

Zodiac Aerospace Challenge



LETECKÝ ÚSTAV

Institute of Aerospace
Engineering

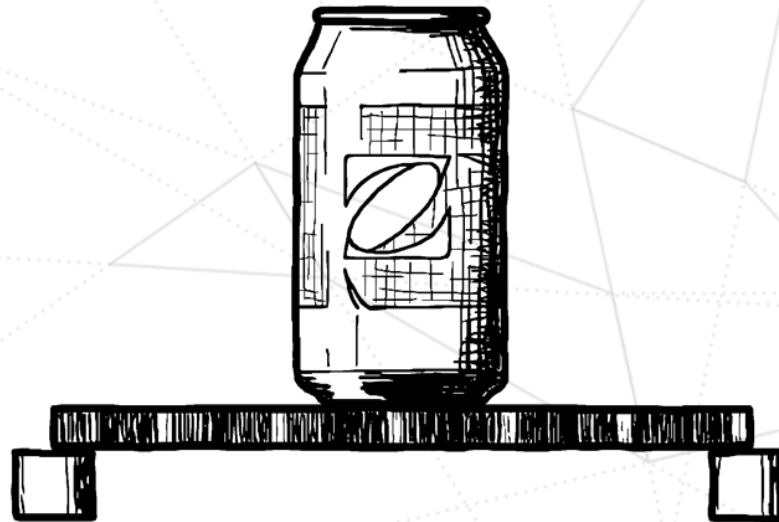


**BRNO
UNIVERSITY
OF TECHNOLOGY**

Zodiac Aerospace Challenge

Structural competition for bachelor's students

ZODIAC
AEROSPACE



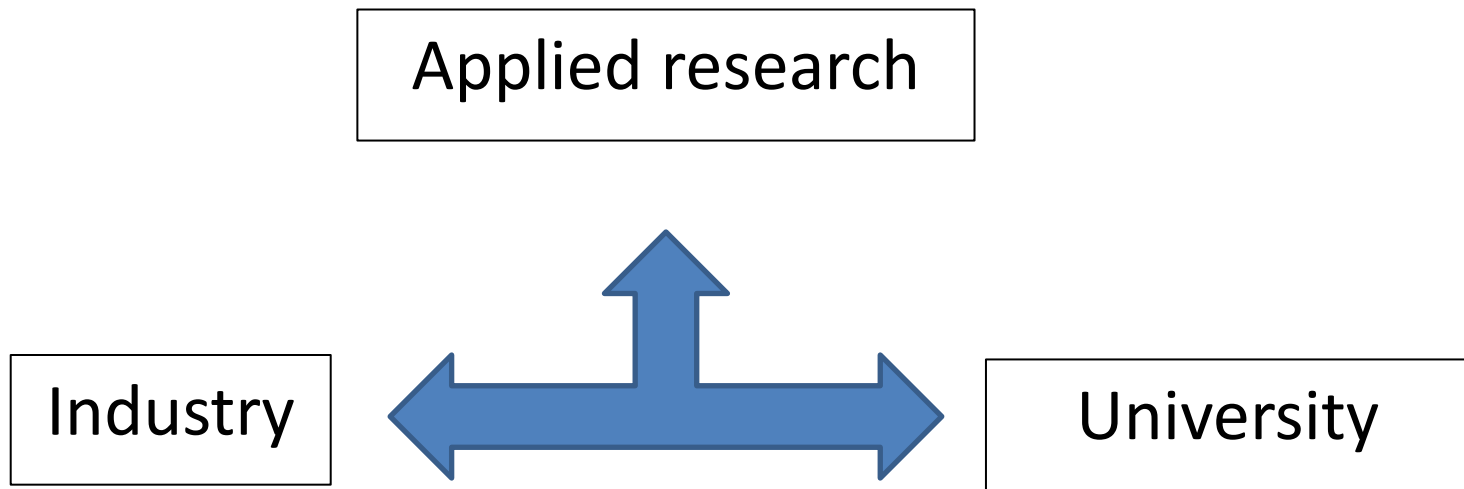
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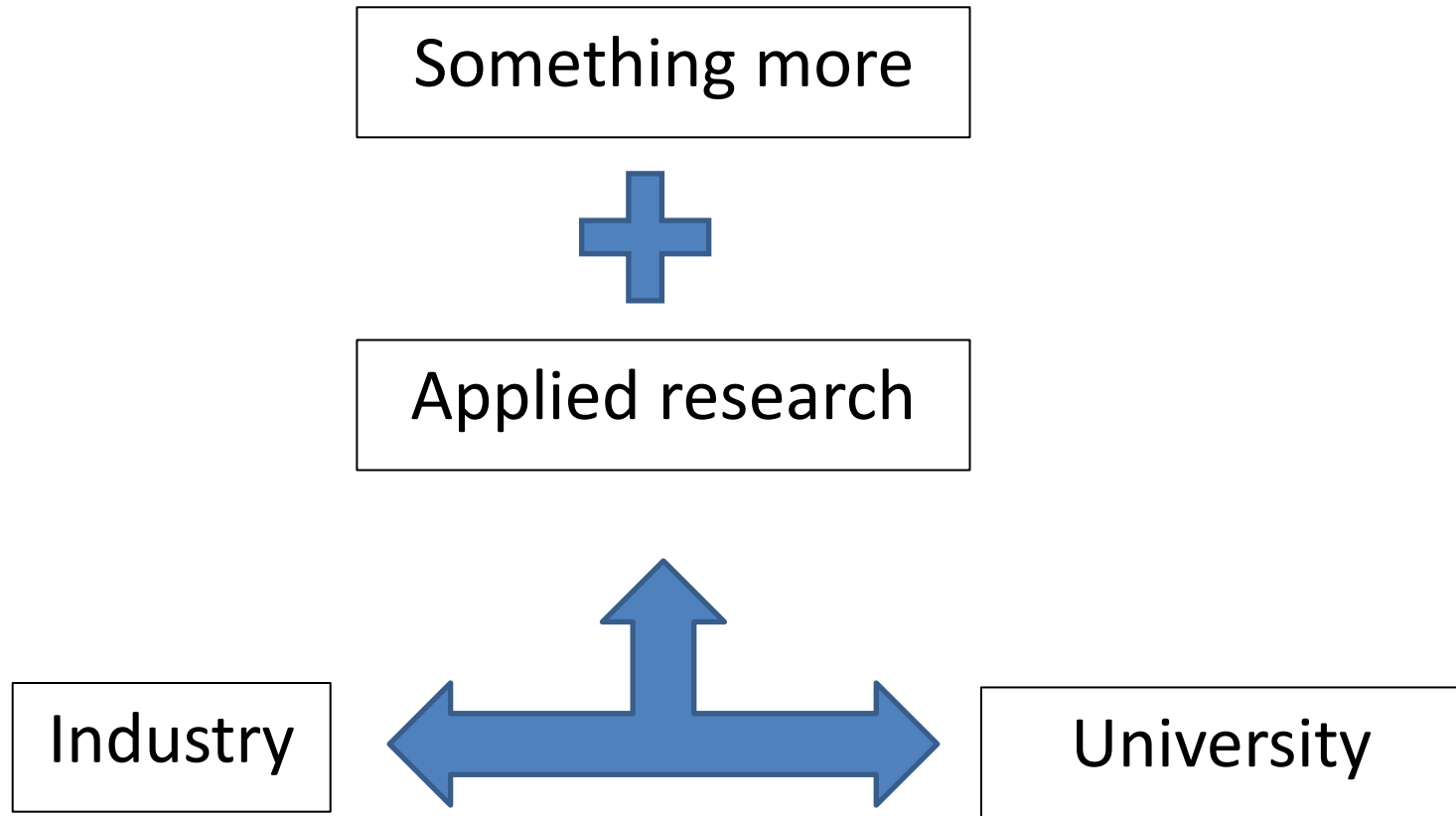


