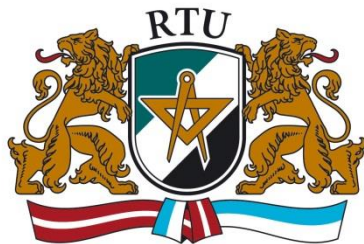


Comparison of a load bearing capacity for composite sandwich plywood plates

10th International Scientific Practical Conference «Environment. Technology. Resources»



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Content

- **Actuality**
- **Description of Plates with cell type core**
- **Methodology**
- **Comparison of Plates**
- **Conclusions**

Actuality

- **Plywood**

- Layered wooden material with improved wood properties, with possibility
 - to improve strength (improved with reduce of imperfections)
 - to obtain higher specific strength
 - to obtain low amount of waste
 - to vary with required properties in various directions
 - to get waved form

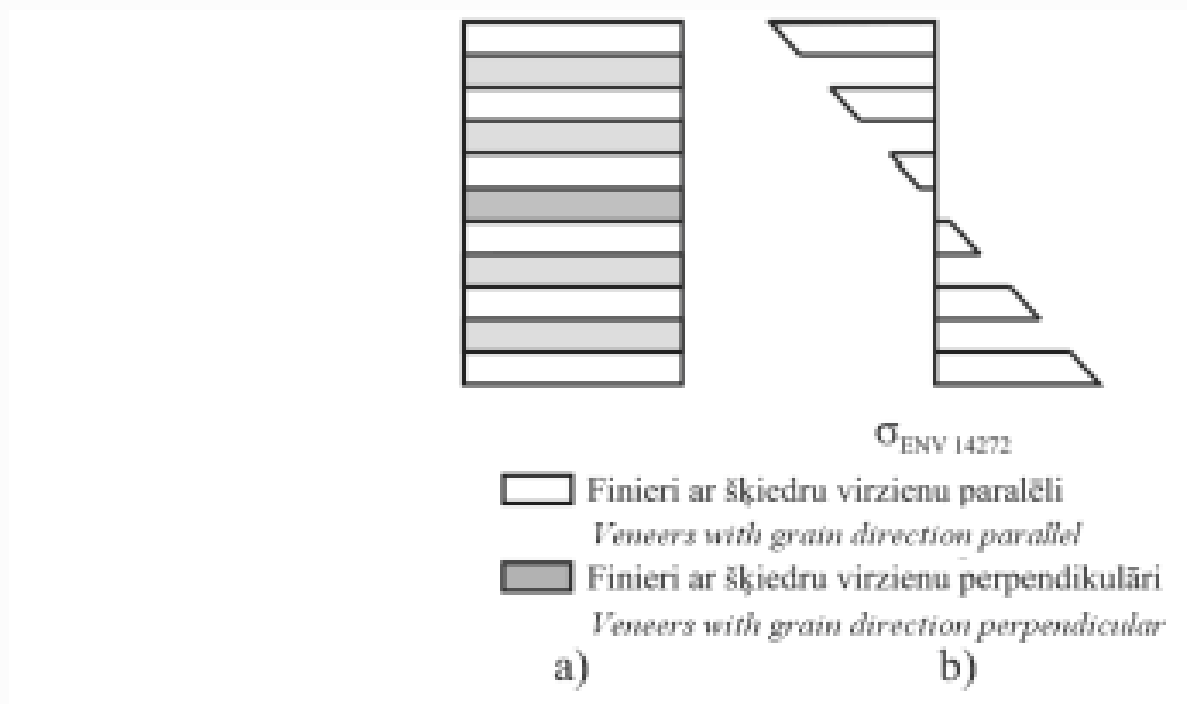


14.01.2016.

