



Development of a conservation compatible window

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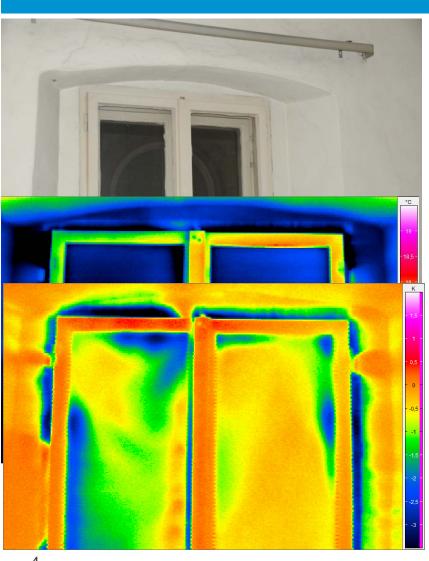


Conservation compatible window



Windows in the building stock





... are usually

- not thermally insulating
 - e.g. CS1 Waaghaus / Bozen:
 - \rightarrow 33 kWh/m² = 11% of total

transmission losses

- not airtight
 - e.g. CS1 Waaghaus / Bozen:
 - \rightarrow ~40 kWh/m²



What to do?



- original windows with heritage value
- restoration of the existing window
- if original windows have already been replaced – as e.g. in 3ENCULT CS1
- new energy efficient and aesthetically fitting window







This was the challenge for ...





3ENCULT Partner André Menuiserier Andre with their development expert Franz Freundorfer

... in close collaboration with the consortium!



1st meeting at CS1



with Mrs. Kofler Engl, the director of the regional conservation aurohority in Bozen to understand

- → the specific demands of CS1, the Public Weigh House
- → But also "typical" demands
- Window size is typical for a baroque window
- Since the windows had been changed in the mid of the 20th century and there is no documentation about the original ones, the conservator recommends a "baroque" window, as typical for the region:
 - Two sashes with two sash bars each
 - Both box-type and coupled window are possible
- Documents & drawings



