



STRENGTH PROPERTIES OF AL2519/TI6AL4V BIMETALL FABRICATED BY EXPLOSIVE WELDING

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New advanced layer Al-Ti materials with enhanced ballistic resistance for aeronautic and space constructions

Presentation plan

1. *Application*
2. *Tested materials*
3. *Performed studies*
4. *Heat treatments*
5. *Analysis of obtained results*
6. *Conclusions*



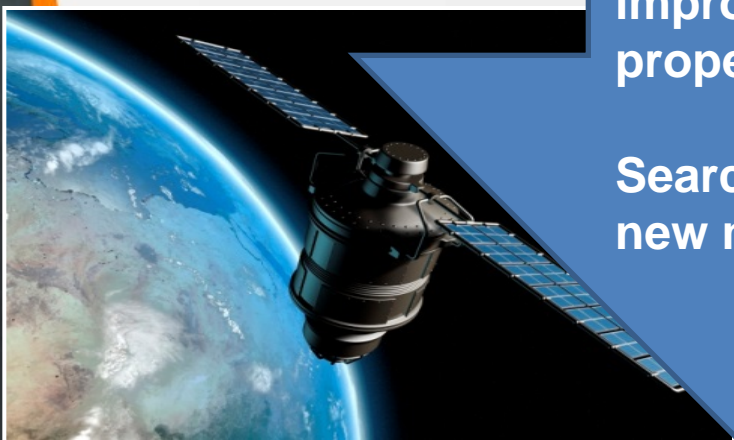
Application of lightweight materials



**Weight
reduction=
cheaper
exploitation**



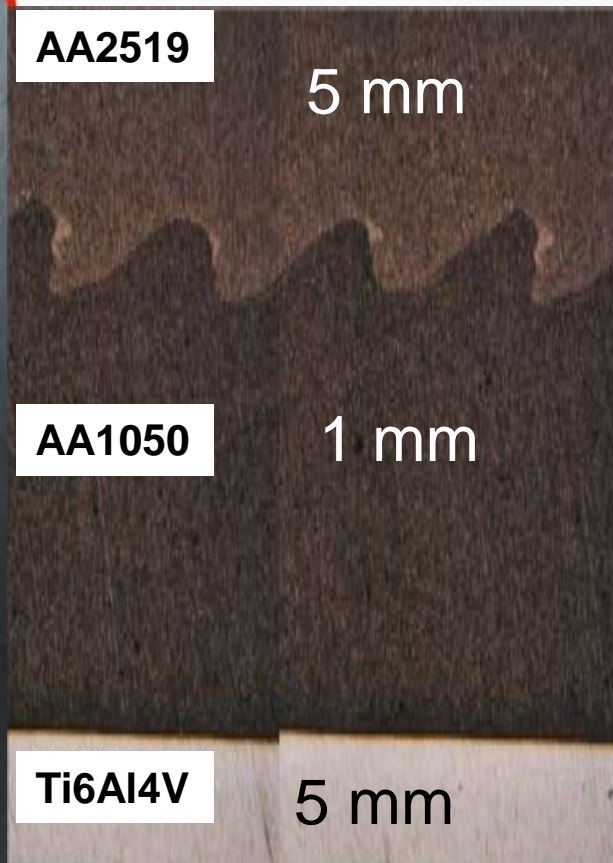
**Maintain or
improving the
properties**



**Searching for
new materials**



Application of lightweight materials



Material	Cu, %	Mn, %	Si, %	Fe, %	Al, %	R _m , MPa	R _{p0,2} , MPa	A, %	ρ, g/cm ³
AA2519	6,2	0,4	0,25	0,5	Rest	430	355	15	2,7