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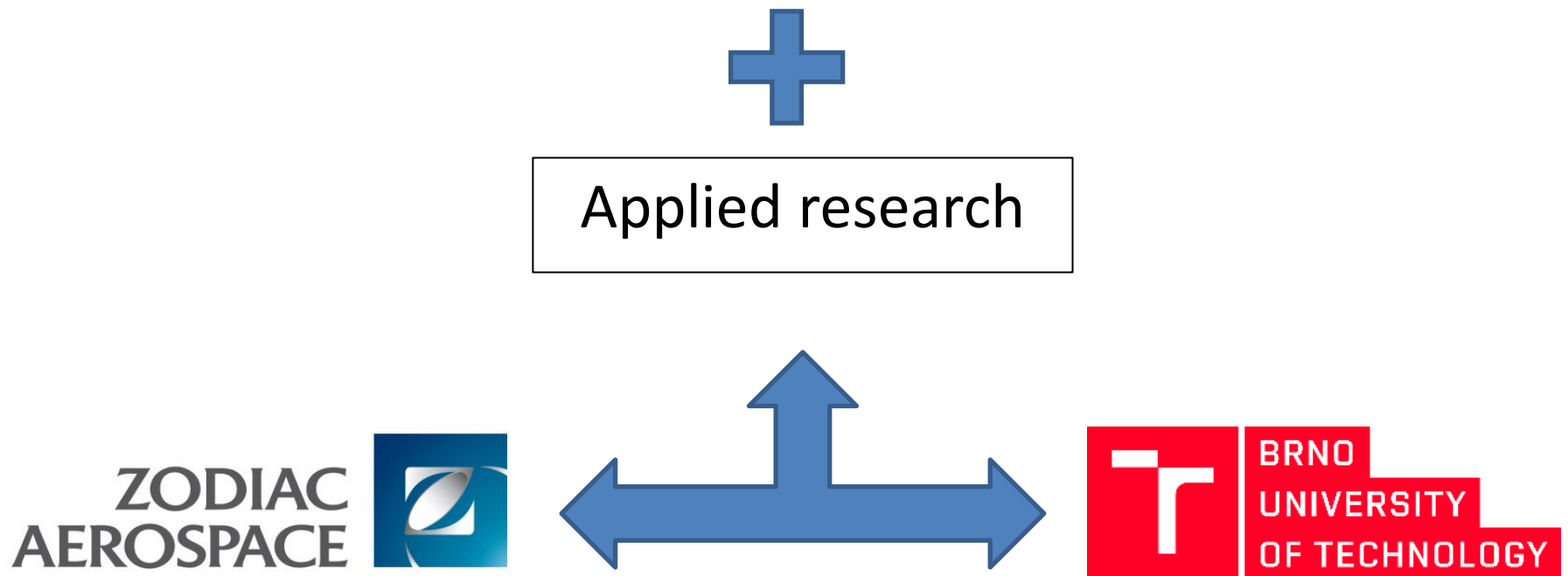
Schema of typical cooperation



Schema of wider cooperation



Schema of wider cooperation

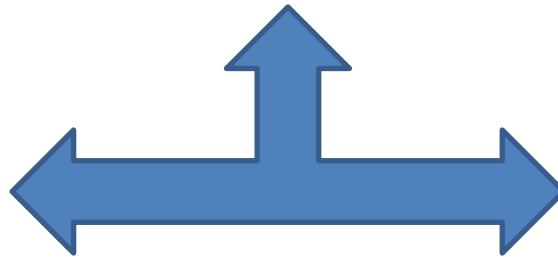


Schema of wider cooperation

Student's structural competition



Applied research



Zodiac Aerospace Challenge

Student's structural competition



Zodiac Aerospace Challenge

Student's structural competition

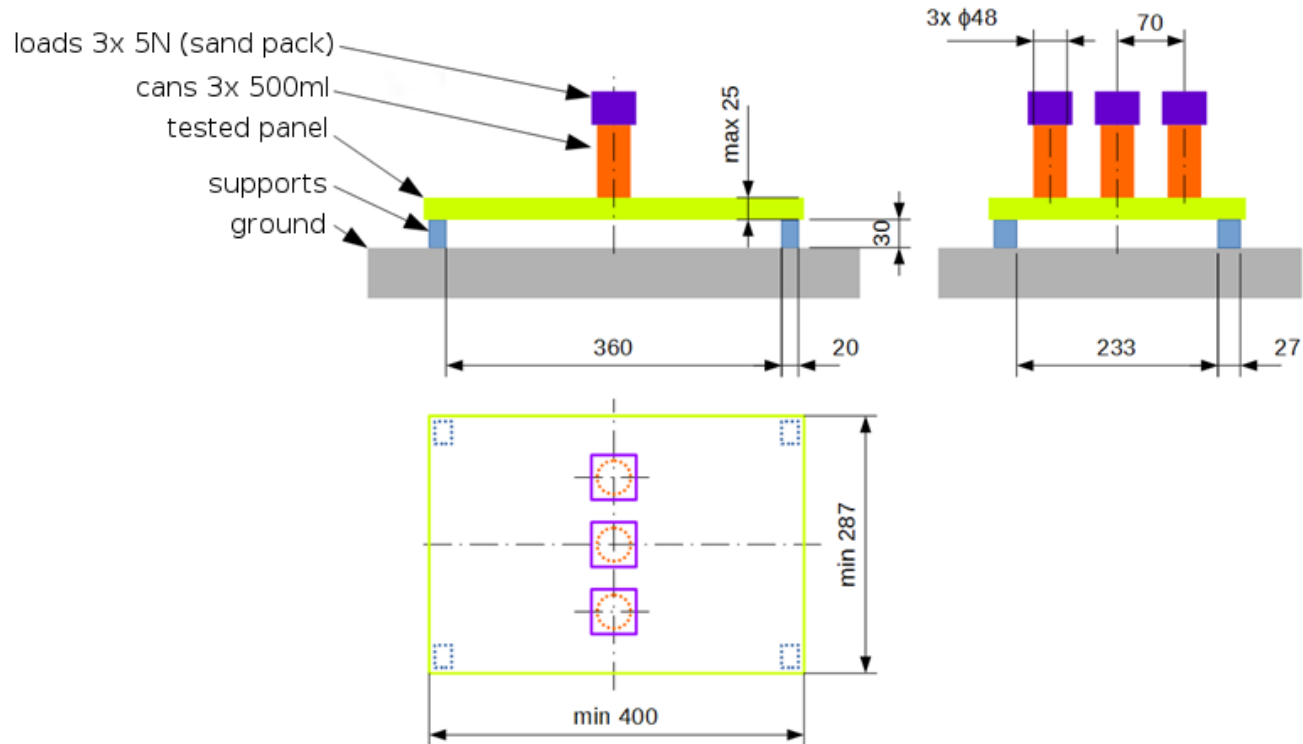
The task was inspired by airliner galley