Workshop in Bozen











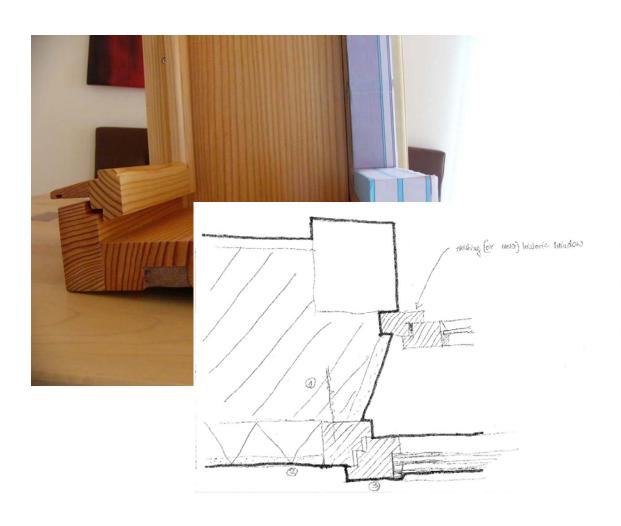


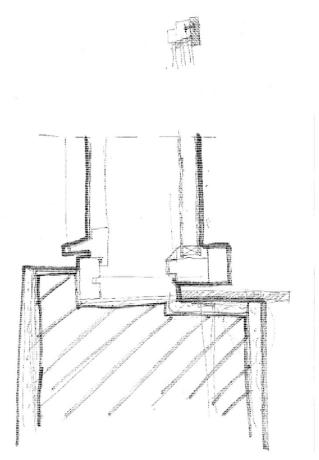




Workshop in Bozen





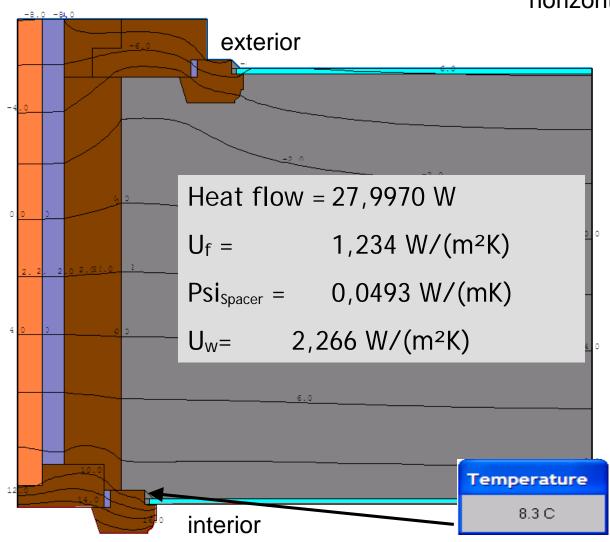




... start of simulation with the profile of a historic casement window



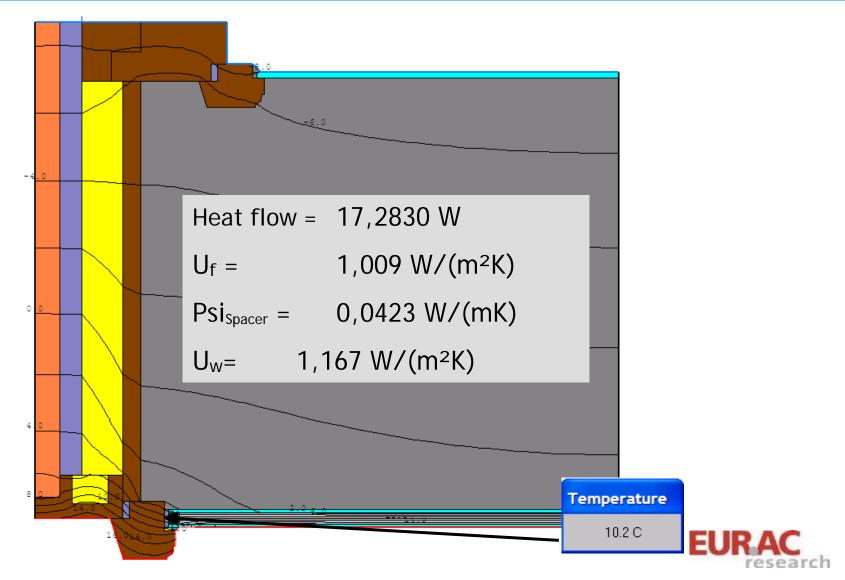
horizontal cross-section





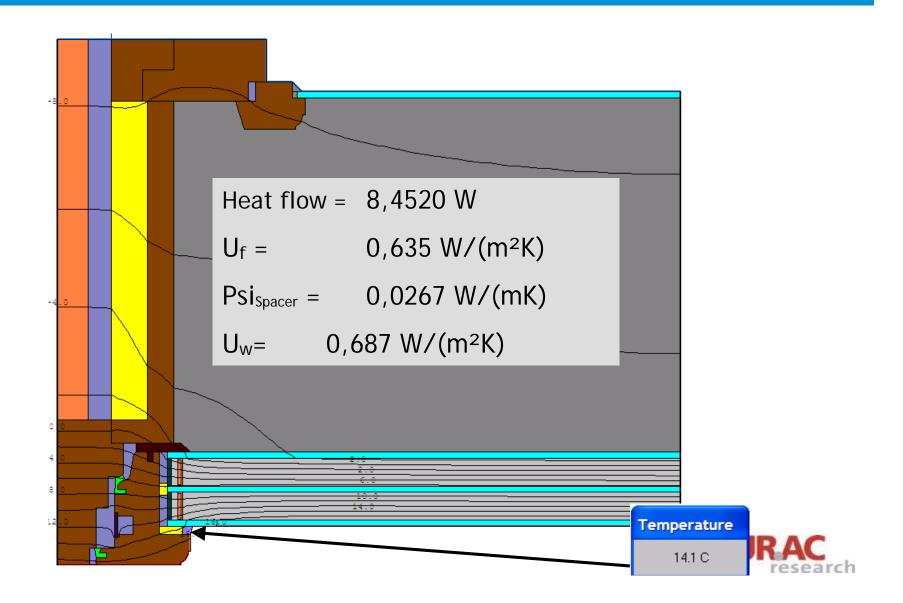
... first variant with thermal pre-tensioned thin window glass





