THE REVISIONS OF THE BS EN ISO 12215

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Marine Sector Showcase
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CONTENTS

- Motivations behind the revisions

- Changes to the scope

- Applicable methods for structural analysis

- Double Curvature

- Natural Stiffeners

- Upgrades to composite theory

- Webscant

- Conclusions

The ISO 12215-5 is currently at DIS (Draft International Standard)

stage, open for voting until the 26th of October 2017

Disclaimer: The views expressed are those of the authors only and do not necessary reflect those of the WG18.

All information presented in subject to changes made by the WG18 and approval of the standard.

- Current version published in 2008

    - Significant changes have occurred in the marine and composite industry since then

- The aims of the new version are:

    - Answer the feedback from industry

    - Improve the clarity of the standard to widen the range of users

    - Propose an improved consideration for single and double curvature

    - Refine the definition of natural stiffeners for round bilge hull

    - Offer a more modern approach to the mechanical properties of composites through CLT

    - Better definition of the pressures (including applications to large sandwich panels)

- The revision work also allowed to improve a great many details.

- The definition of the local design pressures and design strength apply to both monohulls (ISO12215-5), and soon multihulls (ISO 12215-7)

- The scope has been extended to cover small crafts for professional use (workboats)
    - Speed limit extended beyond 50 knots and accelerations up to 8g for workboats

- To bridge the regulatory no-man's-land arising from the small craft upper limit being at 24m hull length and the IMO regulation starting at 24m Load Line length, the Working Group decided that the ISO 12215 will now apply to an 'enhanced' definition of small crafts, i.e. a new upper limit of 24m Load Line
    - Note: this is only for the ISO 12215, and has not been adopted by other working groups of the RCD.

- **1. Simplified Method**
  - Based on simple thickness equation for metal, wood and GRP single skin

- **2. Enhanced Method**
  - Ply by ply analysis for metal, wood and quasi-isotropic GRP

- **3. Developed Method**
  - Application of CLT to all FRP structures

- **4. Direct Test**
  - Relying on mechanical testing, applicable to all but primarily intended for FRP

- **5. FEM**
  - Finite element methods using the ISO design pressures and properties, also mostly aimed at FRP

- **6. Drop Test**
 - Applicable to vessels less than 6m in FRP and non-reinforced plastics

- The significant impact of double curvature for small crafts is not normally accounted for in rule-based structures

- Finite element methods have been employed to first validate the Timoshenko coefficient for curved plates, and then utilised to develop new correction coefficient for the loading on a panel with double curvature
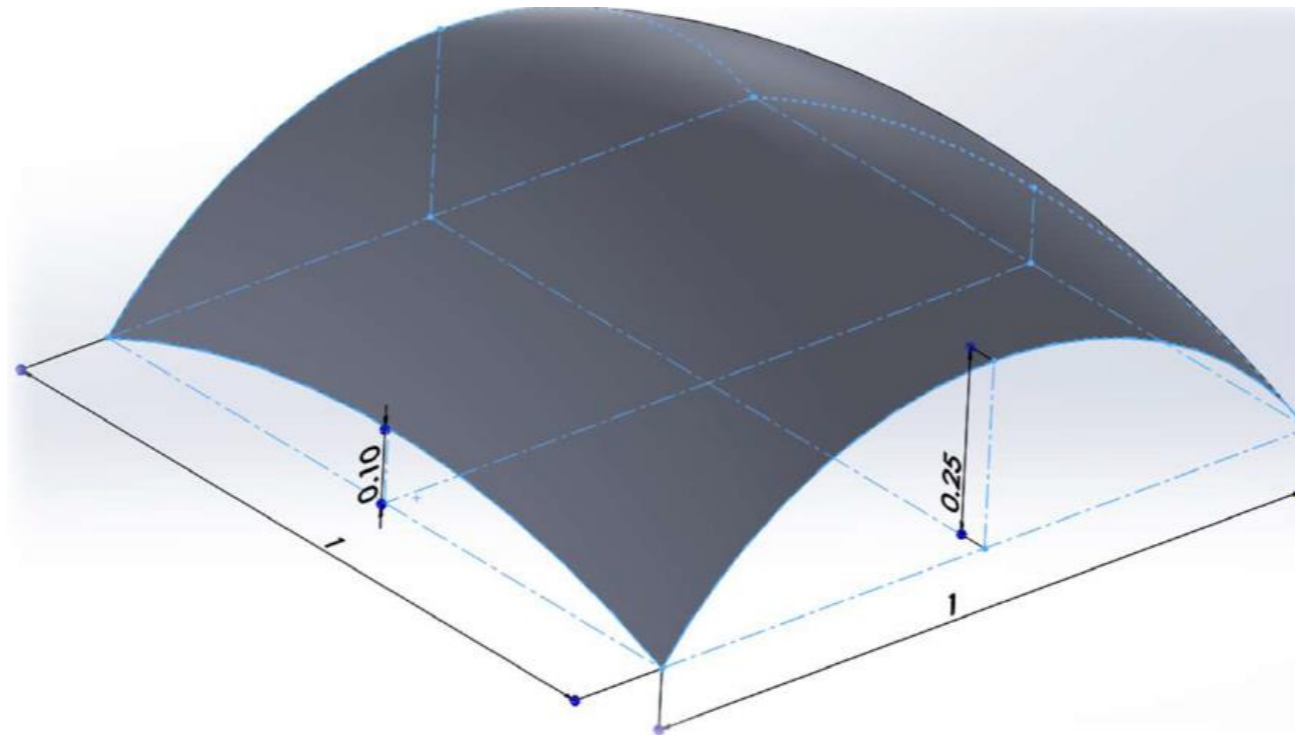
- Natural stiffeners are well defined for a sharp angle between two plates