<http://www.finieris.lv/lv/produkti/saplaksnis/riga-ply>

Actuality

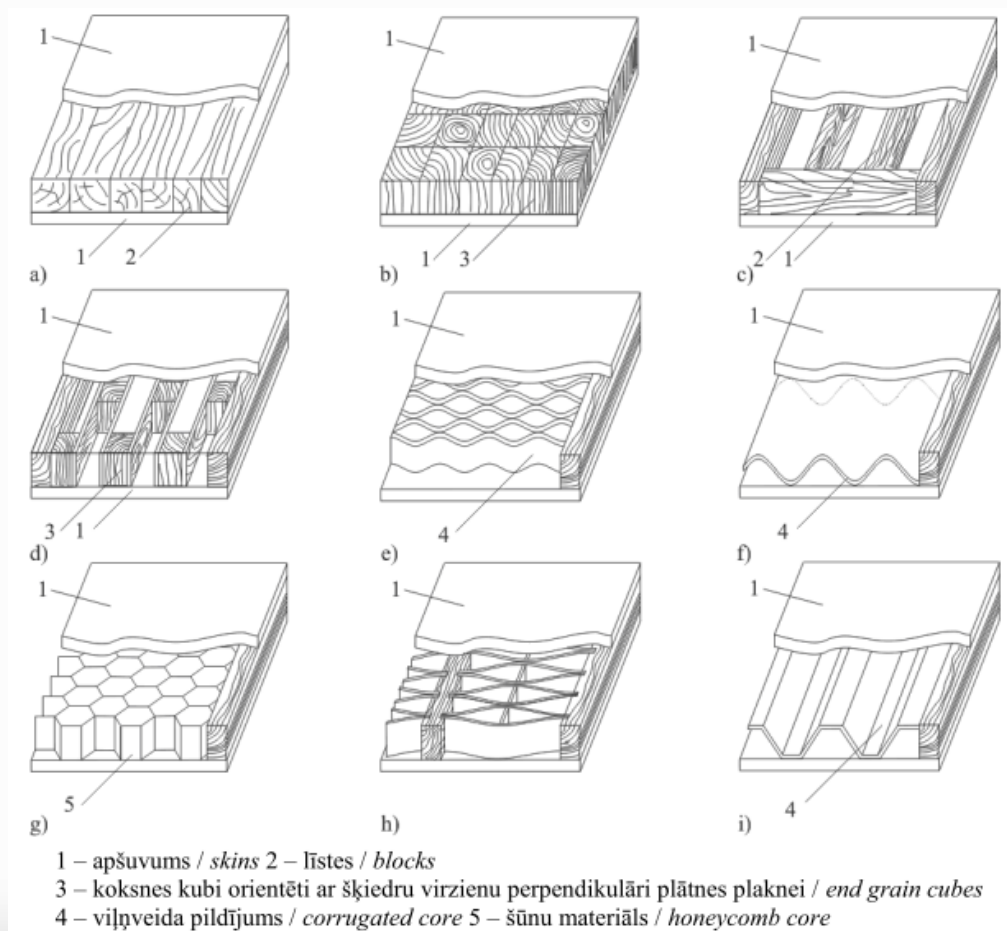
Stress distribution in standard plywood



Zudrags K. Paaugstinātas īpatnējās stiprības saplākšņa plātnes. Promocijas darbs. –Jelgava: LLU, 2010.

Actuality

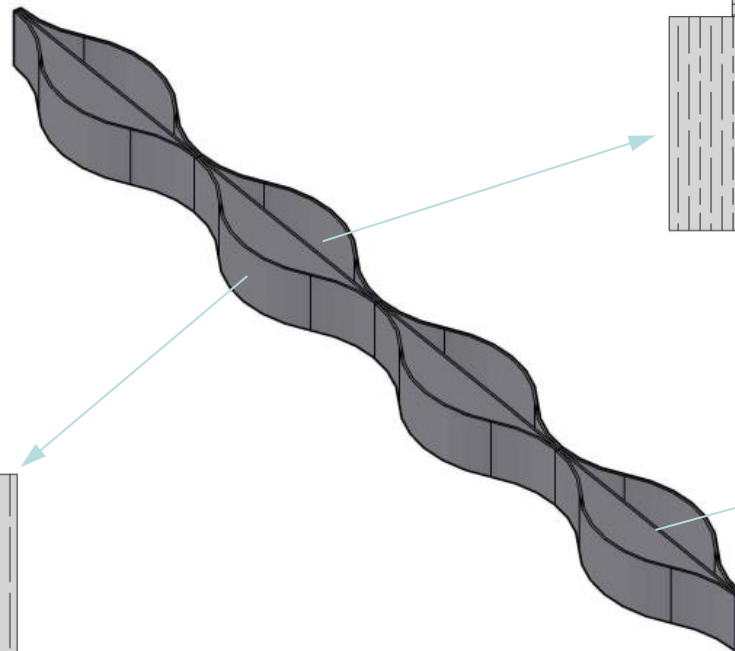
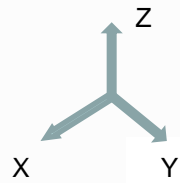
Types of composite plates



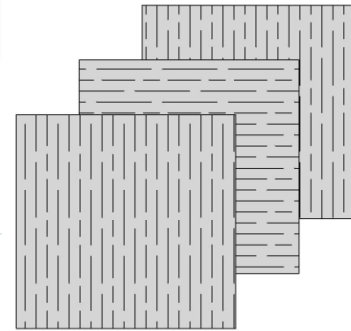
14.01.2016.

Zudrags K. Paaugstinātas īpatnējās stiprības saplākšņa plātnes. Promocijas darbs. –Jelgava: LLU, 2010.