The task

Build a panel

- 1) from paper and glue only
- 2) withstand prescribed load of packs and cans
- 3) be the lightest!



...and I almost forgot...



...and I almost forgot...

1st team prize:

12 000,- CZK (approx. 444 EUR)



...and I almost forgot...

1st team prize:

12 000,- CZK (approx. 444 EUR)

Other prizes:

6 000,-
2 000,-

T-shirts

3 000,-

2 000,-

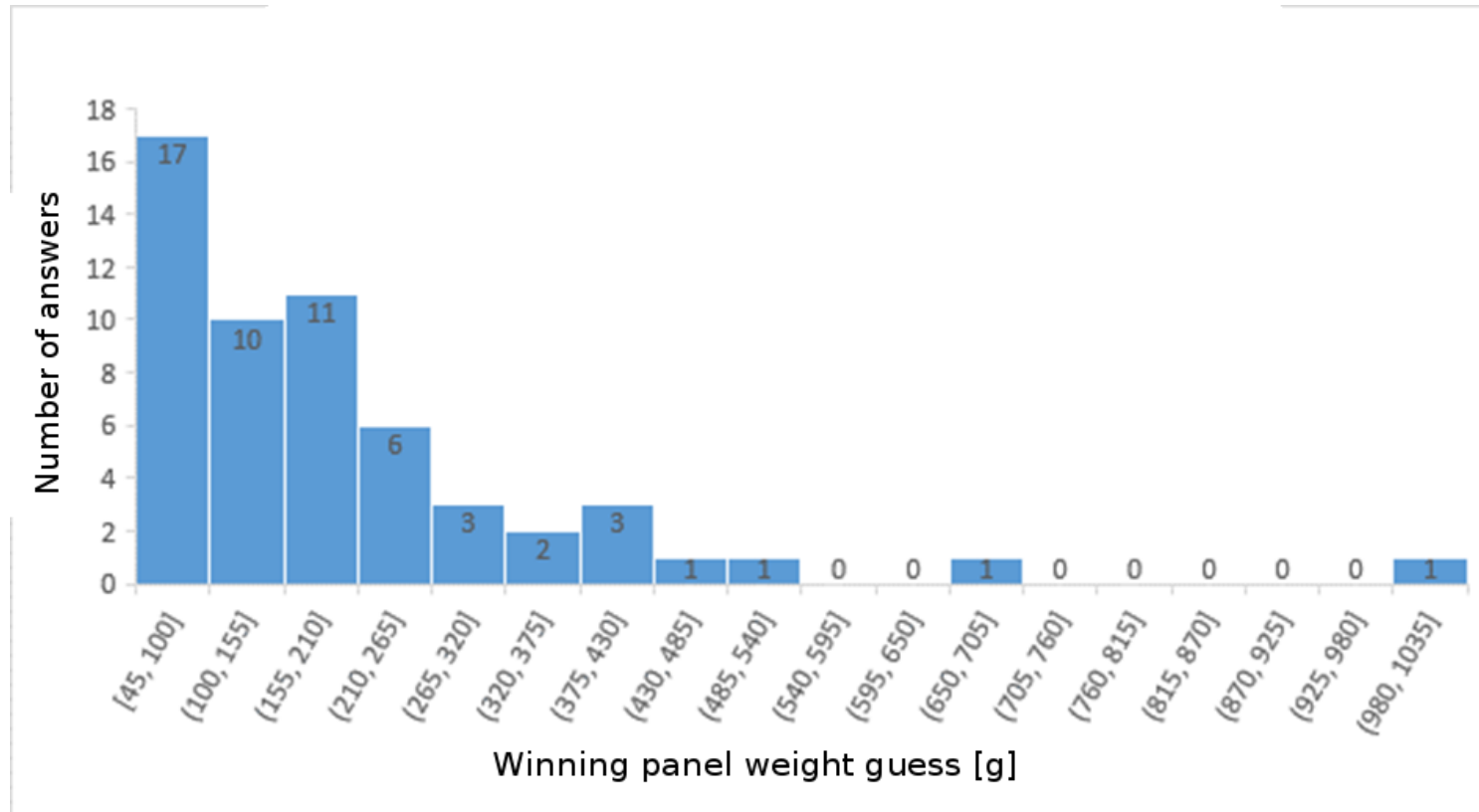
Special gift

Special gift

How many grams will the winner weight?