- The problem is made more complex when looking at a highly curved plate

- Further investigation into the effects of curvature on structures allows to define a new criteria for natural stiffeners

- *Find, if possible, a circle that corresponds approximatively to the shape of the hull. Its connection to the hull is usually at the tangent point with a parallel to the diagonal between bottom at CL and deck edge. If the radius of this circle is ≤0,40 the length of the diagonal, and if the chord of contact or intersection between the circle and the hull is > 0,8 R, the "turn of the bilge" is considered strong enough to be a "natural" stiffener.*
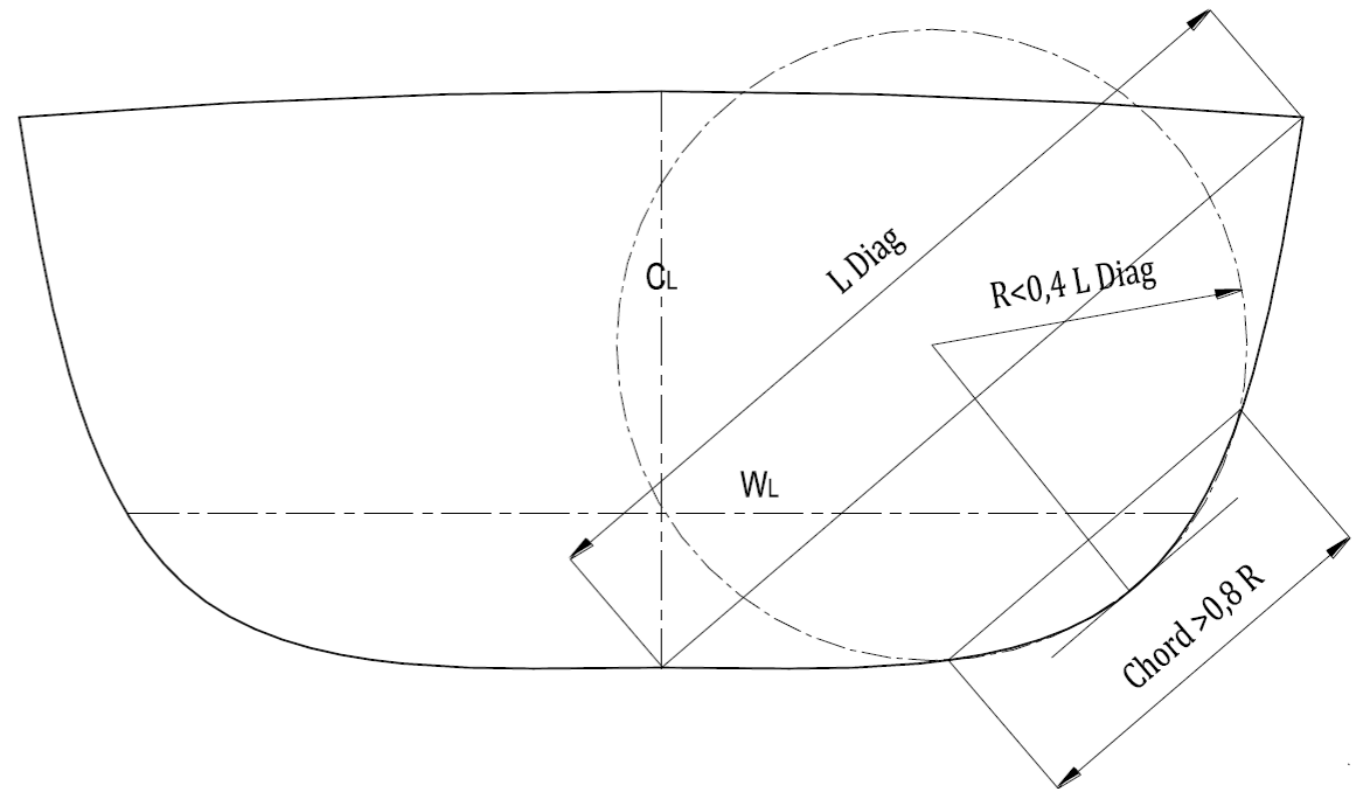