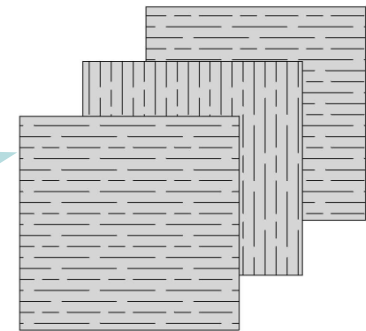
Cell-type Core



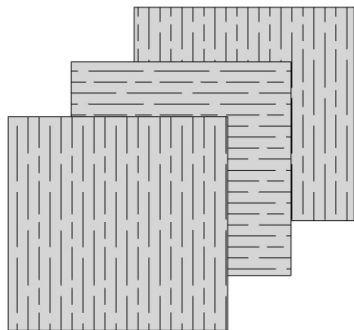
Waved rib part
90 / 0 / 90



Straight rib part
0 / 90 / 0

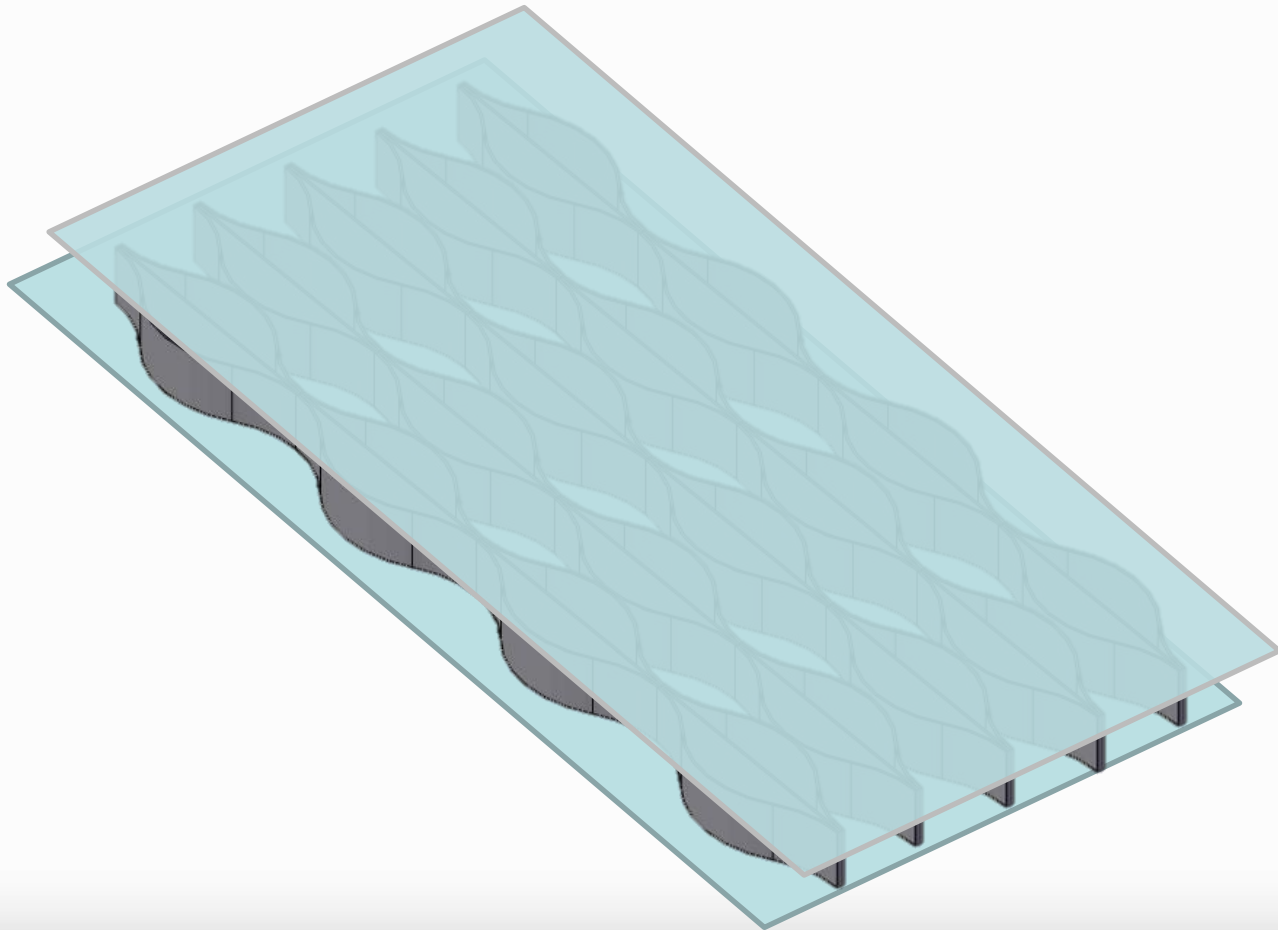


Waved rib part
90 / 0 / 90

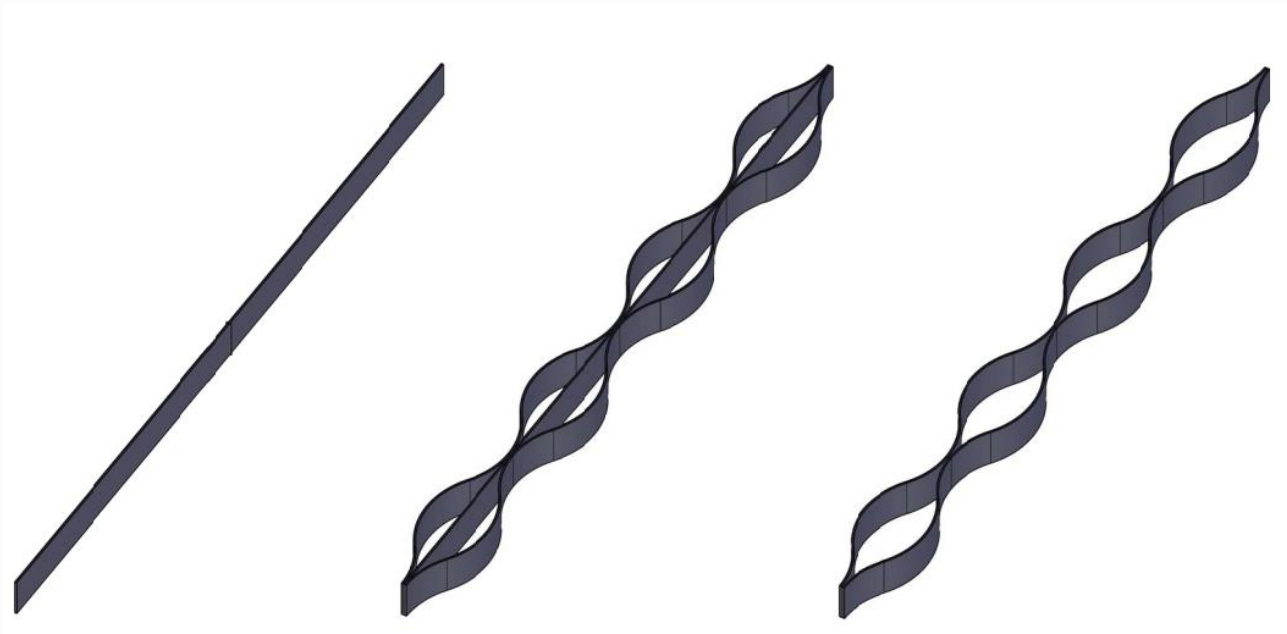


