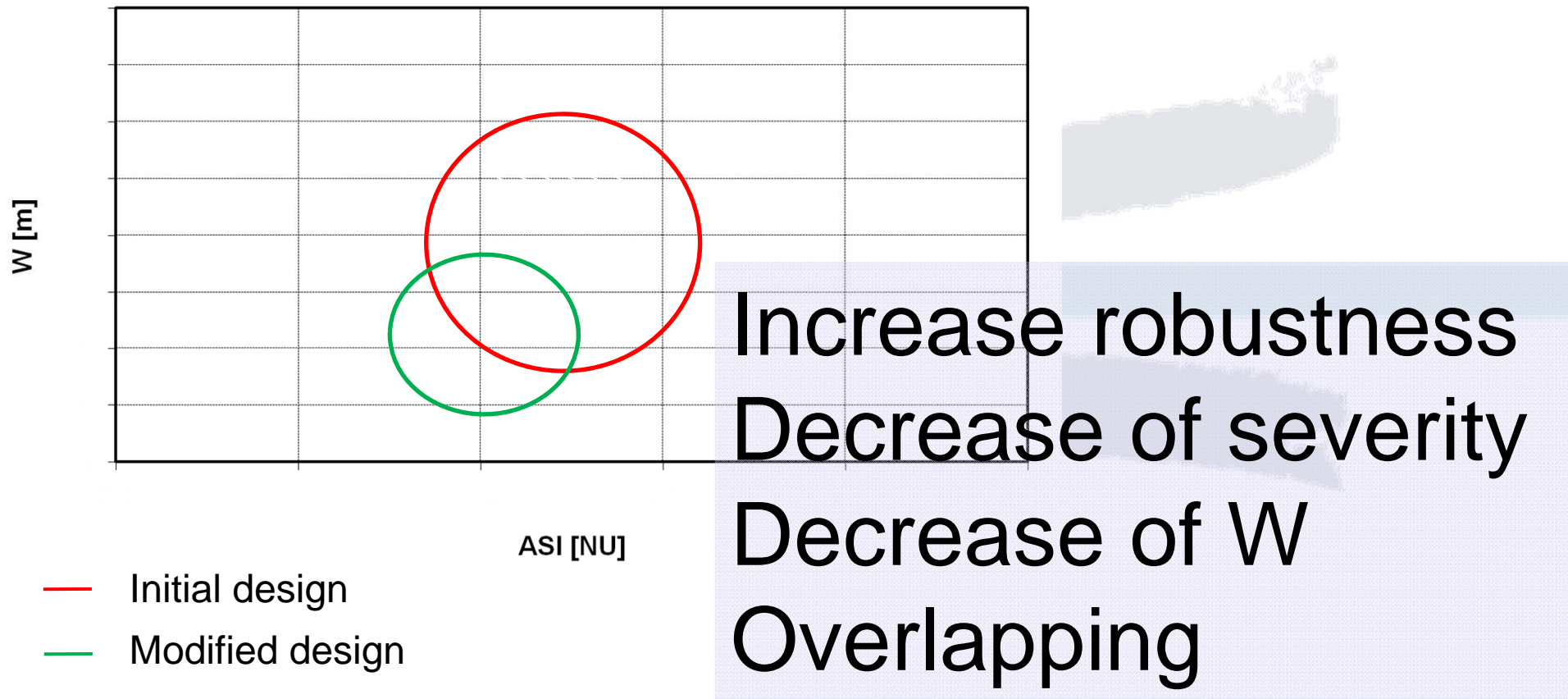
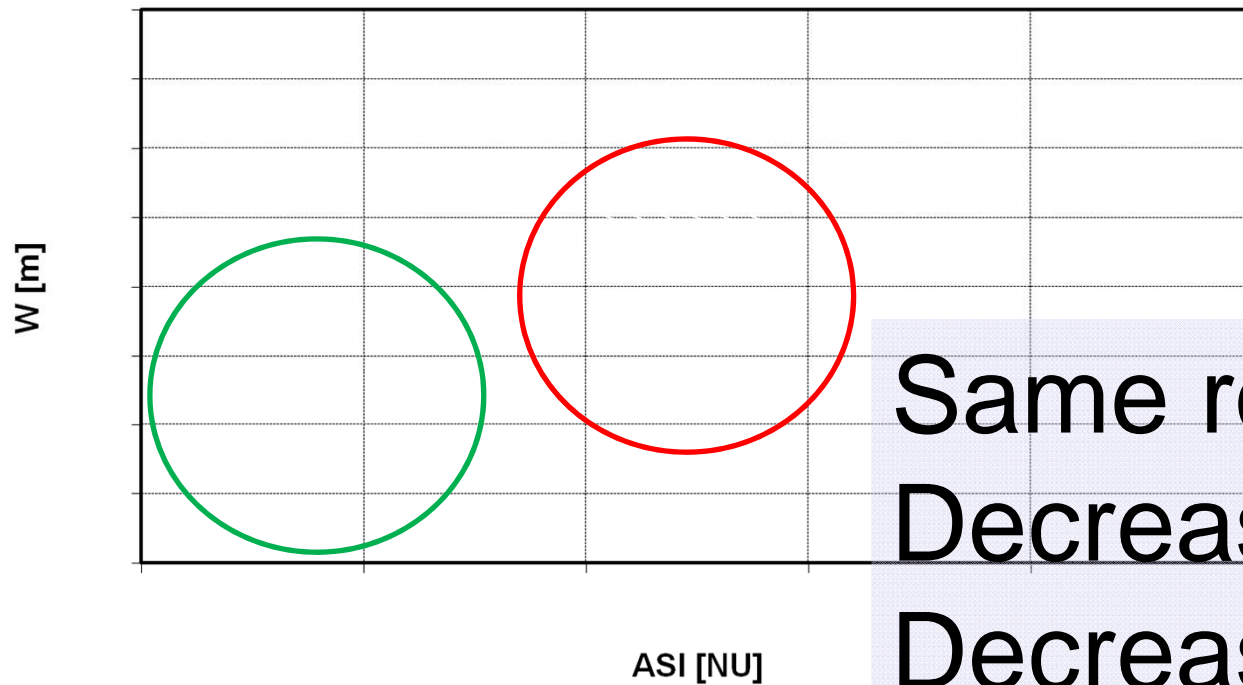


Illustration #3



- Initial design
- Modified design

Same robustness
 Decrease of severity
 Decrease of W
 No overlapping

Conclusion

Parametric approach allows:

- Decision tool before crash tests
- Definition of validation areas
- Definition of robustness classes
- Definition of criteria for modified product acceptance

Thank you for your attention !

- Questions ?

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