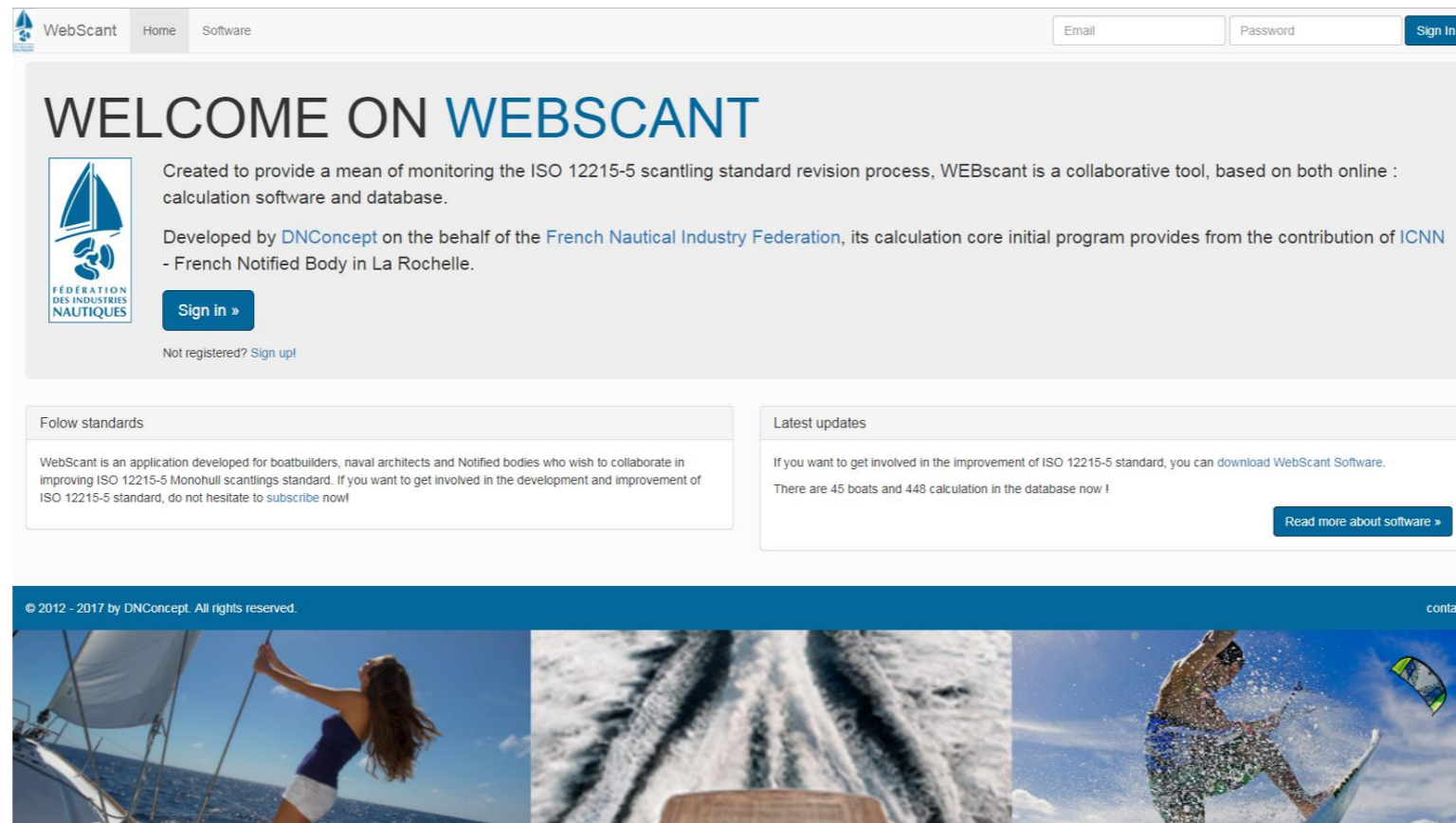- Updated mechanical properties for CLT applications to reflect the developments over the last decade

			Reinforcement fibres			Matrices
			E Glass	Aramid	Carbon HS	Polyester/epoxy
Specific gravity ρ		Kg/m³	2,56	1,44	1,78	1,2
Young's modulus E	// Fibres	N/mm²	73 000	124 000	235 000	3 300
	⊥ Fibres	N/mm²	73 000	6 900	20 000	3 300
Shear modulus G		N/mm²	30 000	2 800	50 000	1 222
Poisson's ratio ν		1	0,22	0,36	0,27	0,32

- Also features improved 'guidance values' for fibre weight fractions for a wider range of clothes and lamination process (from Hand layup to prepreg in autoclave).
- And a 'boat building quality factor' to reflect the production method and quality control during the build process.