Cell-type Core

Assembly of a plate with cell type core



Research Object



A - r

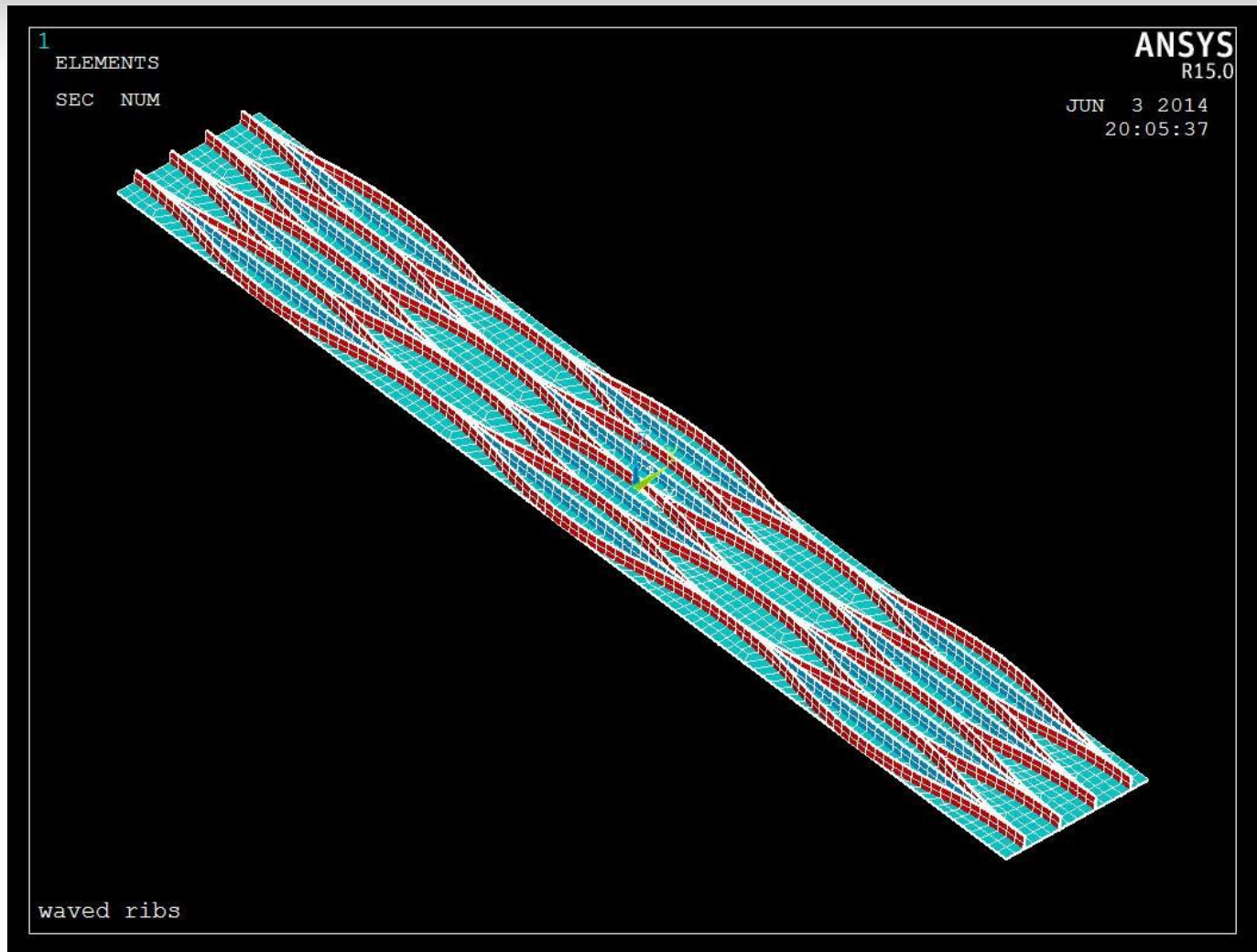
B - \tilde{r}_I

C - \tilde{r}_{II}

Research Methods

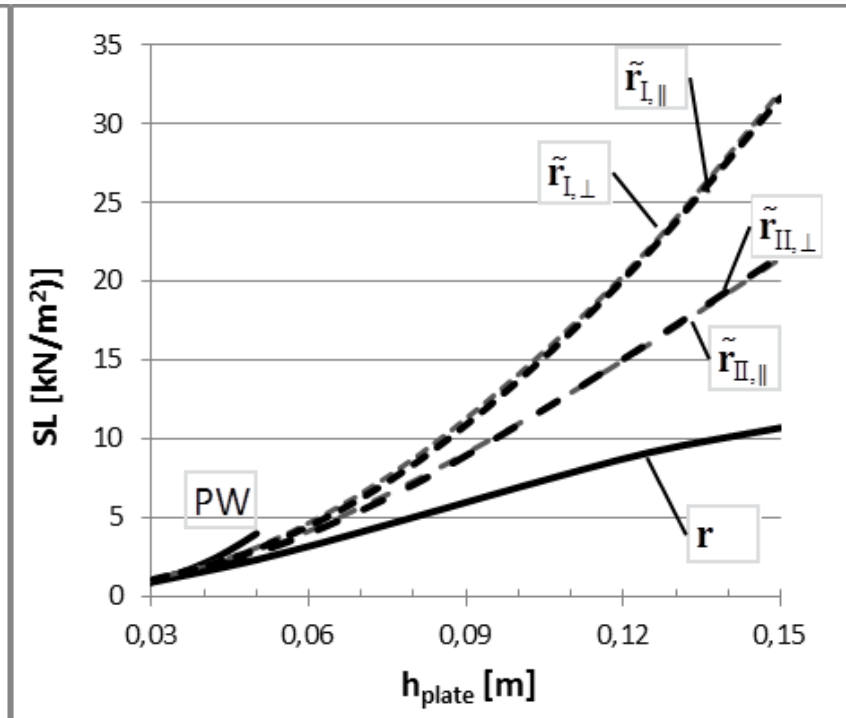