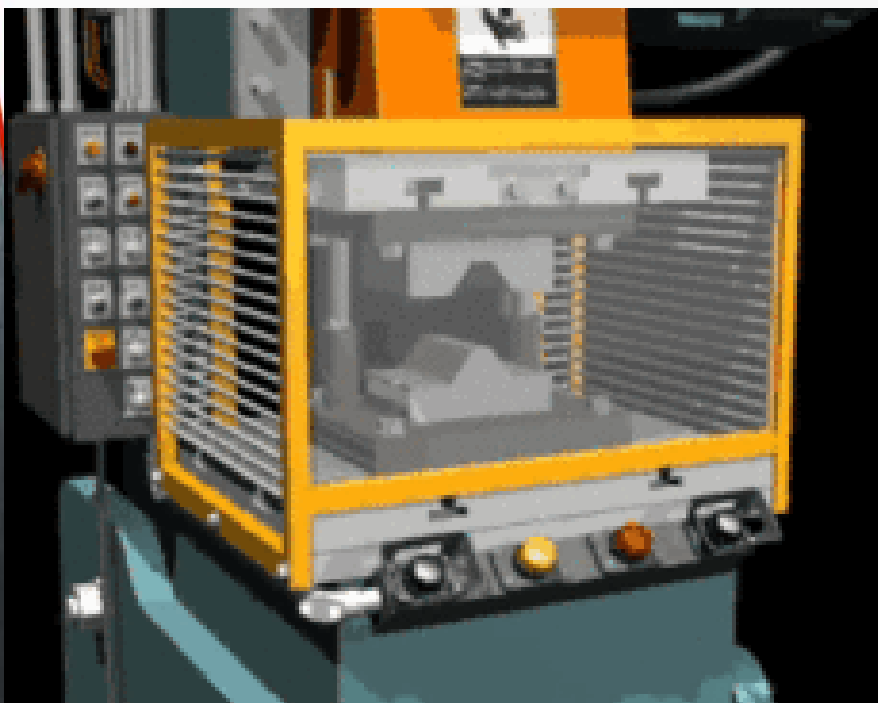
Material	Cu, %	Mn, %	Si, %	Fe, %	Al, %	R _m , MPa	R _{p0,2} , MPa	A, %	ρ, g/cm ³
AA1050	0,04	0,04	0,24	0,27	Rest	125	85	12	2,7

Material	C, %	N, %	V, %	Al, %	Ti, %	R _m , MPa	R _{p0,2} , MPa	A, %	ρ, g/cm ³
Ti6Al4V	0,1	0,05	4,5	6,75	Rest	860	758	10	4,5