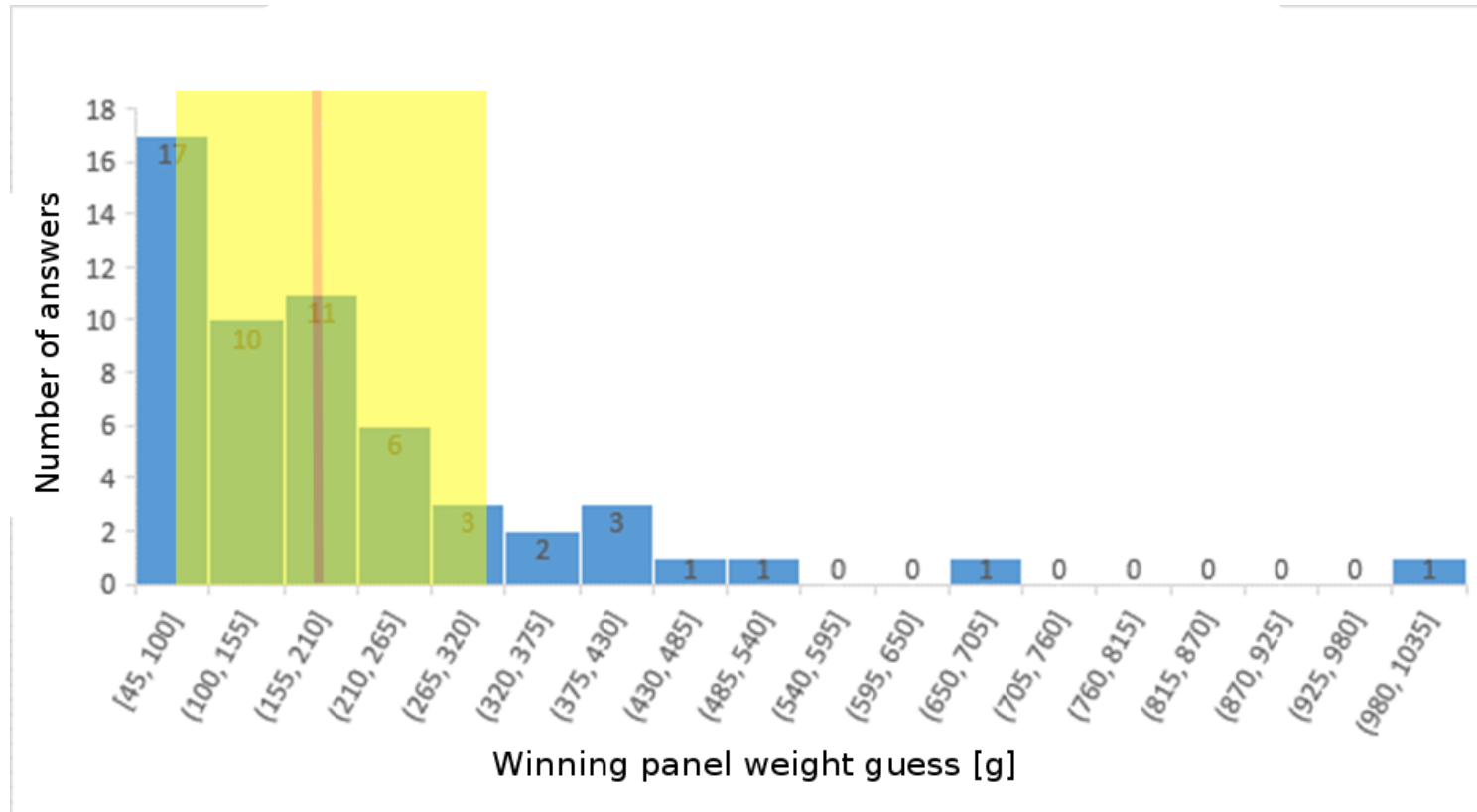


We asked 57 students

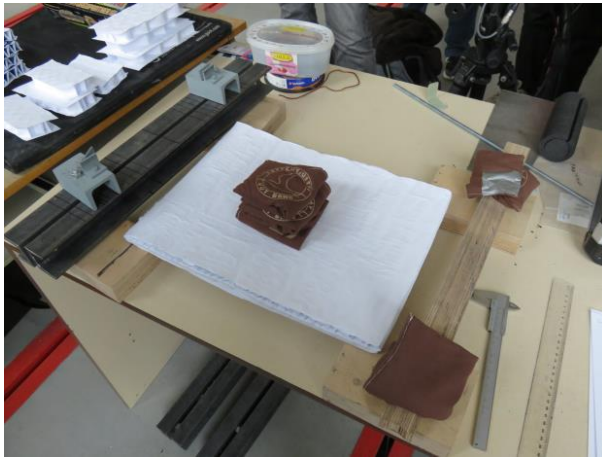


Who were right if

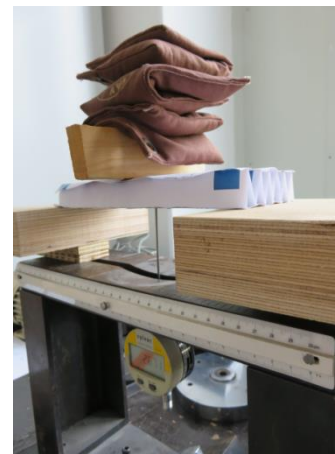
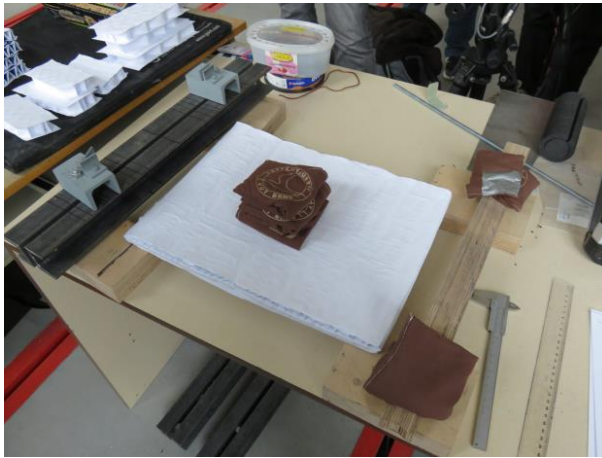
the mean value was 187 g and standard deviation 127 g?



Of course organizers experimented a bit before all that



Of course organizers experimented a bit before all that



Schedule

Tue	8. 11.	Promotion and registration start
Wed	9. 11.	
Thu	10. 11.	
Fri	11. 11.	
Sat	12. 11.	
Sun	13. 11.	
Mon	14. 11.	
Tue	15. 11.	
Wed	16. 11.	
Thu	17. 11.	
Fri	18. 11.	
Sat	19. 11.	
Sun	20. 11.	
Mon	21. 11.	
Tue	22. 11.	
Wed	23. 11.	
Thu	24. 11.	



Schedule

Tue	8. 11.	Promotion and registration start
Wed	9. 11.	
Thu	10. 11.	Capacity is full
Fri	11. 11.	
Sat	12. 11.	
Sun	13. 11.	
Mon	14. 11.	
Tue	15. 11.	
Wed	16. 11.	
Thu	17. 11.	
Fri	18. 11.	
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Schedule

Tue	8. 11.	Promotion and registration start
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Thu	10. 11.	Capacity is full, capacity increased
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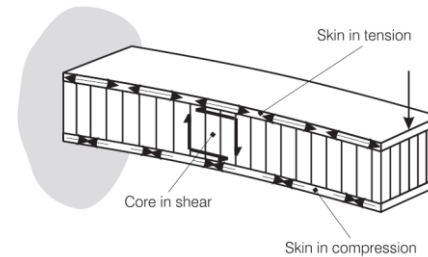
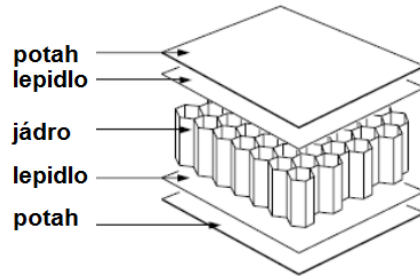
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Fri	11. 11.	
Sat	12. 11.	
Sun	13. 11.	
Mon	14. 11.	Final capacity reached – 30 teams (67 students)
Tue	15. 11.	
Wed	16. 11.	
Thu	17. 11.	
Fri	18. 11.	
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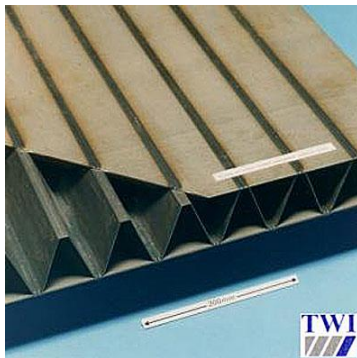
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Mon	21. 11.	
Tue	22. 11.	
Wed	23. 11.	Manufacturing deadline
Thu	24. 11.	Final day