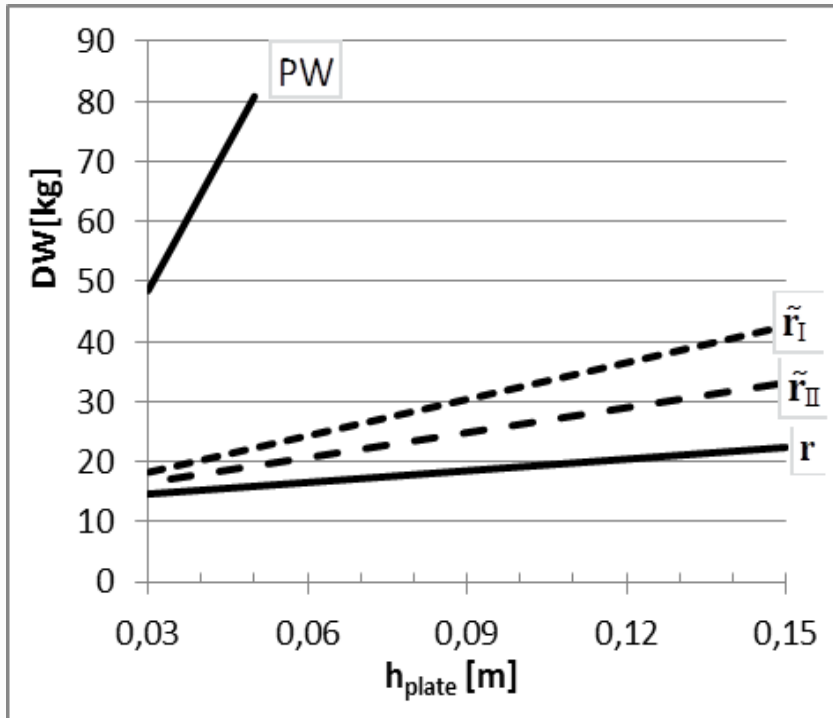
- ▶ Composite plates applied mechanics methods by using Mindlin-Reissner theory and stress-strain calculations of sandwich structures
- ▶ Finite Element Method in Linear-Elastic Stage
- ▶ Shell Type Elements
- ▶ ANSYS Programm Code