Application of lightweight materials as housings



Application of lightweight materials as housings

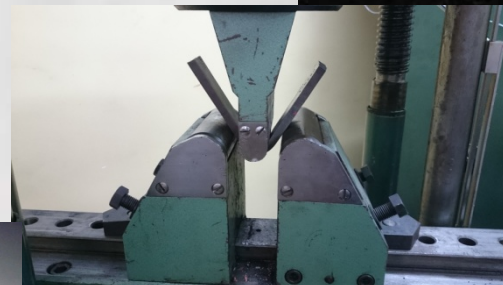
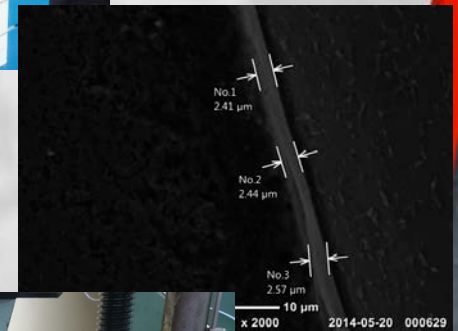




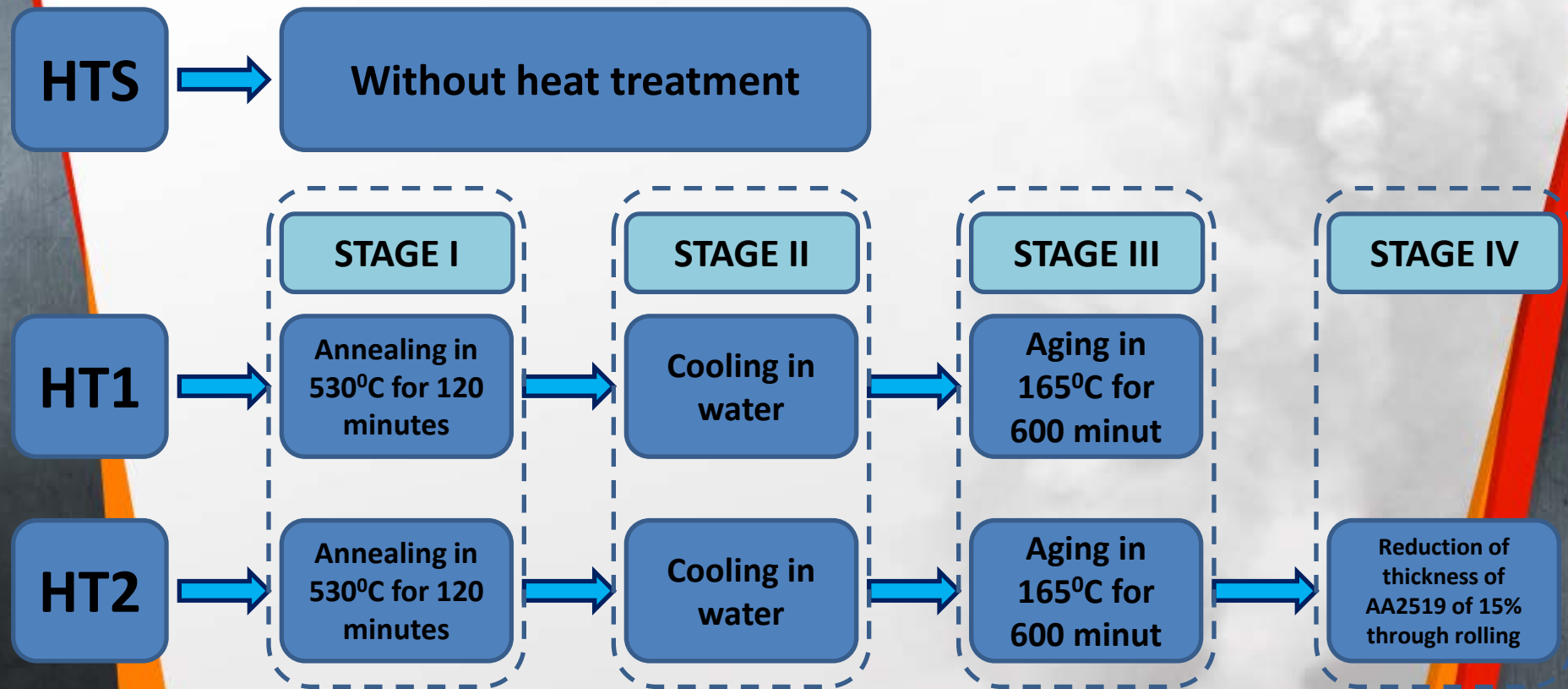
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Experimental procedure

