CONTACT RESISTANCE BONDING IMPORTANCE

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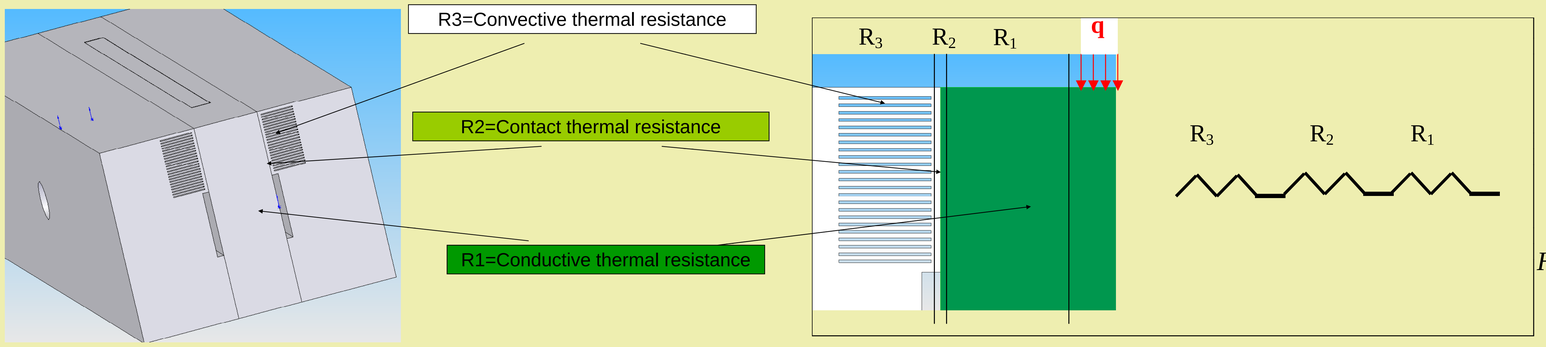
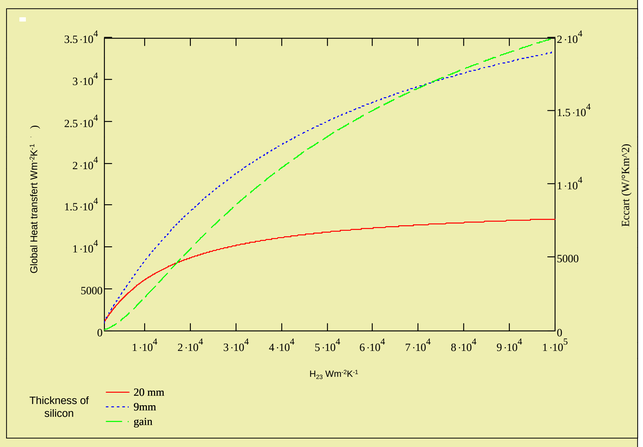
Because of practical reasons, optical devices are often cooled by bonding systems. Thermo-mechanical deformation amplitude of optical devices is given by thermal contact resistance. Therefore, we developed a mathematical model from M. Yovanovich theories. That tool gave us the opportunity to compare several solutions in order to improve the interface heat transfer (« foil », « coating »…).

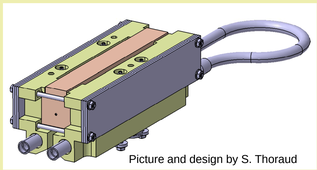
Thermal resistance crossed by input power and influence of contact resistance



$$H_i = \frac{1}{R_i}$$

$$Hglob < \frac{1}{0{,}065 \quad 10^{-3} + \frac{1}{H_{23}}}$$




Picture and design by S. Thoraud

In order to improve the contact heat transfer, we use the M.M. *YOVANOVICH's theory

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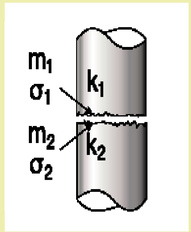
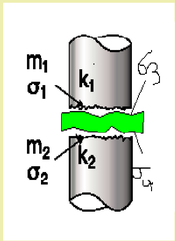
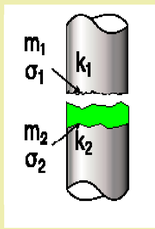