FEM Model



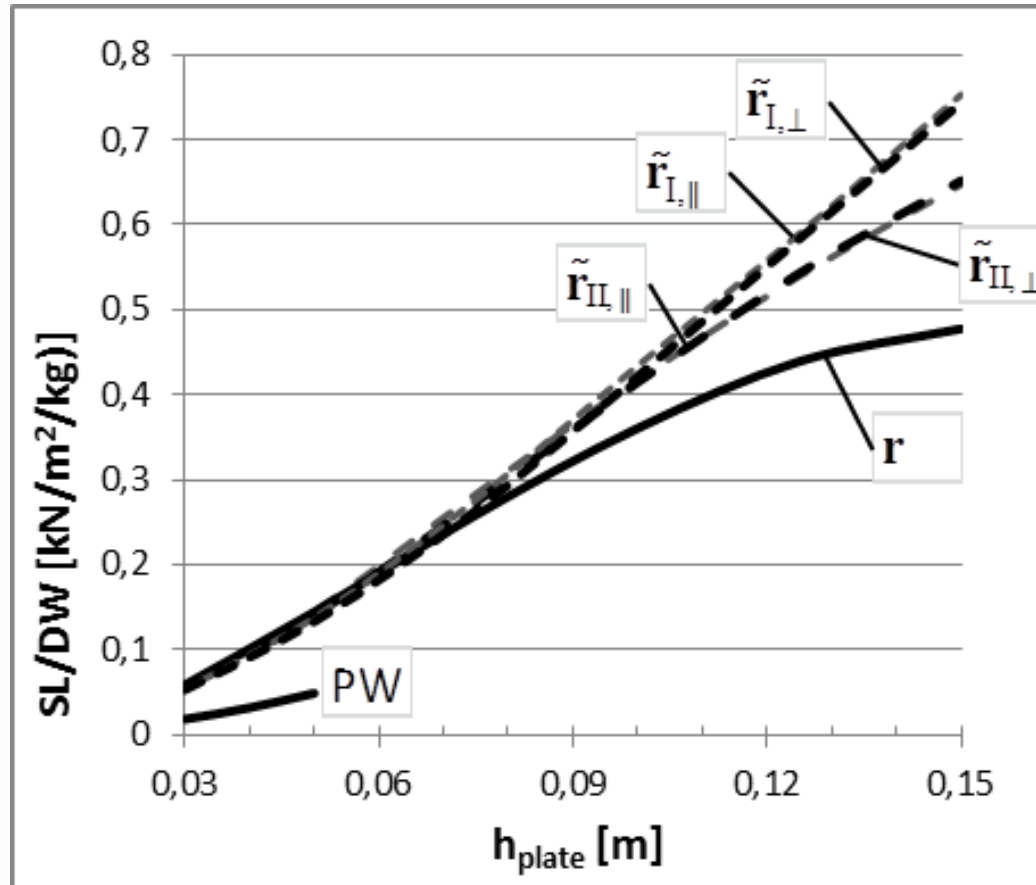
Without Covering plate
14.01.2016.

