VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

DEVELOPMENT AND APPLICATION OF UNIFIED DESIGN METHOD OF ADHESIVELY BONDED STEEL AND COMPOSITE CROSS-SECTIONS

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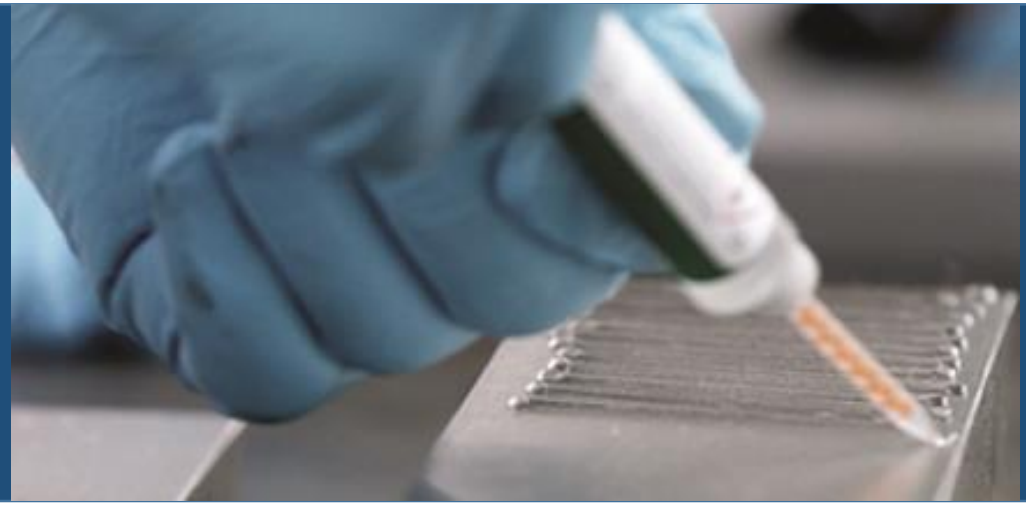

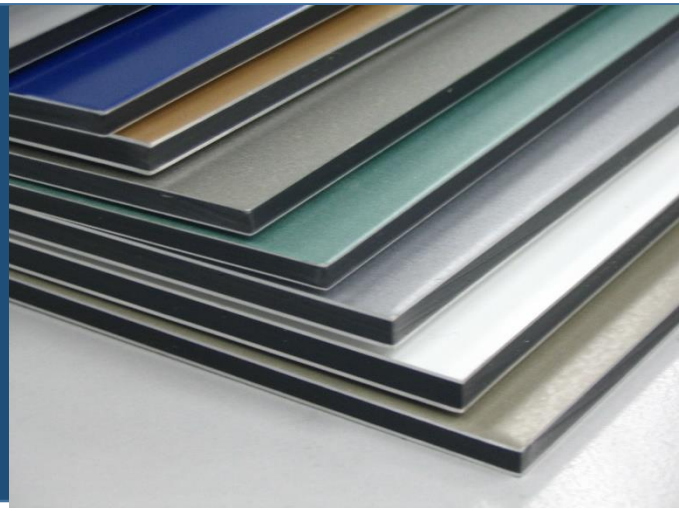

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- Project
- Need for the Research
- Research Idea
- Research Plan
- Expected Results

Postdoctoral Fellowship

Development of Scientific Competences of Scientists, other Researchers and Students through Practical Research Activities

Funding instrument – European Social Fund

The purpose of the activity is to support post-doctoral fellowship studies

The implementation of the Measure is managed by the Ministry of Education and Science of the Republic of Lithuania and the Research Council of Lithuania

Current structures require of use of materials with advanced and special properties resulting in effective solutions in respect of the economy, energy, and CO2 emission.

In order to reduce the dimensions of a cross-section (as well as the weight) and increase the load-bearing capacity, ordinary steel is replaced by high strength steel.

High strength steel is usually used in hybrid structures with very high static stresses

Despite the well-known merits hybrid steel structures have an inherent drawback – joints

In order to join different materials and avoid complex stress distribution in the contact zone, **adhesive bonding** (AB) becomes the most effective alternative.

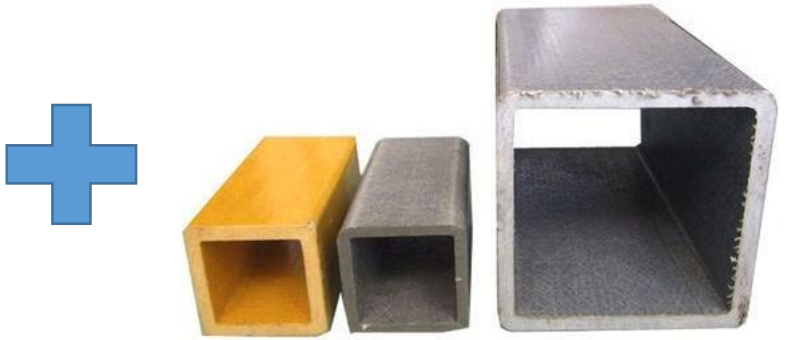
AB enables to obtain a high strength-weight ratio, versatile design and application, reliability and high fatigue resistance

There are numerous adhesive materials and composites **available** in the market, constitutive models suggested are **unreliable** due to deficiency of experimental investigations

the AB joints will be used in order to develop steel and composite beams with the approach of an effective relationship between **load-bearing capacities** and **self-weight**

Reference – mild steel cross-section

An **alternative** to steel components, the lightweight fiber reinforced synthetic polymers can be applied



Objective

Development of unified design method of effective (load-bearing capacity to self-weight ratio) adhesively bonded steel and composite cross-sections

The accomplishment of the objective considers

- ✓ determination of reference cross-section of mild steel;
- ✓ development of cross-sections using high strength steel and advanced synthetic composites;
- ✓ determination of adhesives and AB technology;
- ✓ manufacturing and testing of beam elements;
- ✓ determination of effective cross-sections in respect of the ratio of load-bearing capacity and self-weight ;
- ✓ development of unified method in order to apply adhesively bonded composites for manufacturing the lightweight beam structures

- ✓ Determination of reference cross-sections of mild steel (S355)
- ✓ Design of prototype beam cross-sections;
- ✓ Experimental investigation of adhesively bonded prototype composite cross-sections;
- ✓ Determination of effective composite cross-sections ;
- ✓ Experimental investigation of adhesively bonded effective composite cross-sections
- ✓ Development of unified design method of adhesively bonded composite cross-sections

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Thank You for Your Attention