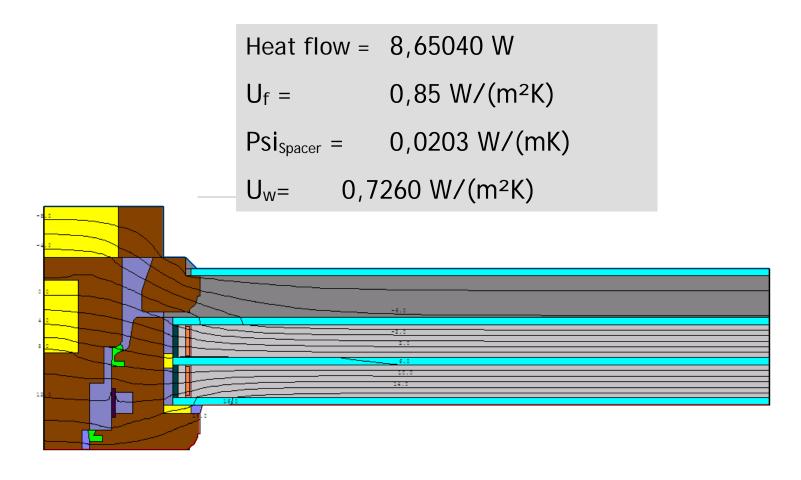
... second variant with Passive House Quality





... simulation of compound window





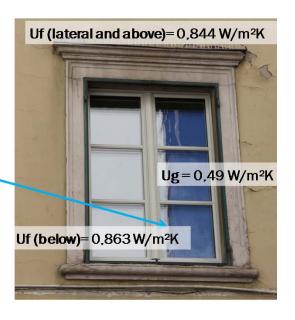


1st prototype for CS1, the Weigh House





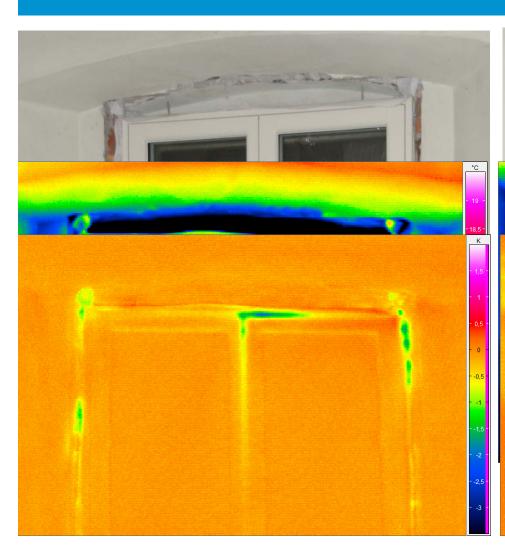


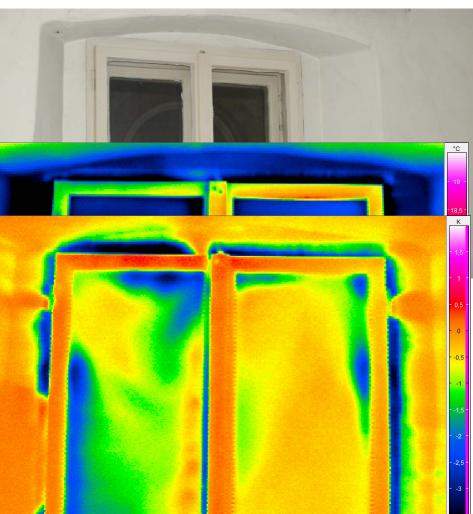




Efficiency of the prototype









Feedback from conservator



"I do have overall a positive impression as regards frame & sash bar dimension as well as subdivision & proportions.

The optic of the outer glazing seems to me exaggerated, both the too irregular reflection from outside, and distortion from inside. And I ask whether a 3-pane glazing for Bolzano climate is really needed.



Frau Dr. Waltraud Kofler Engl



2nd prototype



Using thin glass → 2mm!

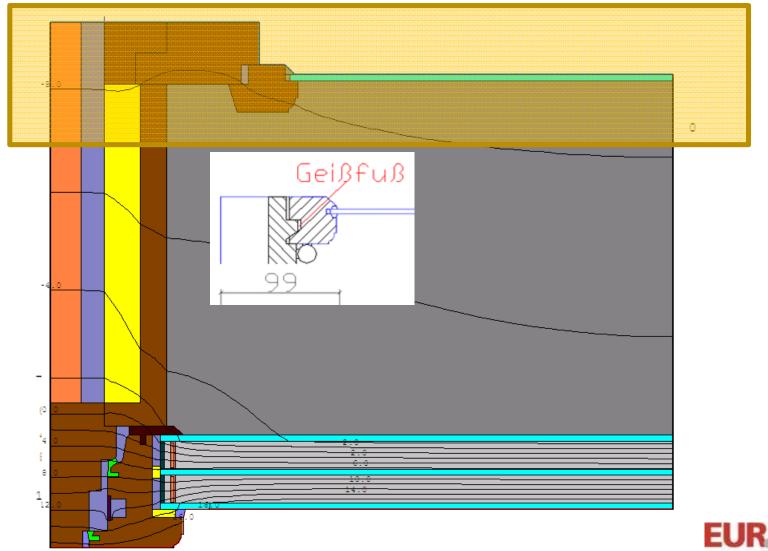
- 2+8+2+8+2
 - = 22 mm
- 4+12+4
 - = 20 mm