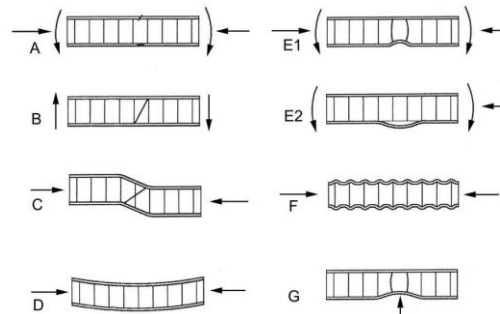
Students got basics of sandwich structures



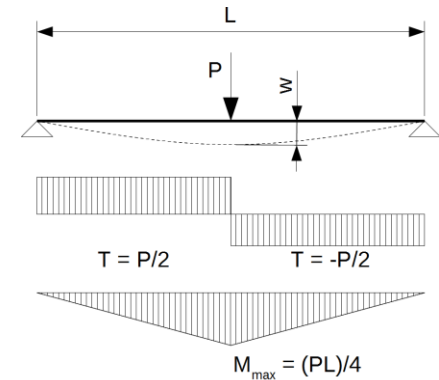
<http://hexcel.com/resources/technology-manuals>



http://www.designforlasermanufacture.com/17/Lightweight_sandwich_panel.html



Space engineering: Insert design handbook. ECSS-E-32-22A. ESA-ESTEC 2011 Noordwijk Netherlands



First, they thought and measured,



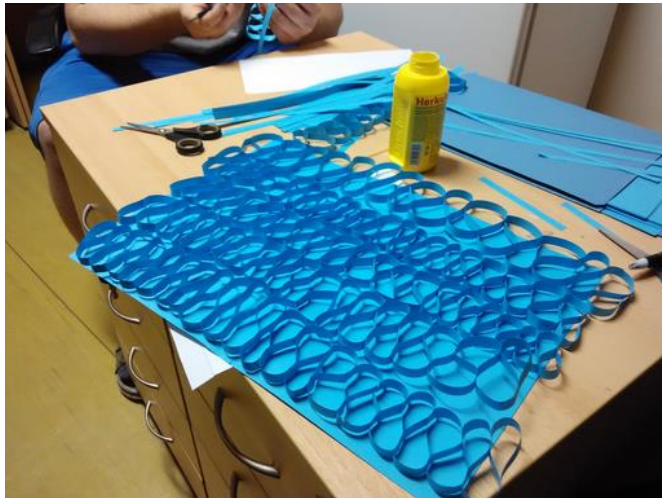
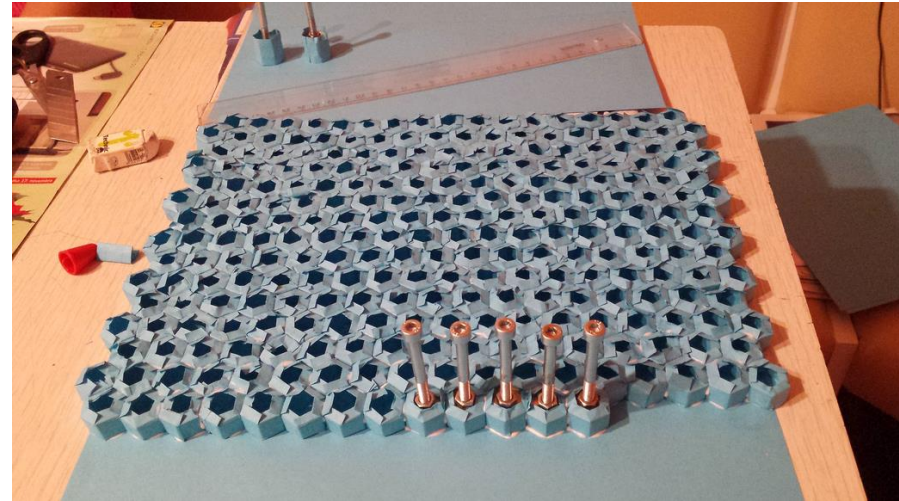
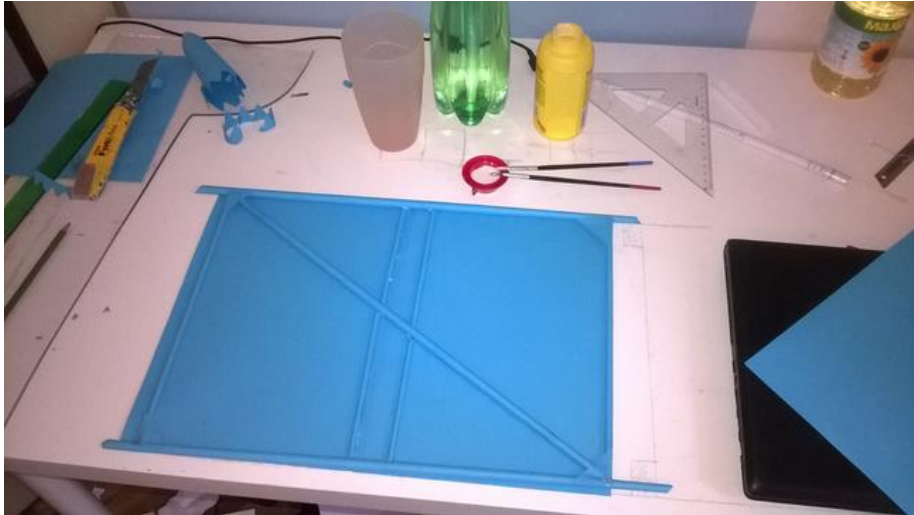
than worked hard,



