

STRUCTURAL GLASS FACADES SUBJECTED TO SEISMIC LOADING

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1. Motivation, objectives and methodology

Structural glass facades [Fig. 1] correspond to a commonly used typology but which may be quite susceptible to the **seismic action** [Fig. 2]. Present code provisions do not cover all necessary aspects of this topic and as a consequence the industry of this sector pays a significative tool. The present project aims at contributing to tackle this predicament by preparing tailored **design formulation, constructive guidelines** and also **retrofitting recommendations**. The focus will be on **point fixed facades** [Fig. 1], which are the most affected by the seismic load. In the **first phase**, the parametric variation will encompass the **type of bolt** (**countersunk**, **embedded** and **adhesive** or **bonded**) [Fig. 3] and the **lamination interlayer** (**PVB**, **EVASAFE** and **Sentryglas®**).

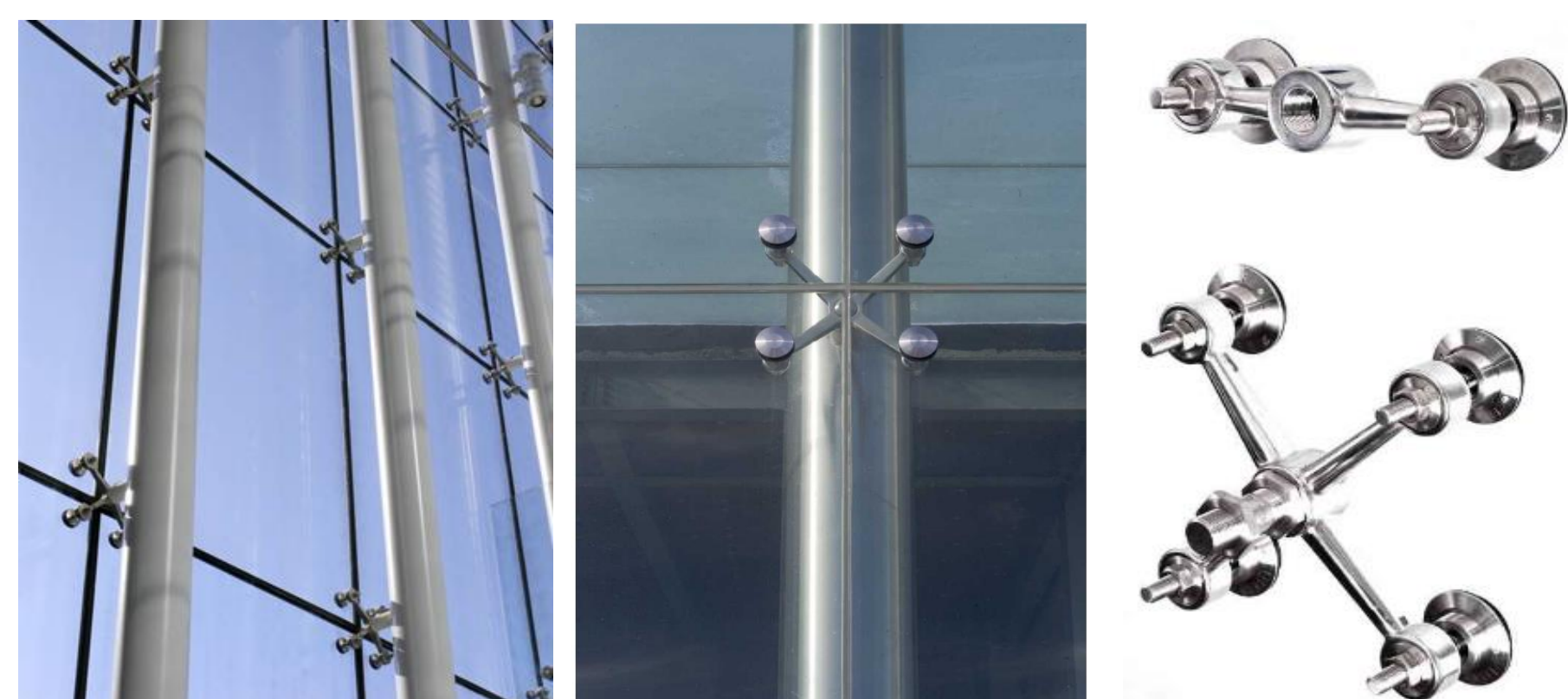


Fig. 1 – Examples of glass facades with spiders in point fixed bolted panels

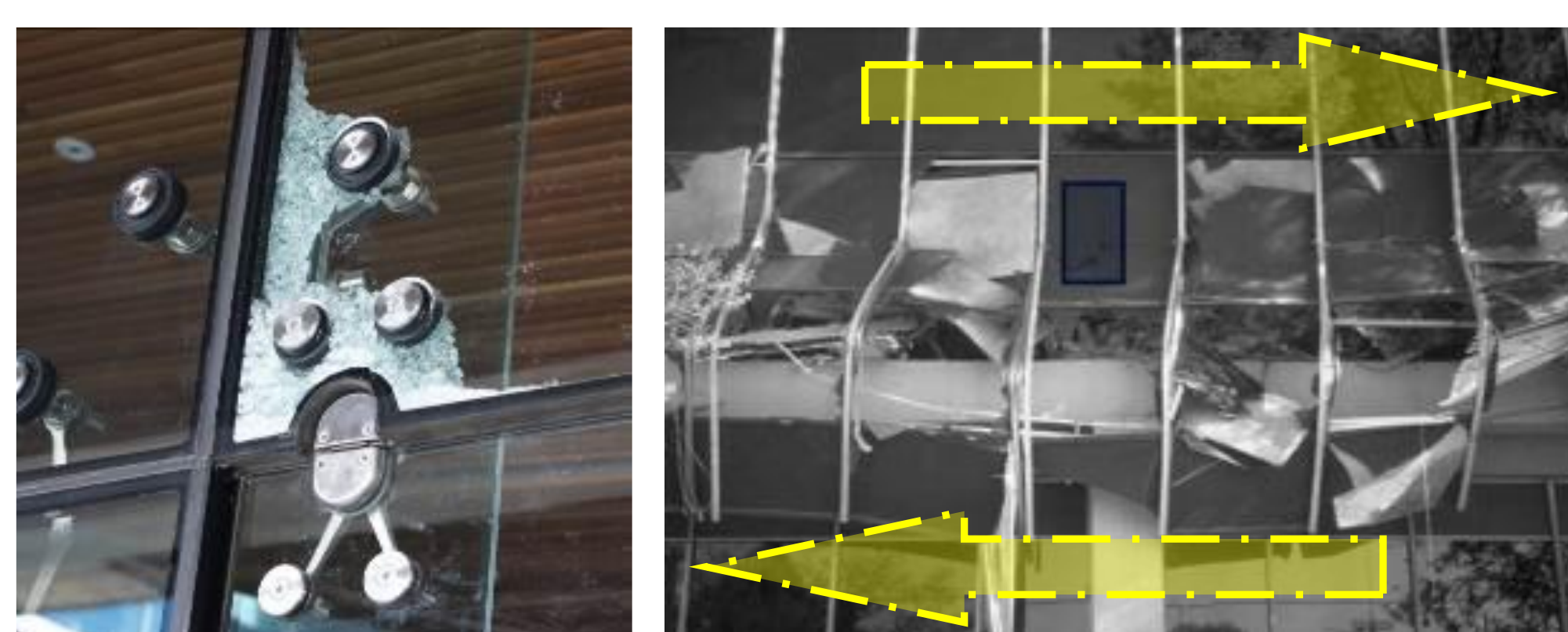


Fig. 2 – Glazing damage during an earthquake

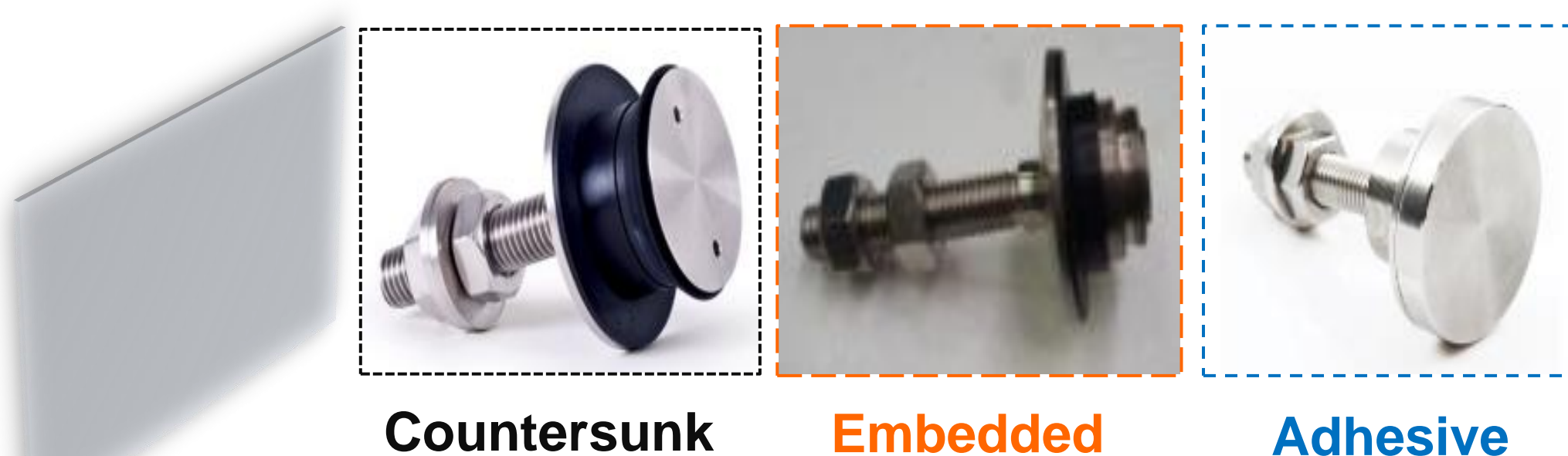


Fig. 3 – Isolated glass panel with 4 stainless steel bolts

The foreseen new analytical design formulation will be duly validated by numerical models calibrated with experimental results of a sector of a full scale facade (with 9 panels). Due to the inherent complexity of seismic analysis of the sector of the facade (**Phase 2**), the work will consider an initial phase where the panel and joints are considered individually (**Phase 1**) [Fig. 4]. This will allow for a step by step analysis which will yield key information on the structural behaviour of the panel and local phenomena, and will allow for detailed step by step numerical modelling of all the key structural features up to the final facade.

2. Phase 1 - Experimental analysis of individual panels subjected to wind load

The present full-scale models of individual glass panels are being considered to fully characterize its own behaviour and study local phenomena at the respective joints, diagonals and central point [Fig. 5].