- Simulated heat treatments
- Tensile test
- Ram test
- Bend test with force measurements
- Hardness measurements

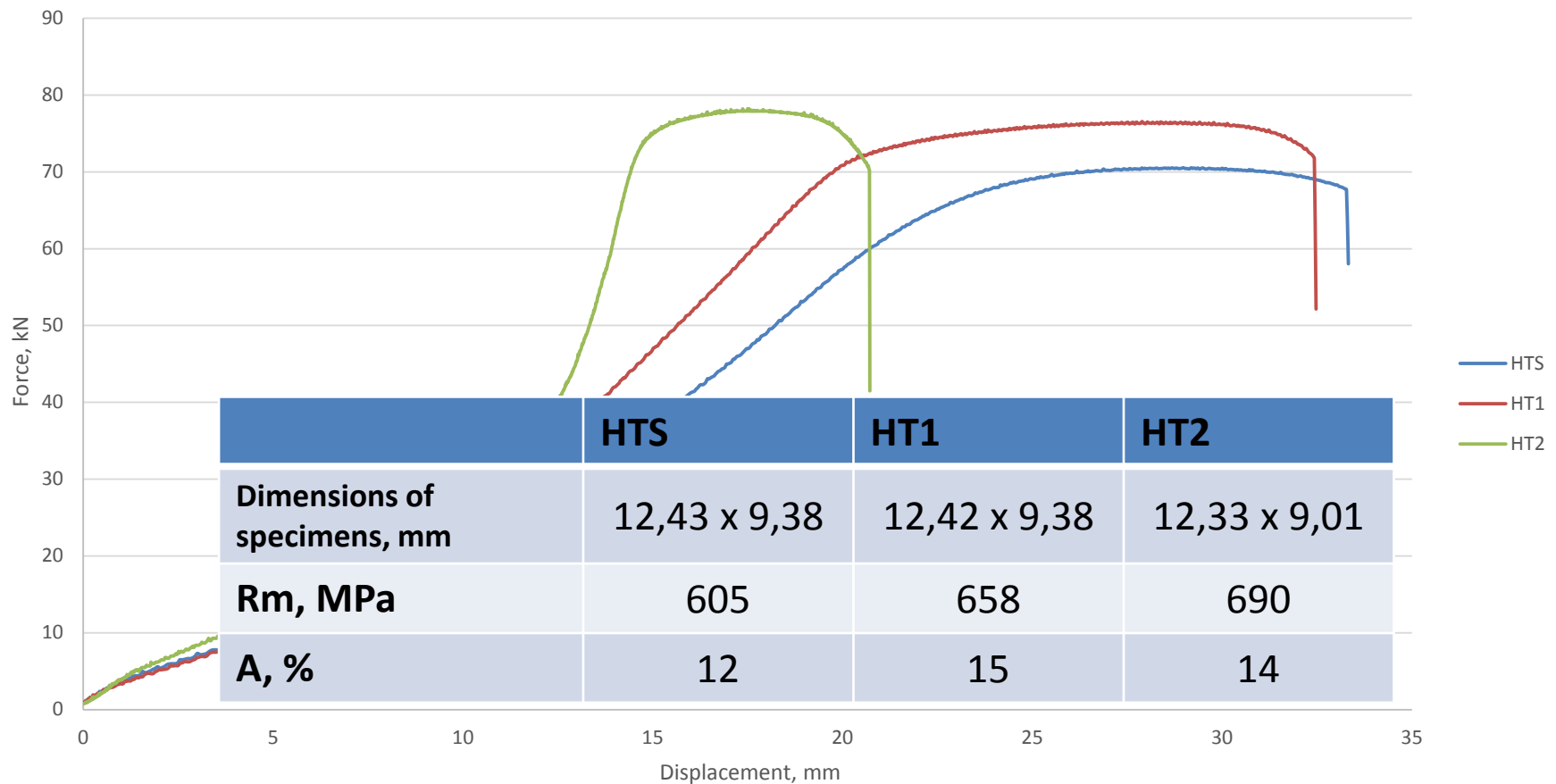


Simulated heat treatments



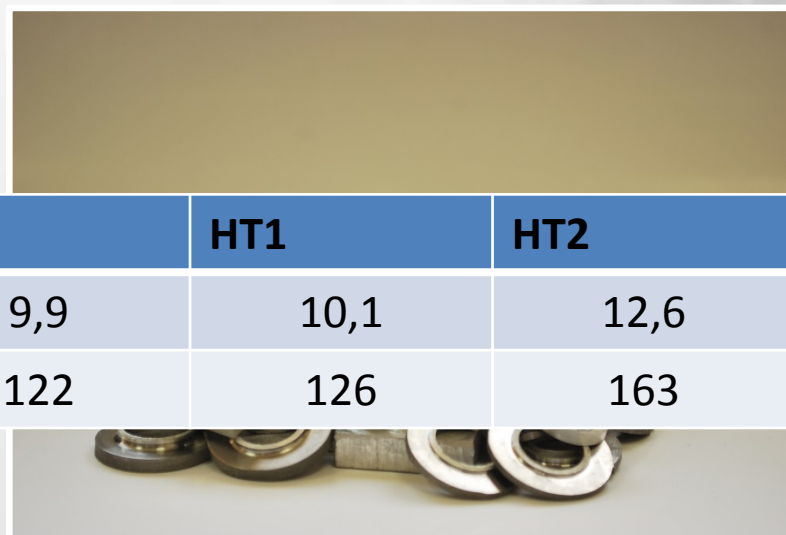
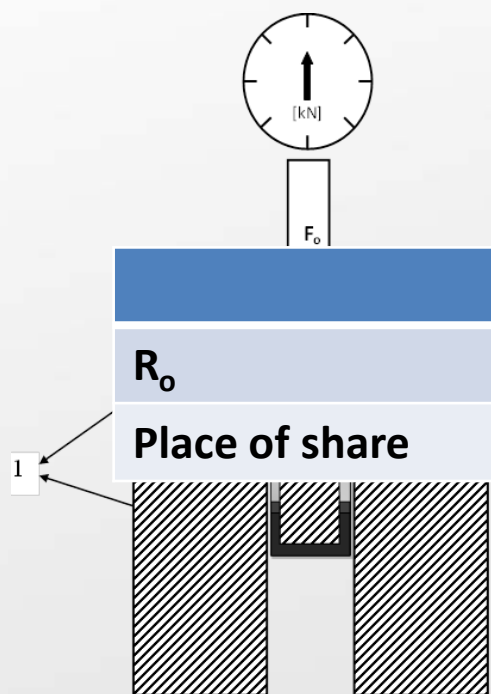
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Tensile test



Nowe zaawansowane materiały warstwowe Al-Ti o podwyższonej odporności balistycznej na konstrukcje lotnicze i kosmiczne