Flexibility of the concept 3encult

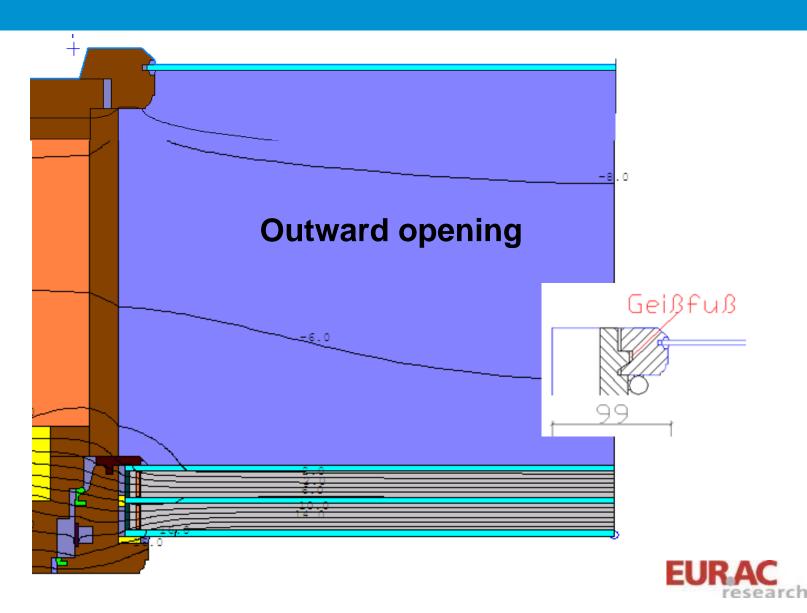






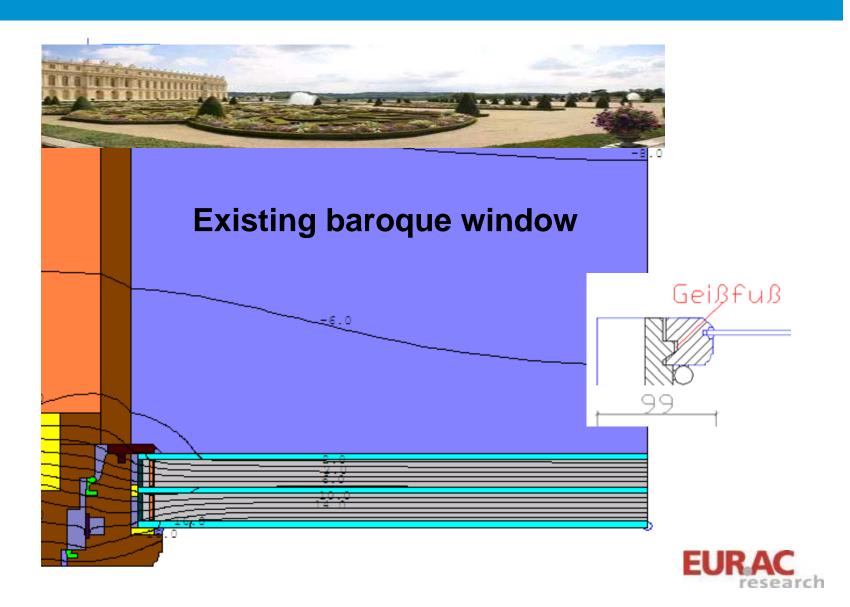
Flexibility of the concept 3encult





Flexibility of the concept 3encult





Résumé André/Freundorfer



- Very high energy efficiency & conservation are compatible!
- Preservation of the historic "substance" and the appearance in listed buildings have first priority
- If the window has to be exchanged → choose class phA!
- Box-type / coupled window?
 Depends on regional context and installation situation
- Always calculate psi-values (thermal bridge) of built-in situation!
- There is no standard solution
 - → but there are construction principles for project related solutions
- Both conservation & Passivhaus support craftsmanship