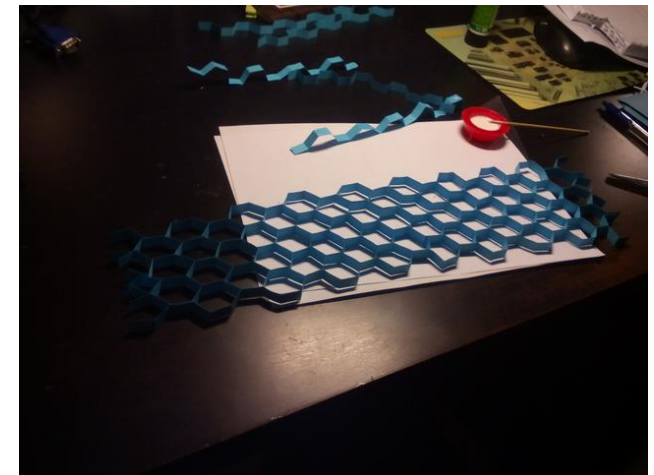
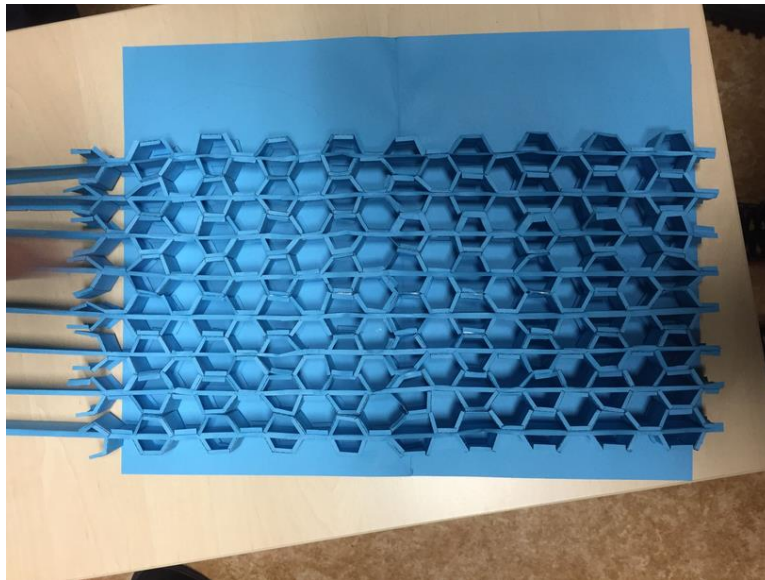
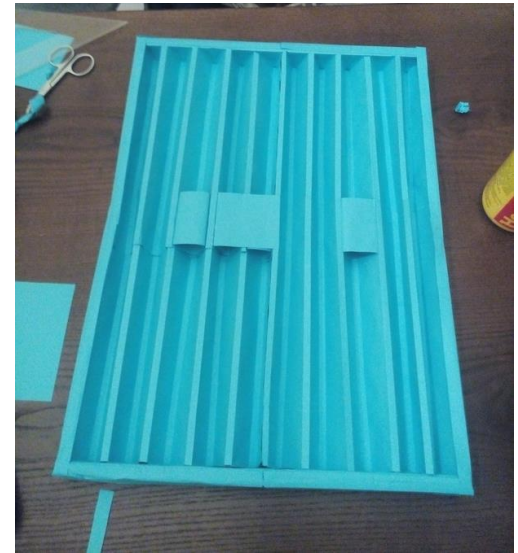
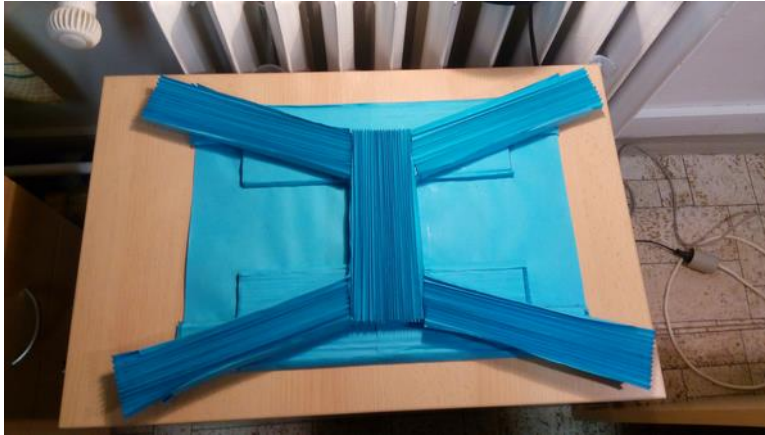
spent a lot of glue,



used different concepts,



many different concepts,



and experimented by themselves.



For submission panels had to pass through
25 mm thick measure



For most of them this was a formality,



but one team needed strong hands



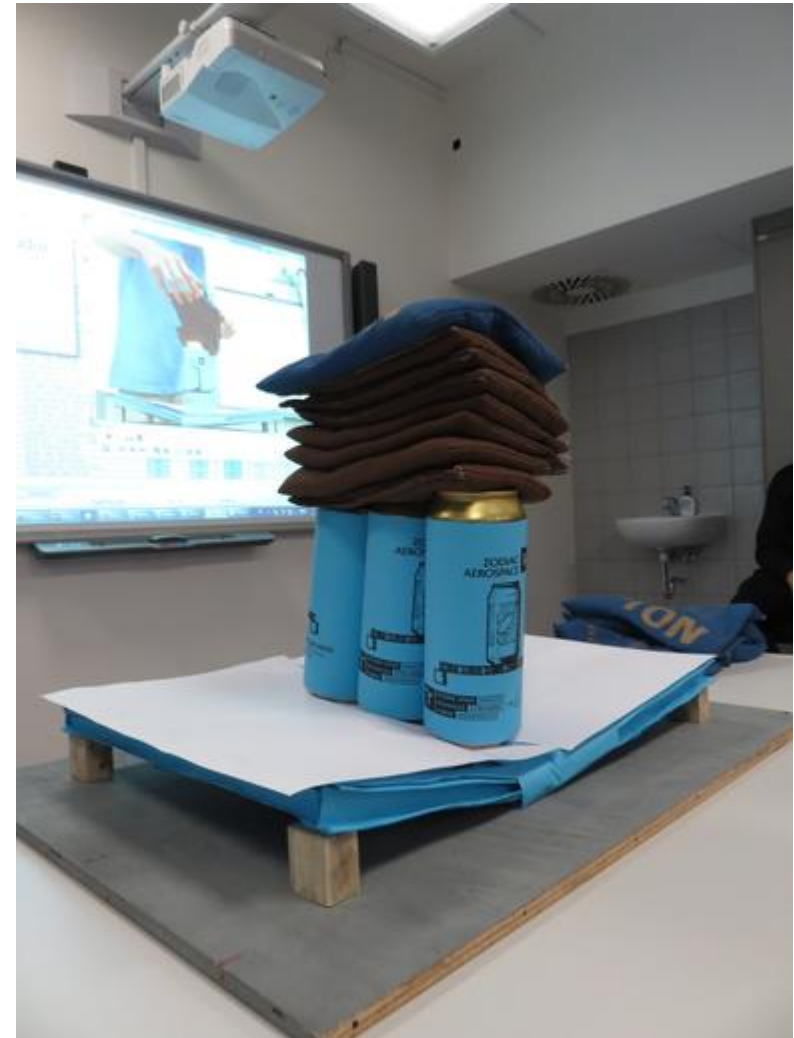
At the final day
we started to test from the heaviest
(332 g)



Almost all the panels withstood prescribed load



and broke later



Some panels were so over-dimensioned that we didn't have enough weight



But if a crowd...