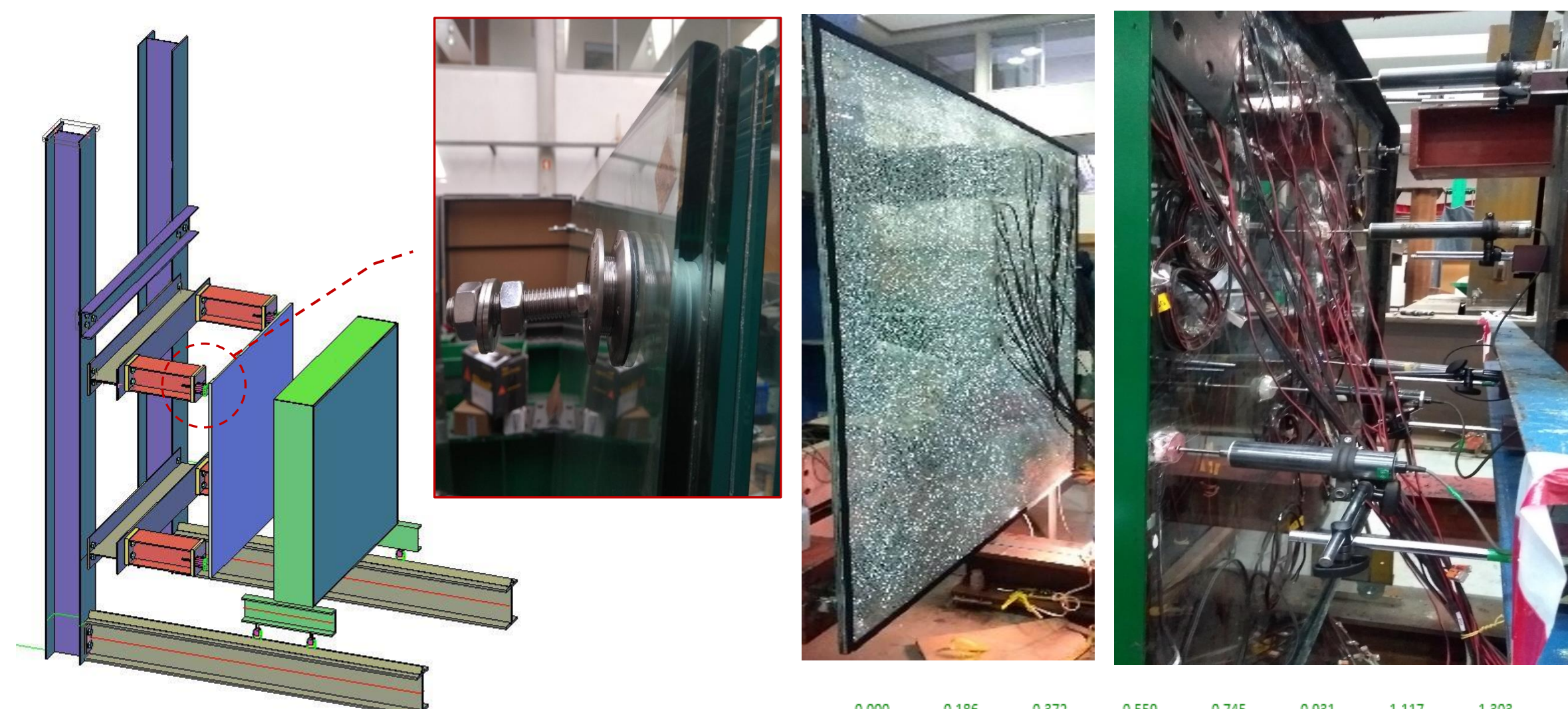
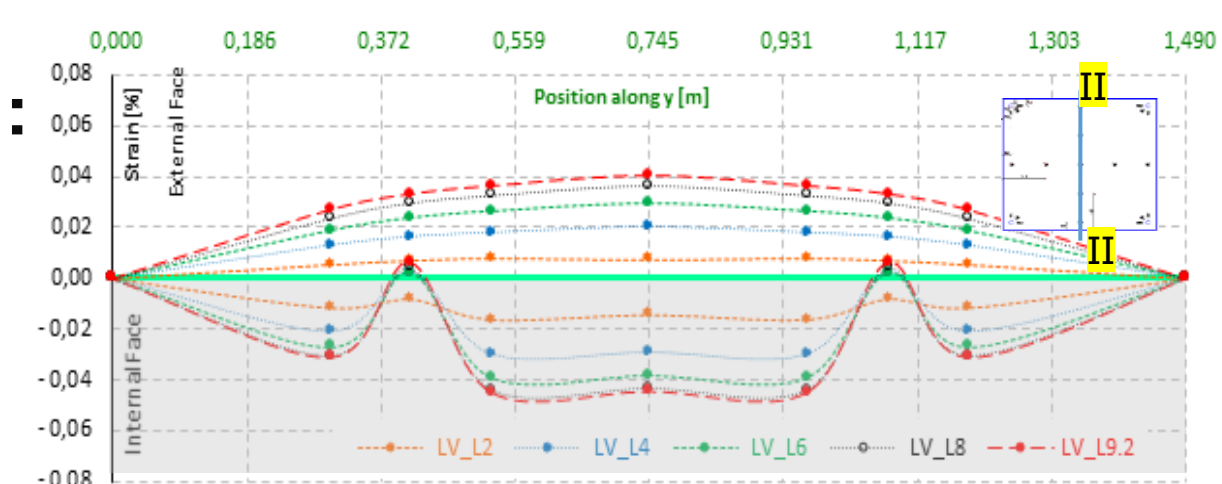