- In order to validate the development of the standard and ensure a good application once launched, the WEBSCANT website was created

http://www.webscant.com/

- Webscant allows to input examples of interesting yachts:
  - Well experience boat or component not meeting the ISO 12215-5 (2008)
  - Well experience boat or component at the limit of the ISO 12215-5 (2008)
  - Well experience boat or component easily in accordance with the ISO 12215-5 (2008)

- All data is kept secured, only accessible by the Convenor of the ISO 12215 for validation purposes
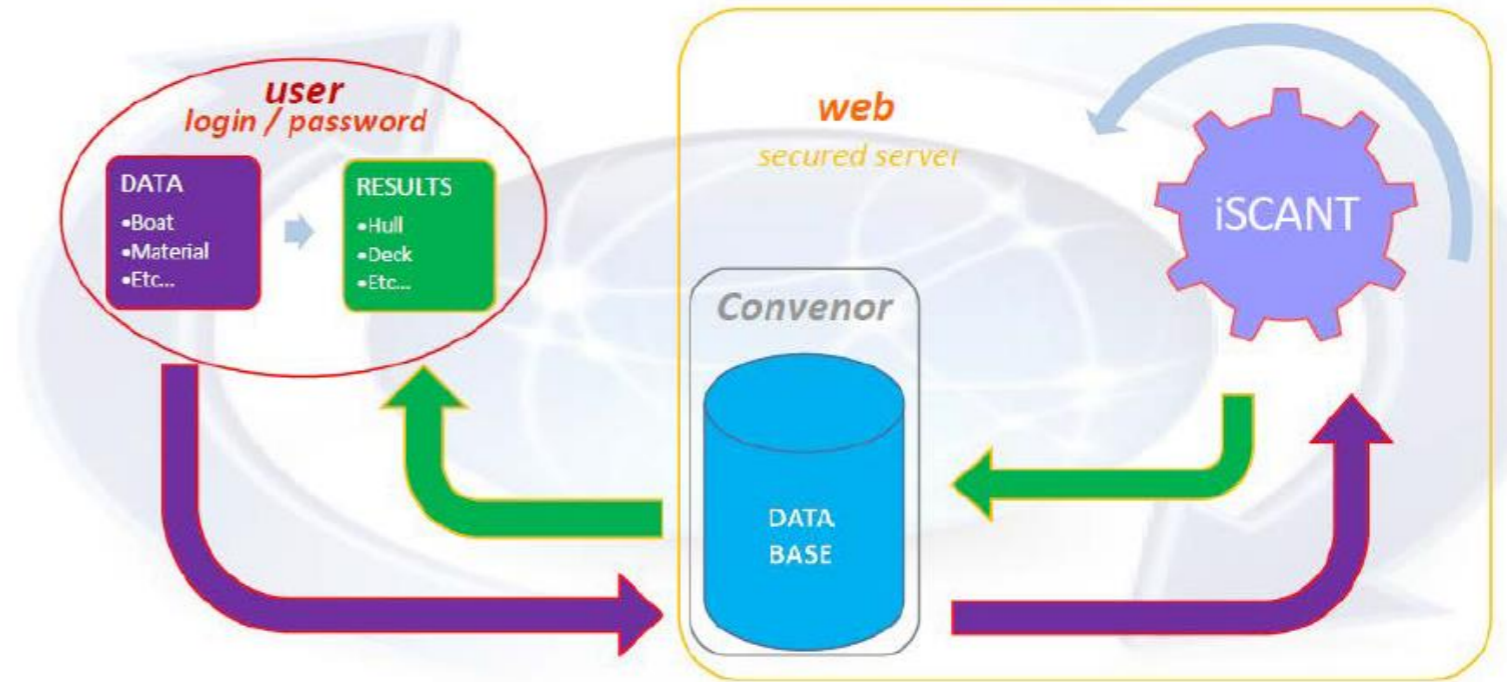
The larger the industry involvement, the better the final standard will be.

- Significant amount of work gone into improving the standard

- Revised Scope
    - Multihulls (Part 7)
    - Workboats (speed greater than 50 kts)
    - New 24m Load line limit

- Main Changes
    - 6 methods applicable for the structural analysis (from drop test to FEM)
    - Consideration for double curvature
    - Definition of natural stiffeners for highly curved panels
    - Upgrades composite theory

- Webscant tool available to industry to support the validation

- Also towards the end of their development and coming soon:
    - ISO 12215-7: Multihulls (including global loads)
    - ISO 12215-10: Rig loads and rig attachments (including composite chainplates)

THANK YOU

For more information, to obtain a copy of the draft standards
or to get involved with the validation process, please contact:

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