

UGent LMO Project sheet	
Research project :	Tetra-project "Building with Glass and Adhesives"
Image :	
Researchers involved :	<ul style="list-style-type: none"> - BOS, Freek; (researcher) - CALLEWAERT, Dieter; (researcher) - VAN HULLE, Arno; (researcher) - BELIS, Jan; (supervisor)
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Time span :	November 2009 – ongoing (planned finish: December 2011)
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 linear</p>

	<p>support. These two types were subdivided into five specific cases, so-called demonstrators, each one having a different set of boundary conditions.</p> <p>Once these demonstrators were defined, a broad experimental test program was executed for a lot of different types of adhesives. That way it was 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. The tests consisted of single lap shear tests after different stages of ageing due to high humidity and high temperature.</p> <p>A first selection of adhesives, based on criteria defined in the five demonstrators, was made after this broad test program was completed. These selected adhesives are currently subjected to another experimental test program, this time much more in-depth and examining different parameters. Examples of the parameters that are or will be investigated are tensile strength, static load, properties at high and low temperature, etc.</p> <p>The results of this second experimental program will lead to a second adhesive selection, to define the five adhesives which shall be used in the five demonstrator case-studies. For each case at least one prototype will be build, and additional full-scale tests will be executed, using the actual connection geometries.</p> <p>Eventually, when all the test are carried out, the literature study and the experimental results will be compiled into a comprehensible document, which can be used as a first guideline to elaborating certain adhesive glass-metal 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 and which types of adhesives are more appropriate for certain types of connections.</p>
<p>Most important publications :</p>	<ul style="list-style-type: none"> - BELIS, Jan; VAN HULLE, Arno; OUT, Bas; BOS, Freek; CALLEWAERT, Dieter; POULIS, Hans <i>Broad Screening Of Adhesives For Glass-Metal Bonds</i> Proceedings of Glass Performance Days 2011, Tampere, pp. 286-289. - 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; 2010, Düsseldorf. - CALLEWAERT, Dieter; VAN HULLE, Arno; BELIS, Jan; BOS, Freek; DISPERSYN, Jonas; OUT, Bas <i>The Problem Of A Failure Criterion For Glass-Metal Adhesive Bonds</i> Proceedings of Glass Performance Days 2011, Tampere, pp. 654-657. - VAN HULLE, Arno; BELIS, Jan; CALLEWAERT, Dieter; SCHEERLINCK, Lies; OUT, Bas <i>Development Of Structural Adhesive Point-Fixings</i> Proceedings of Glass Performance Days 2011, Tampere, pp. 661-664.