Fig. 4 – Layout and measuring devices : LVDTs and Strain gauges



Vertical strain – position curves superposition (y axis, line II - II)

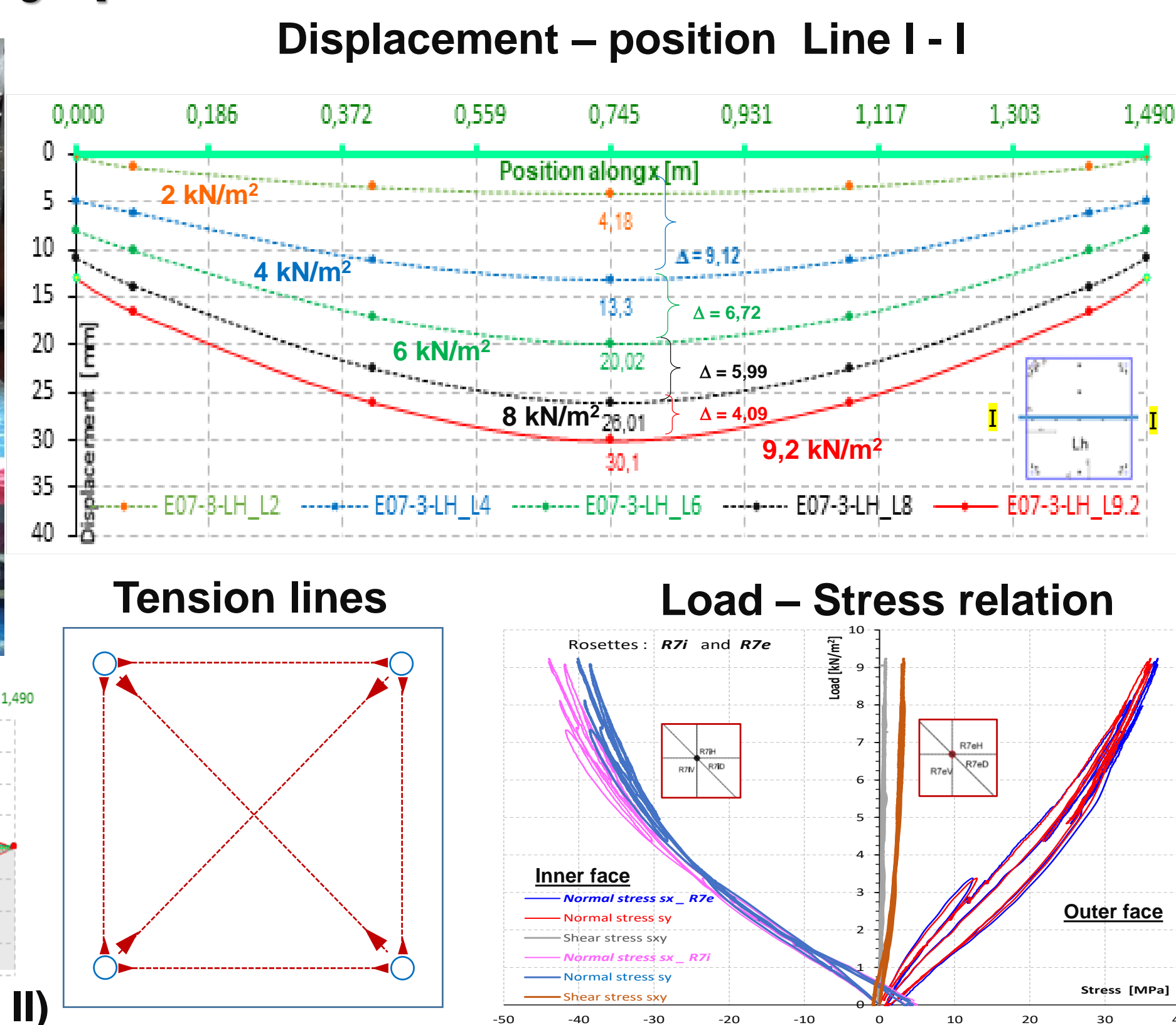


Fig. 5 – Main results regarding the structural behaviour of the individual panels (Phase 1)