Comparison SLS

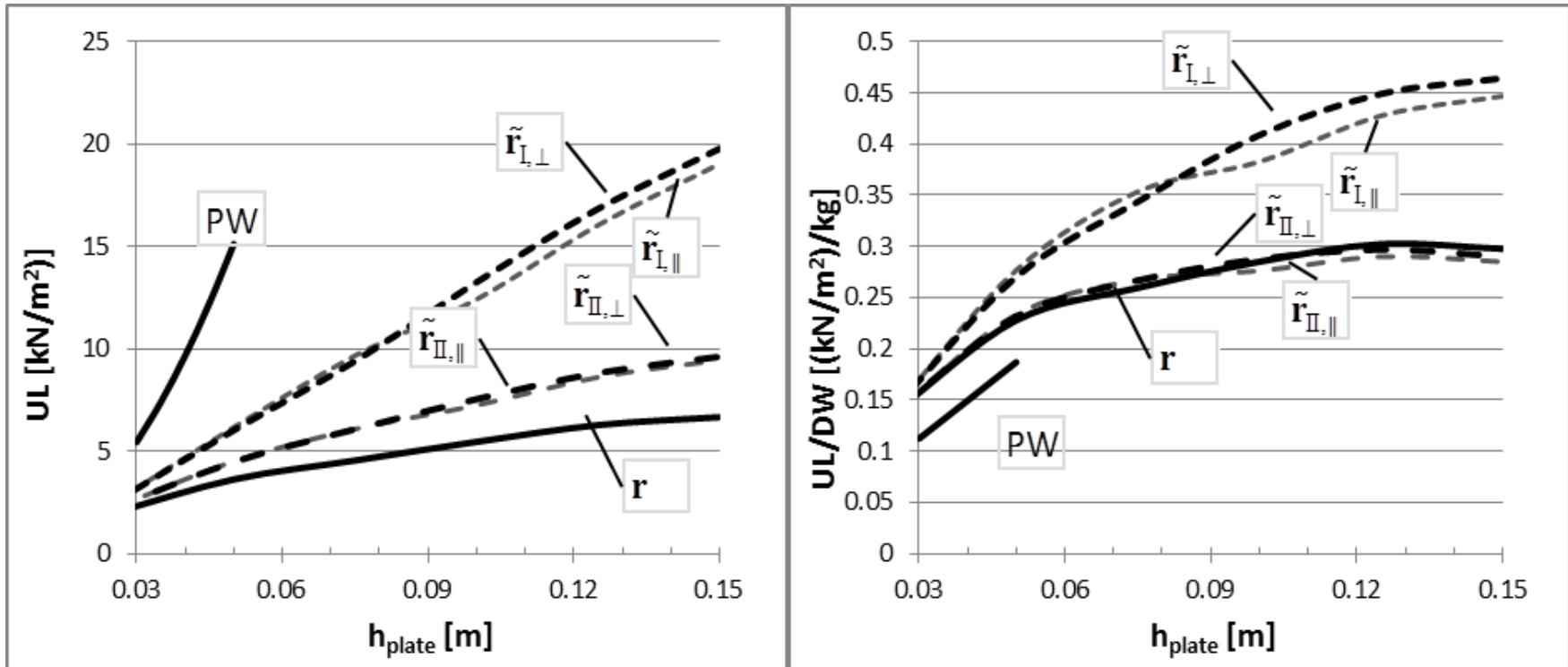


Comparison SLS

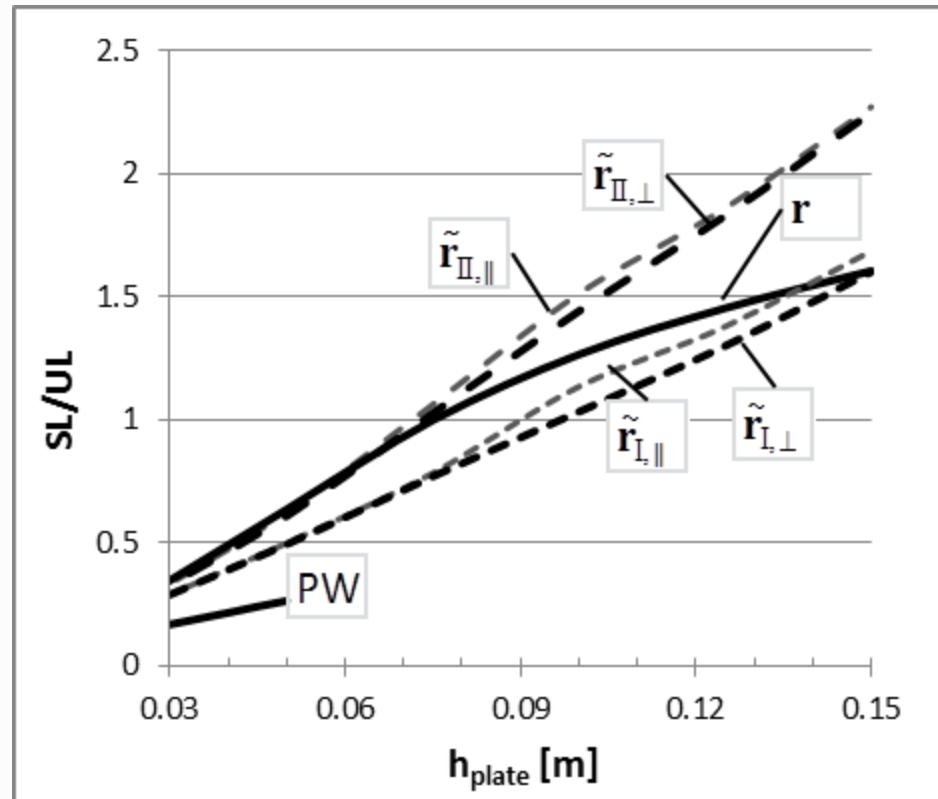
Maximal Service-Load to Mass Ratio



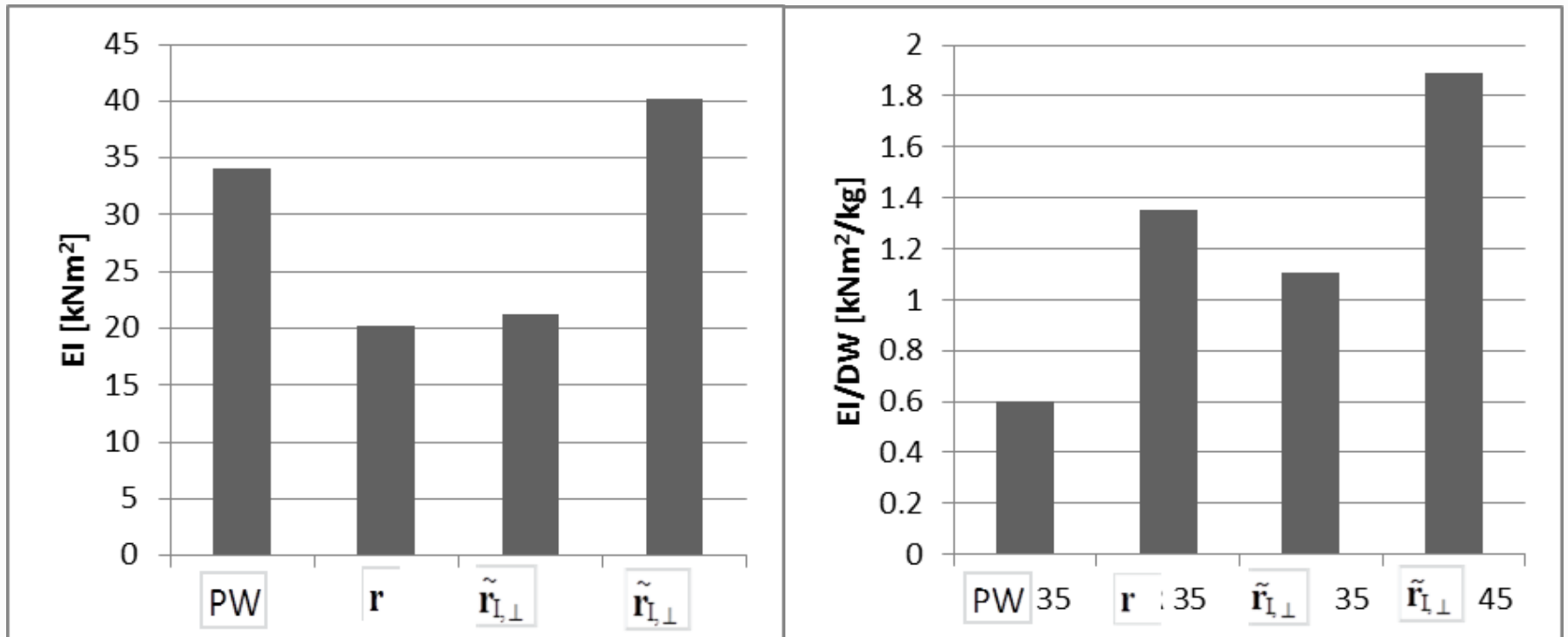
Comparison ULS



Comparison SL / UL



Stifness in Longitudinal Direction



Future problems and research

- Complicated manufacturing
 - by improving technology of plate's assembly and forming of waves
 - by choice of glues
 - solving insulation material placing between ribs
- Glued joint between Core and Skins
 - a research for rib-to-skin glued joint
 - plates' shear tests

Conclusions

- Three type of ribbed plates were compared to stadard Plywood plates and he results show that it is possible to vary with stiffness by using ribbed plates.
- For calculations were used previously achieved functions EI (L, Hp, Br, Nw, Tsr) of geometrically parameters influence to stiffness and stiffness-to-mass ratio.
- By changing geometry of rib it is possible to increase **stiffness-to-mass** ratio up to 45% (up to 25% decrease of stiffness at up to 55% decrease of mass) comparing to standard plywood plates.
- Where it is possible to increase plate's height for 30% the improvement in stiffness reaches up to 100% and keep increasing by even more increase of height.
- By using such plates it is possible to equal the bearing capacity for Ultimate limit state and Serviceability limit state so that the material is used for the same level in both of the Limit states.

Acknowledgement

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Thank You for Attention !!!