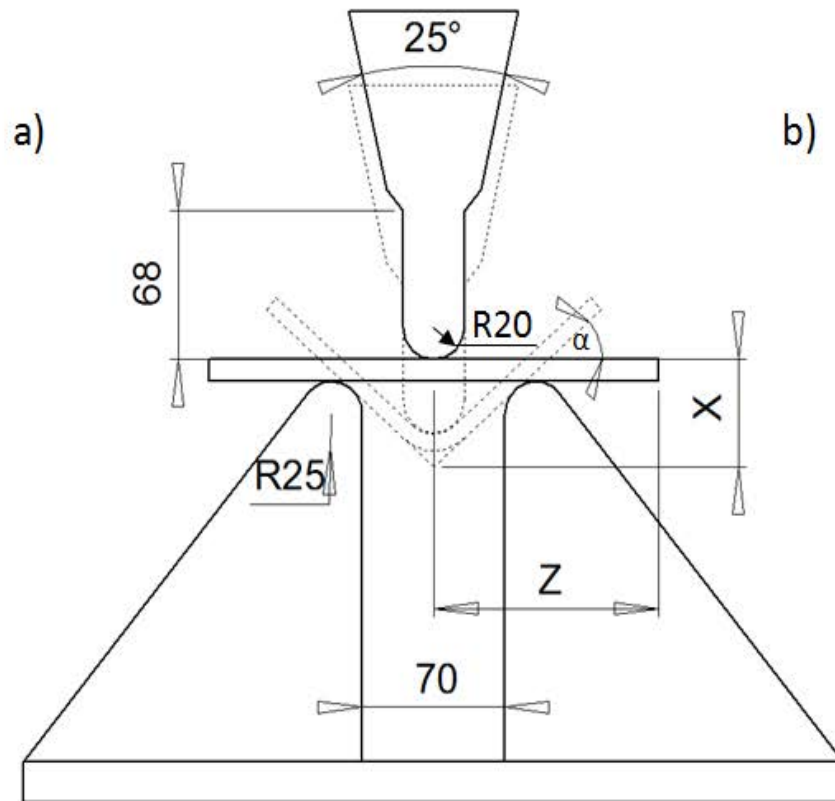
Ram test



	HTS	HT1	HT2
R_o	9,9	10,1	12,6
Place of share	122	126	163

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Bend tests



b)

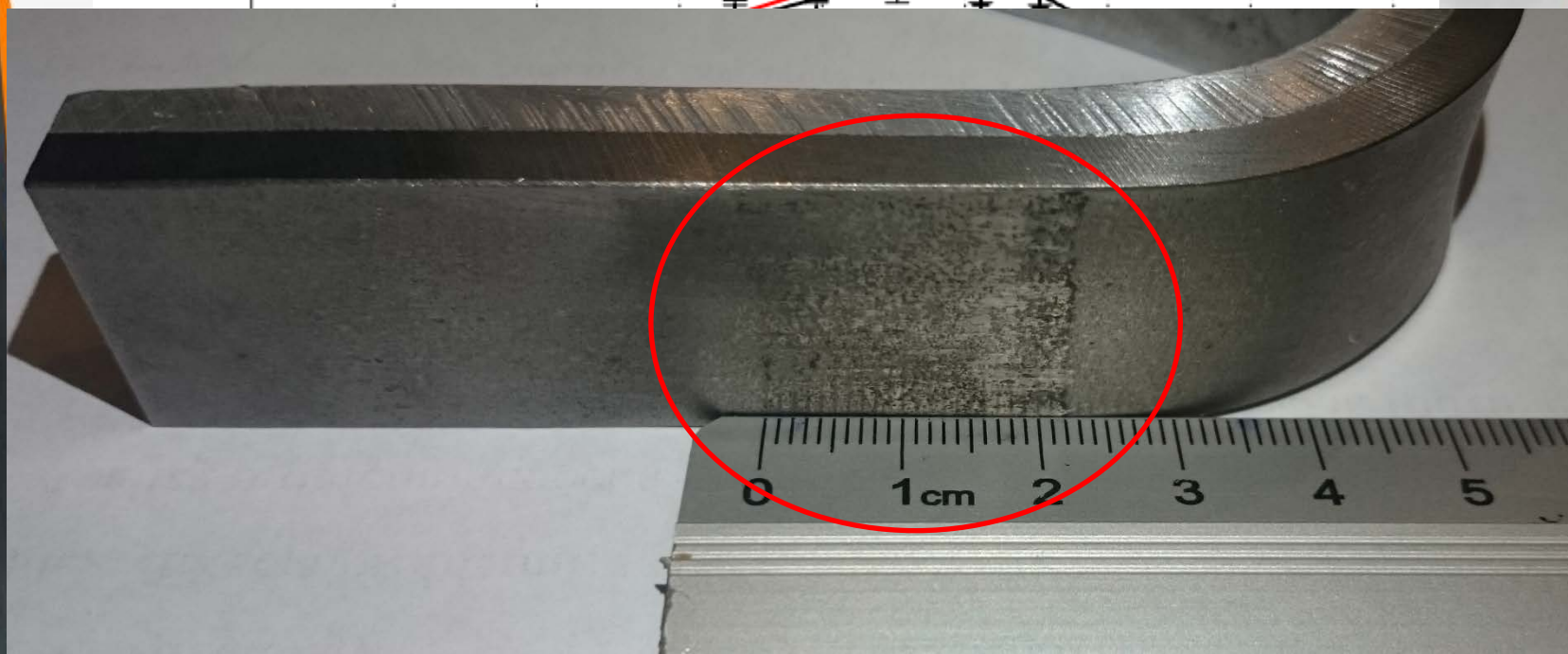
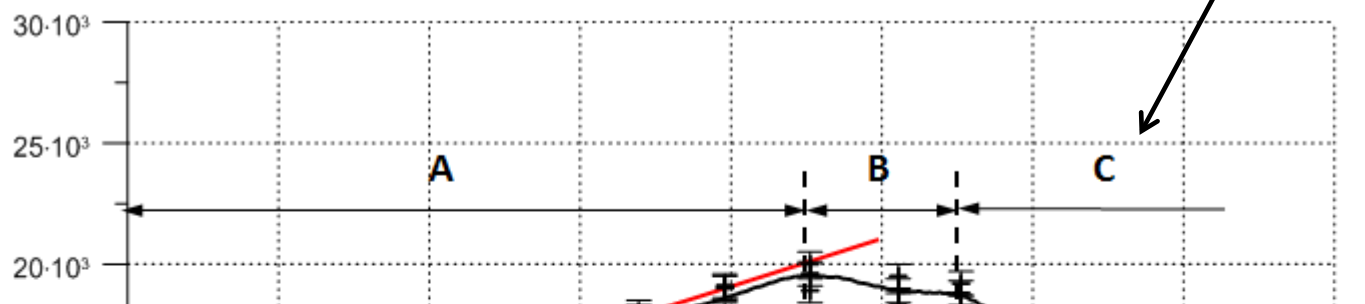