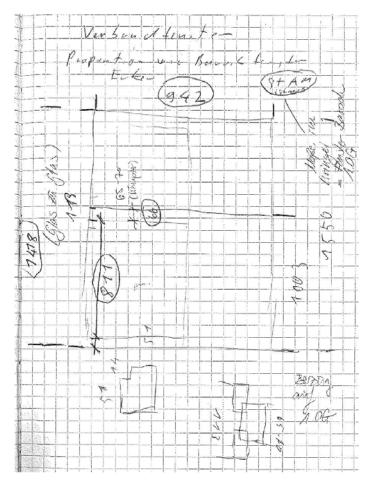




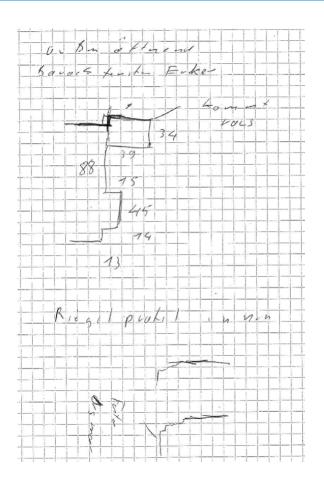


Workshop on site





Außenmaße und Lage und Abmessung des Kämpfers am Erkerfenster und am barocken Fensterrahmen im 1. Obergeschoss (mit Kringel).





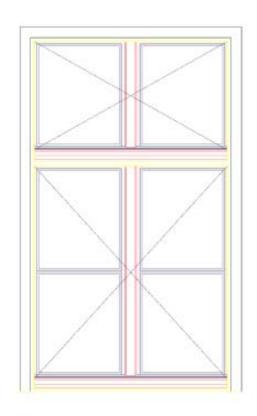




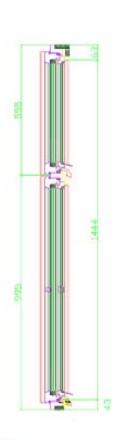








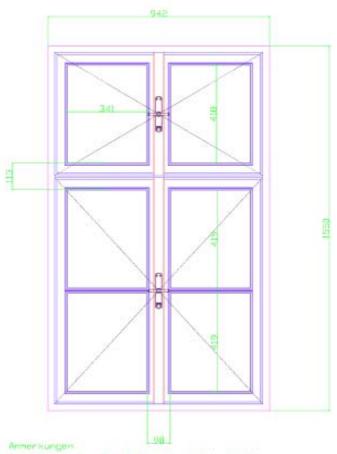




Offene Punkter

- -Kontrolle der Malle
- -Forbe Rohen uno Flüge (Innen+auflen)
 -Forbe des Giosnondverbundes
 -Art des Eriffes

- -Verglasung außen (Restaura leicht) -Fanbe der inneren Dichtung
- -Fanbe Silkonfügen
- -Holzart
- -Profilierungen innen außen --Verglasung innen (2/8/2/8/2)













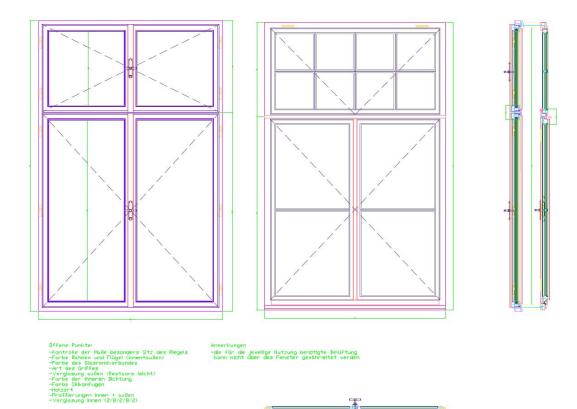




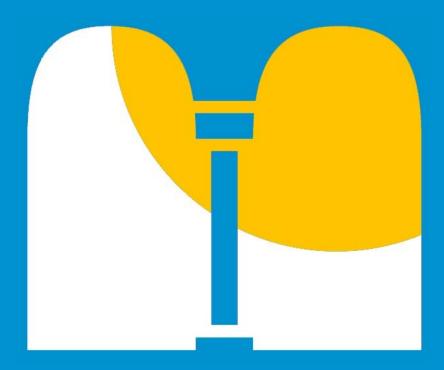












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