

Inventory of existing research

Project datasheet COST Action TU0905	
Research project :	Tetra-project "Building with Glass and Adhesives"
Images :	
Keywords :	Adhesives, Glass-metal connections, Building applications, Point fixings, Bonded frames
Researchers involved :	<ul style="list-style-type: none"> - BELIS, Jan; (supervisor) - BOS, Freek; (researcher) - CALLEWAERT, Dieter; (researcher) - DISPERSYN, Jonas (researcher) - OUT, Bas (researcher) - VAN HULLE, Arno; (researcher)
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Time span :	November 2009 – 2012
Description :	<p>This project is a cooperation between the Laboratory for Research on Structural Models (Ghent University) and the Adhesion Institute (Delft University of Technology) and involves several companies, ranging from adhesive manufacturers over façade engineers to contractors.</p> <p>Structural adhesive glass-metal connections are widely used in the automotive and aerospace industry, but in the building industry their use remains very limited. Most of the glass-metal connections in the building industry are mechanically conceived (clamping, bolting,...), mainly because it is easier to guarantee good quality workmanship. However, mechanical connections also have notable intrinsic disadvantages: they introduce substantial local stresses in the glass, require sometimes a time-consuming process like drilling a hole, etc. For these reasons an adhesively bonded connection could be a better solution in many cases.</p> <p>The main objectives of this project are, firstly, to gather appropriate and applicable knowledge about adhesives and adhesive connections, and secondly, to use this know-how to develop several specific bonded case studies for building applications. The conclusions resulting from these studies must be presented in a comprehensive way so the cooperating companies and the wider target group of building professionals can use the outcome of this project to develop other, innovative applications.</p> <p>First of all, an extensive literature study was carried out. After this study was presented to the cooperating companies, two different types of case studies were chosen: one type having a point-fixed support, the other a frame-like support. These two types were subdivided into five specific cases, each one submitted to another set of practical conditions, with parameters such as climate or UV-exposure.</p> <p>Once the specific cases were designed, a broad experimental test program was</p>

	<p>developed for a lot of different types of adhesives. That way it is possible to make a general comparison between different kinds of adhesives, and it provides a tool to select the adhesives most suitable for a certain specific application (either one of the types defined in the project, or a different one).</p> <p>After the test program was completed, a set of adhesives that are most suitable for each of the five case studies was selected. Subsequently, these adhesives were subjected to another experimental test program, this time much more in-depth and examining much more parameters than in the first, broader program. Examples are shear and tensile tests after exposure to UV, salt spray, contaminated surfaces, creep tests, thick adherend tests, contact angle measurements,...</p>  <p>Subsequently, different real-scale demonstrators and prototypes have been built and tested, including e.g. a glass canopy suspended on adhesive point-fixings, IGUs, etc.</p> <p>Finally, after all the test had been carried out, the literature study and the experimental results have been compiled into a comprehensible document, which can be used as a first guideline to elaborating certain adhesive glass-metal connections.</p> <p>connections. Although it is not the intention to produce a normative document, the reader should nevertheless get an idea which steps are very important when using a certain adhesive, which types of adhesives are more appropriate for certain connections and performance requirements, etc. For the latter, a practical adhesive selection table has been developed.</p>
Most important publications :	<ul style="list-style-type: none"> - BELIS, J., VAN HULLE A., OUT, B.; A., CALLEWAERT, D., DISPERSYN, J., J. Belis, A. Van Hulle, B. Out, F. Bos, D. Callewaert, H. Poulis, Broad screening of adhesives for glass-metal bonds, Proceedings of Glass Performance Days, Tampere: 2011, 286-289. - BELIS, J., VAN HULLE, A., CALLEWAERT, D., DISPERSYN, J., OUT, B.; <i>Experimental investigation of unconventional canopy prototypes, suspended with adhesive bonds</i> Proceedings of Challenging Glass 3, Delft: June 2012, 177-186. - BELIS, J., CALLEWAERT, D., VAN HULLE. <i>Bouwen met glas en adhesieven - praktische gids voor ontwerper en uitvoerder</i> (in Dutch) Ghent University, Ghent: 2011. Xii+95 p. ISBN 978 90 382 1902 8. - VAN HULLE, A., BELIS, J., CALLEWAERT, D., SCHEERLINCK, L., OUT, B.; <i>Development of structural adhesive point-fixings</i> Proceedings of Glass Performance Days, Tampere: 2011, 661-664. - BOS, Freek; VAN HULLE, Arno; SIX, Ben; BELIS, Jan. <i>Influence of Building-Site Contaminations on Adhesive Bond Strength</i> Proceedings of Engineered Transparency. International Conference at Glastec Düsseldorf: 2010, 189-196.
Working group :	WG 4. Novel glass assemblies
Task Group :	TG 10. Connections
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