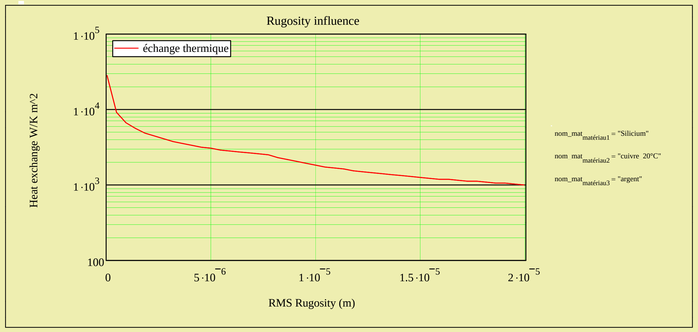
Direct contact



Contact with insertion of a soft metal foil



Contact with insertion of coated joint



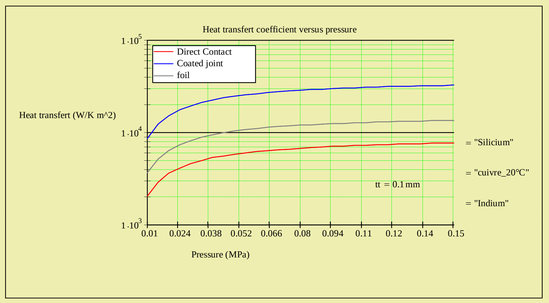
$$H(k, H_v, \sigma, E_{substrate}, \nu_{substrate}, \text{Pressure, foil or coating property})$$

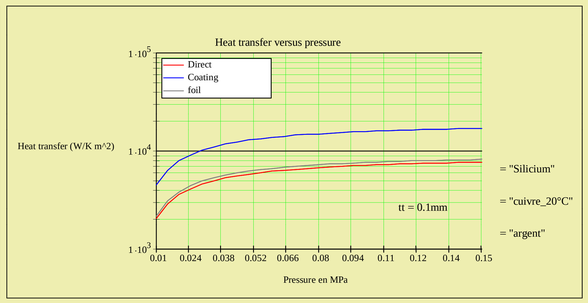
Rugosity

Hardness Brinel

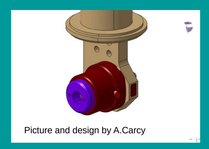
Conductivity

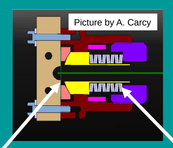
Heat transfert coefficient

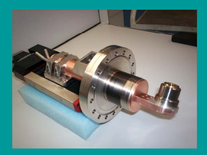




« White beam monitor » application

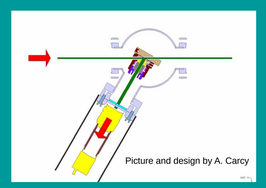

Picture and design by A.Carcy


Picture by A. Carcy



Coated joint (Si-Ag-Cu)

Pressure control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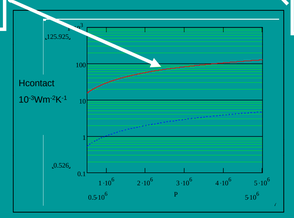

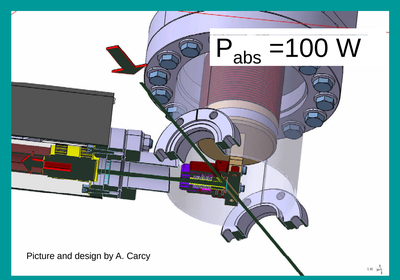
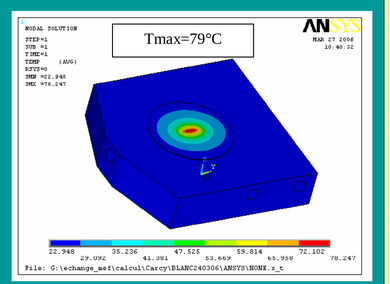
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