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Bratislava, 10.3.2013

**Obligatory offer 1300/01/2013 – foam prototypes**

Based on our previous conversations concerning development and manufacturing of aluminium foam prototype parts for application in engine brackets we offer you following:

Pos. 1: **shaped foam inserts** fitting into hollow parts of existing Al brackets (LH 21815-3M300 and RH 21815-3M350):

- 2 pcs inserts made of AlSi12 alloy foam for 1<sup>st</sup> cavity of Al bracket LH 21815-3M300
  - 2 pcs inserts made of AlSi12 alloy foam for 2<sup>nd</sup> cavity of Al bracket LH 21815-3M300
  - 2 pcs inserts made of Al composite foam for 1<sup>st</sup> cavity of Al bracket LH 21815-3M300
  - 2 pcs inserts made of Al composite foam for 2<sup>nd</sup> cavity of Al bracket LH 21815-3M300
  - 2 pcs inserts made of AlSi12 alloy foam for 1<sup>st</sup> cavity of Al brackets RH 21815-3M350
  - 2 pcs inserts made of AlSi12 alloy foam for 2<sup>nd</sup> cavity of Al brackets RH 21815-3M350
  - 2 pcs inserts made of Al composite foam for 1<sup>st</sup> cavity of Al bracket RH 21815-3M350
  - 2 pcs inserts made of Al composite foam for 2<sup>nd</sup> cavity of Al bracket RH 21815-3M350
- foam porosity of all inserts will be ~ 80%
  - AlSi12 alloy and Al composite containing SiC particles will be used for foaming in order to maximise damping properties
  - the inserts will be foamed in suitable moulds manufactured according to CAD drawing of used brackets (4 moulds are needed, one for each cavity)
  - the inserts will be fastened in the brackets using suitable adhesives selected to maximise damping capability of the brackets (the damping will be evaluated using impact hammer measurement)
  - expected weight increase is about 400 g for each bracket (weight of 2 inserts + adhesive)

**Deliverables:** 8 brackets with inserted and fastened Al foam, technical report including damping properties of brackets obtained by impact hammer measurement

**Material required from customer:** 4 original brackets LH 21815-3M300, 4 original brackets RH 21815-3M350, CAD drawing of both bracket needed for manufacturing of mould for foam inserts

**Duration:** 10 weeks from delivery of CAD drawings and brackets

**Price:** 13.200,00 - euro for whole package

The price includes manufacturing of 4 moulds, manufacturing of 16 foam inserts, assembly and fastening of foam inserts into bracket cavities, damping measurement and technical report



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**slovak academy of sciences**

Pos. 2: **brackets** redesigned to be fully made of reinforced Al foam (without need of original cast part):

- foam shape, alloy, porosity and reinforcement architecture will be designed according to required loading requirements with an aim to minimise weight and maximise damping capability
- FEM calculations (ANSYS) will be performed in order to optimise the design of foamed brackets. The model of available volume and the definition of required loading conditions for each bracket will be needed from customer site for these calculations.
- simple shape stainless steel inserts will be used as foam reinforcements in locations where appropriate (shape and architecture will be designed according to FEM calculation)
- the brackets will be foamed in suitable moulds manufactured according to developed design (2 moulds are needed, one for each bracket)
- the main mechanical and damping properties of developed brackets will be measured and evaluated, if necessary adaptation of reinforcement architecture will be made
- 8 pcs redesigned brackets (4 left and 4 right hand side) made of reinforced aluminium foam will be finally delivered for evaluation by customer

**Deliverables:** 8 redesigned brackets (4 left and 4 right hand side) made of reinforced Al foam, technical report including evaluation of selected mechanical and damping properties and results of FEM calculations

**Information required from customer:** CAD model of available volume for brackets incl. fastening points, required loading conditions and stiffness for both brackets

**Duration:** 4 months from the delivery of required information

**Price:** 11.400,00 - Euro for whole package

The price includes design of new brackets using FEM calculation (6000 Euro), manufacturing of 2 moulds (4200 Euro), manufacturing of 8 brackets from reinforced Al foam (1200 Euro), evaluation (check) of main mechanical and damping properties and technical report

All prices exclude VAT, packaging and transport costs. The offered positions will be invoiced separately after delivery of goods. Payment will be due 30 days after receiving the invoice.

I hope this offer fits to your needs.

Best regards,

Fero Simancik

R&D manager IMSAS