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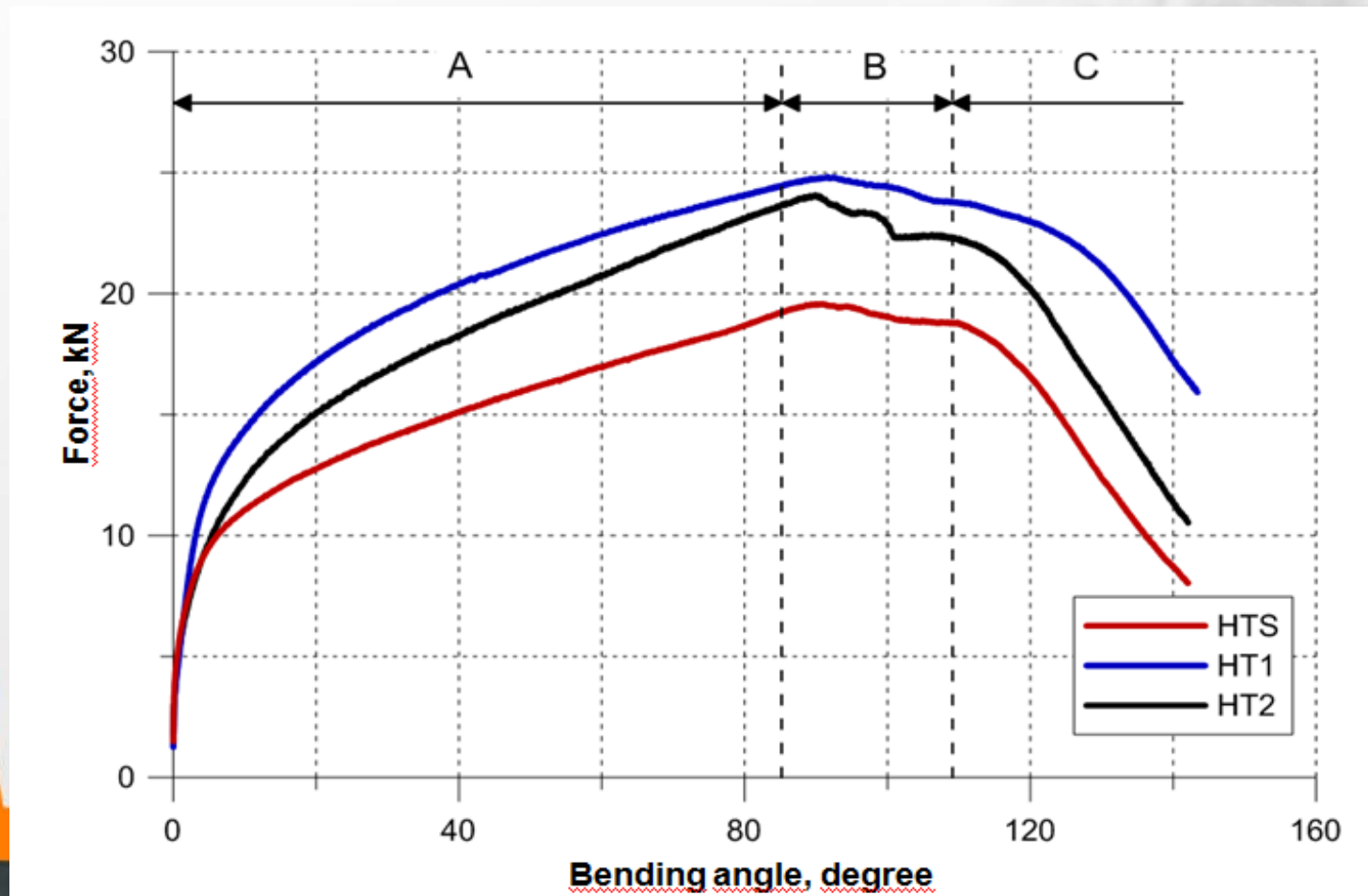
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Bend tests