...wants to see a breakage...



...wants to see a breakage...



The last team “Jaký je plán” (What’s the plan)
presented a panel weighting only 52 g,



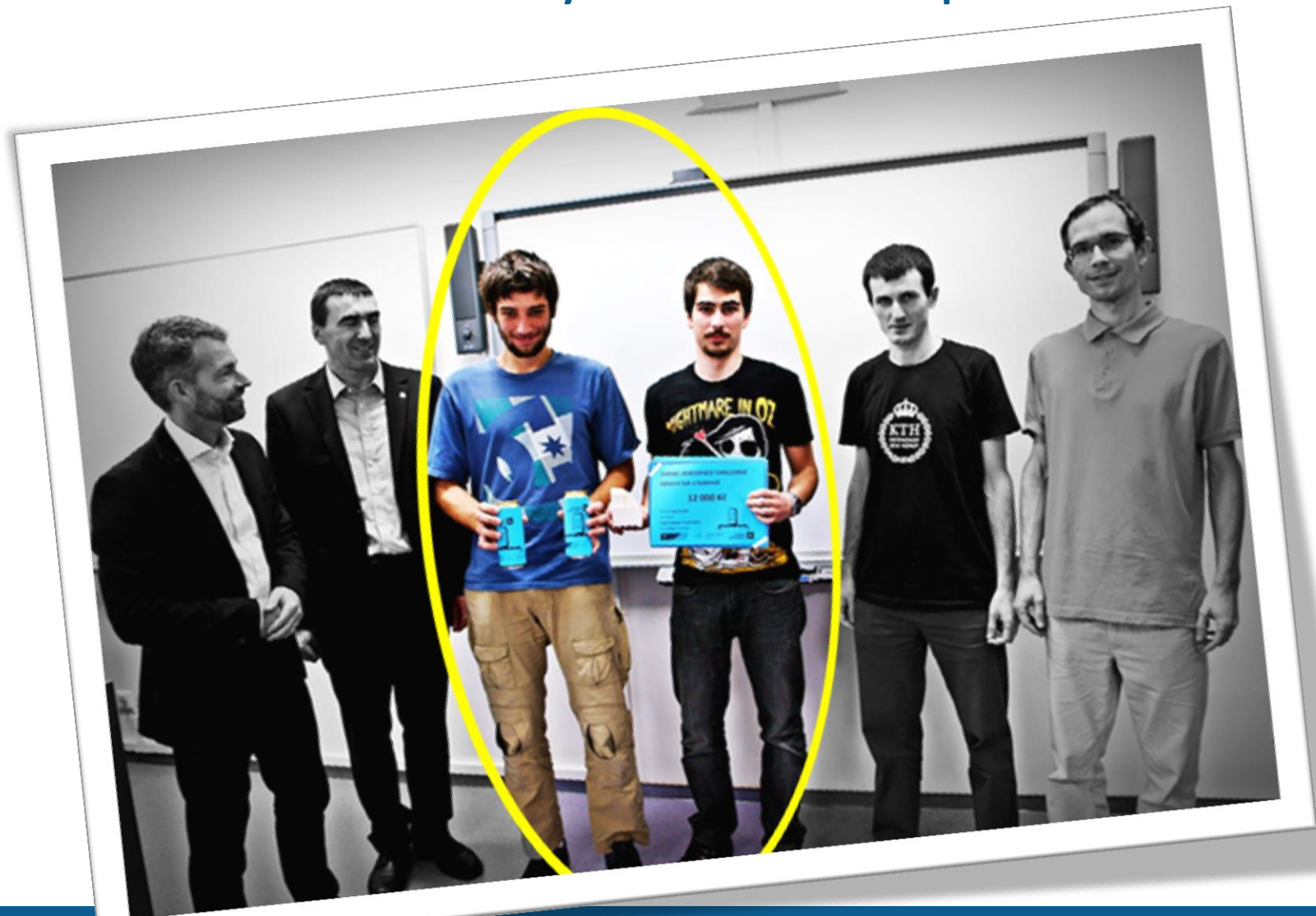
with a tubular frame structure



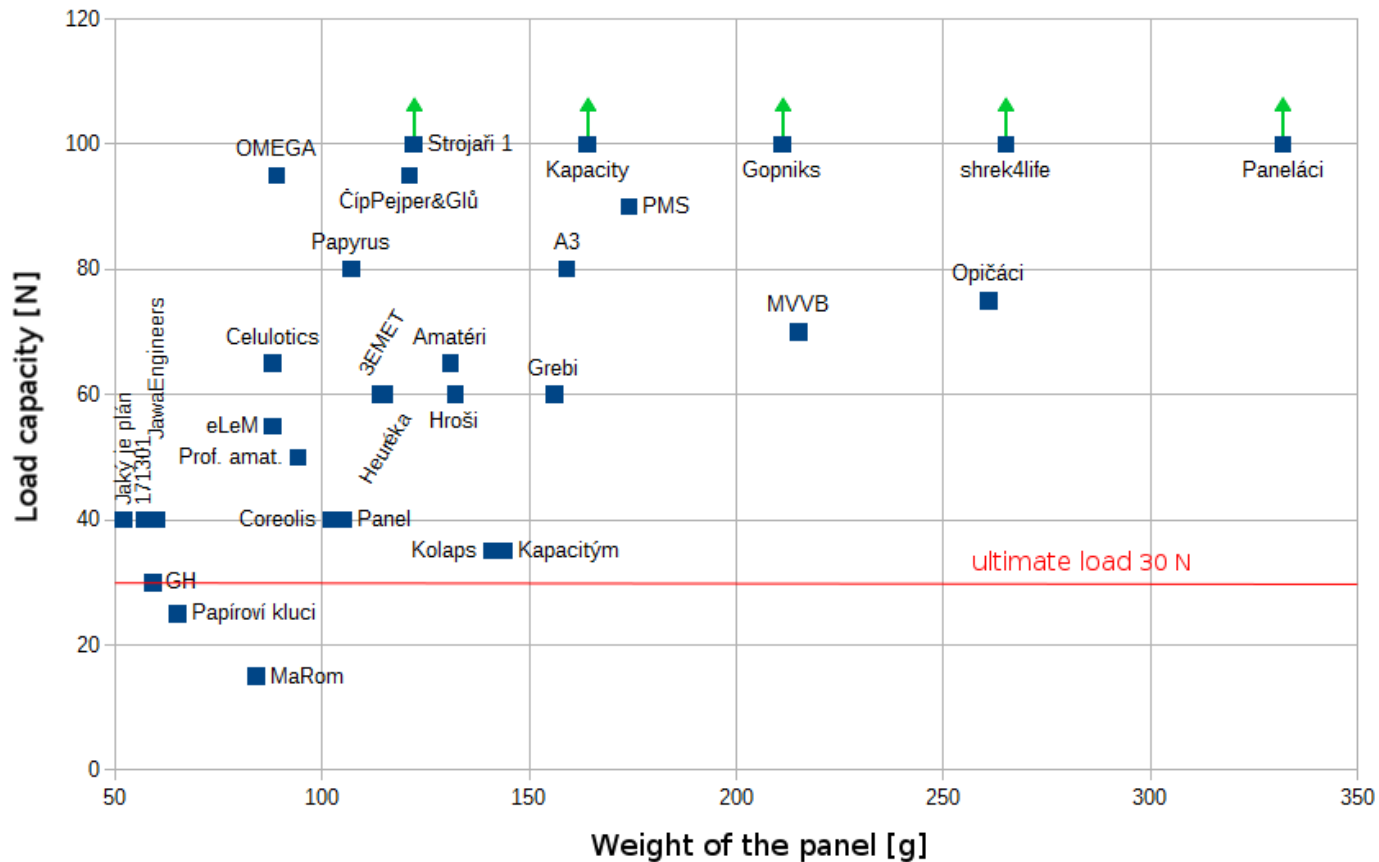
withstood 40 N,



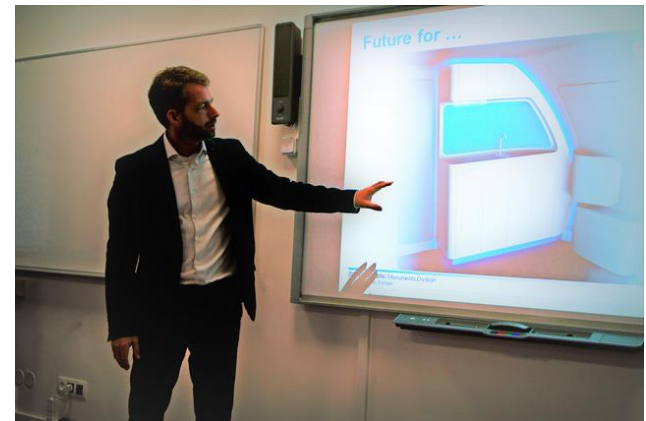
and really won the 1st prize



Make note that several teams were quite close to them



Moreover, engineering director from Zodiac Aerospace in Netherlands gave us an interesting presentation



That's all.

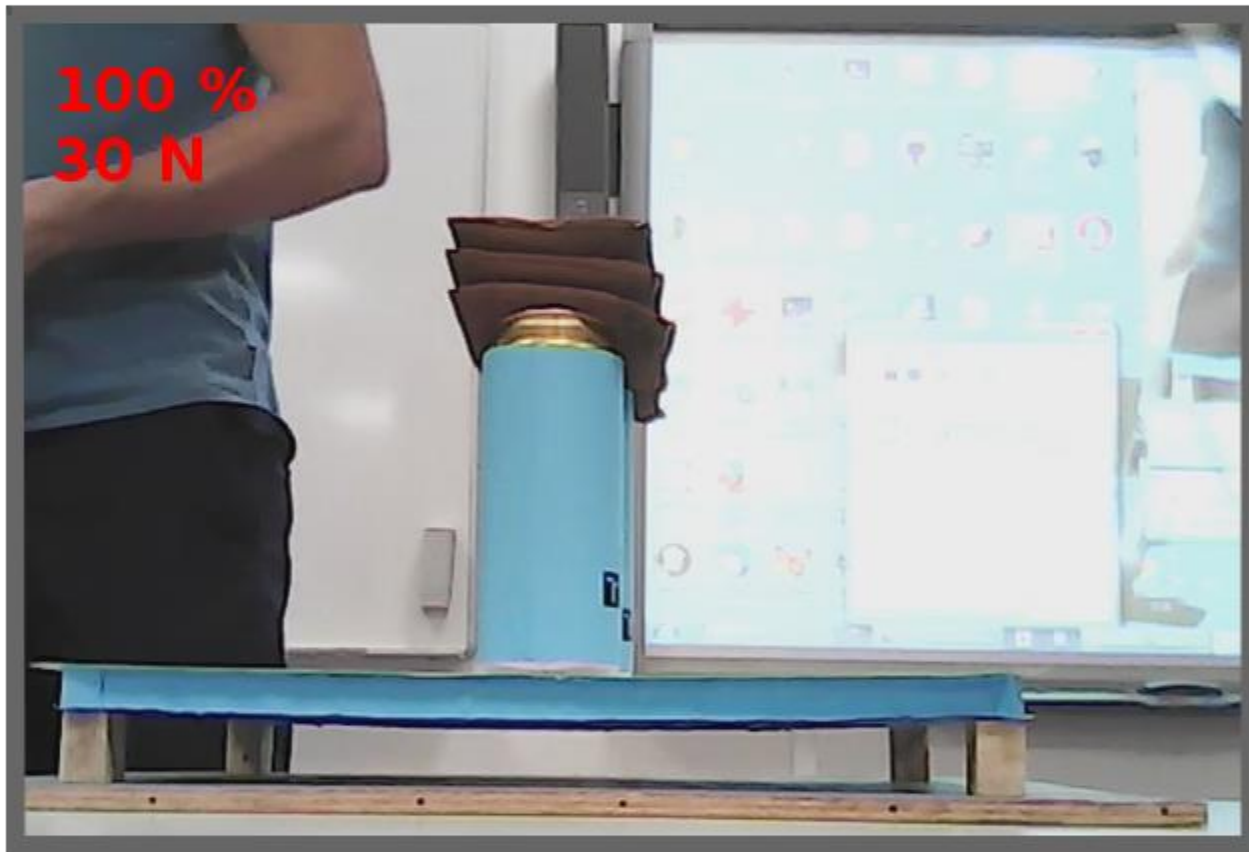


That's all.

However, there was a man who wanted to know
how much is needed to break the heaviest
panel.



Heaviest sandwich panel (332 g)



Heaviest sandwich panel (332 g)



Heaviest sandwich panel



High payload





H

1283 %
385 N

1583 %
475 N

54°C

H

1283 %
385 N

2316 %
695 N

1583 %
475 N



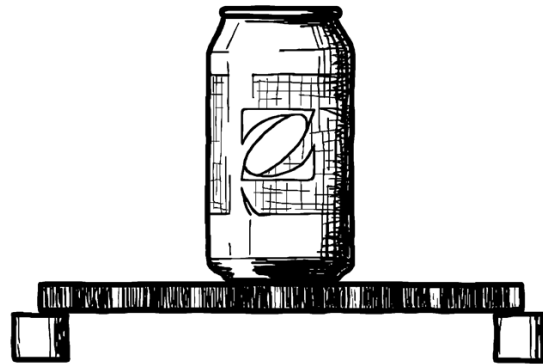
...finally!





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The competition was supported by:

**ZODIAC
AEROSPACE**





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Institute of Aerospace
Engineering

Thank you for your attention

Vysoké učení technické v Brně
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