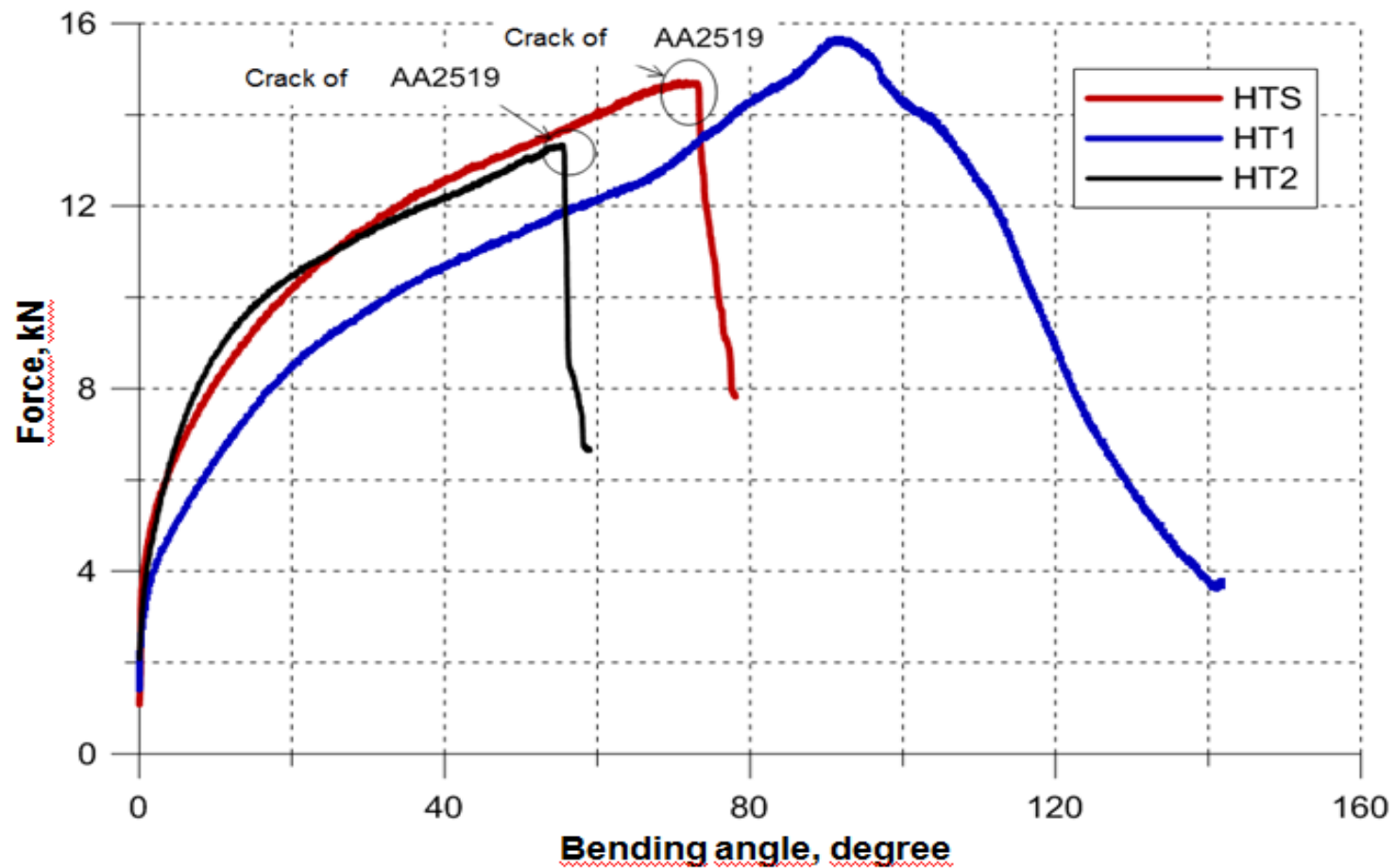
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Bend test - tensile Ti6Al4V layer



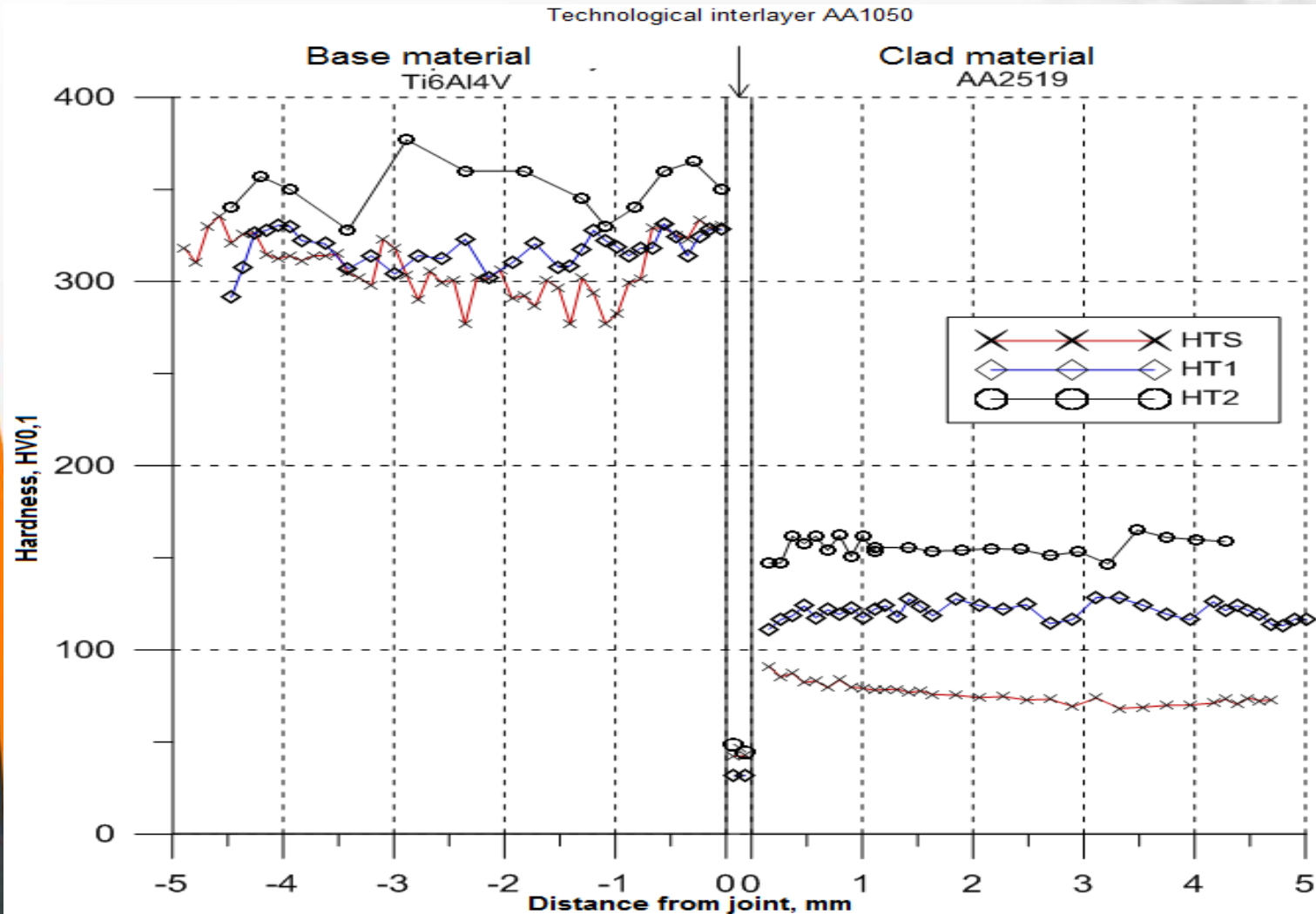
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Bend test - tensile AA2519 layer



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Hardness measurements





Conclusions

- **proposed heat treatments conditions and operations like rolling have significant impact on tensile strength, ram strength, force used to bending and hardness of individual layers of the studied trimetal;**
- **the highest tensile strength and ram strength, as well as proper hardness was obtained for HT2;**
- **it is possible to use the obtained knowledge for proper designing of sequence of shaping stages of such claddings, which allows both plastic shaping of these sheets and obtaining desired increased strength and hardness without risk of damage potentially resulting from deformations related to production processes.**



ZAKŁAD TECHNOLOGII WYSOKOENERGETYCZNYCH
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Thank you for the attention!



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