THE TECHNOLOGY PROGRAMME
SPRING 2007 COMPETITION FOR FUNDING

Lightweight Materials and Structures

A Joint DTI/MOD Competition

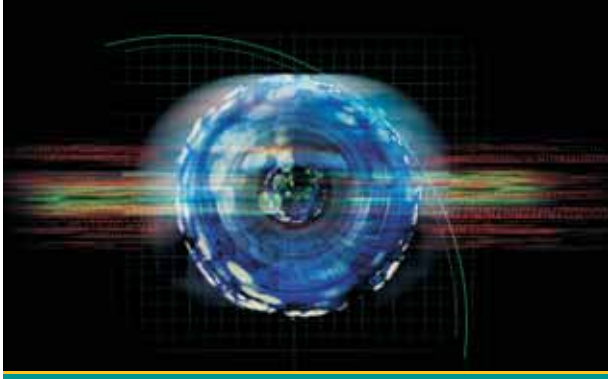
Summary

Funding is available for Collaborative Research and Development in materials technologies that will enable the UK to rapidly meet the global challenge to reduce the weight of materials and structures. What has always been an essential factor in the aerospace and defence industry has also become a necessity for other sectors. From automotive engineering and vehicle construction through mechanical engineering, building and construction, sports and leisure goods to the packaging industry, the trend is moving towards light weighting. Components need to be ultra-light and yet high-strength, because this saves energy, fuel, and while contributing positively to the low carbon agenda, reduces costs and leads to higher performance.
In recognition of the importance of this area of technology to the UK economy, an indicative £15m of funding has been allocated for developments targeted at the following:

- Defence and civil applications in aerospace, marine, land vehicles/automotive and personnel (e.g. portable energy and body armour).
- Civil applications in energy, construction, rail, leisure, packaging and retail, paper/board for publishing.

Background

Materials innovation and application are increasingly vital to sustain advanced manufacturing and modern methods of construction in the UK. They are also crucial to this country's defense and security. All around the developed world, industry is demanding new, cost-effective, environmentally sound materials and process technologies to meet with legislation and consumer demands. The demand for lighter designs is growing for a broad spectrum of products. The development of cost-effective, high-strength, lightweight materials that reduces the weight of a



dti

SUCCEEDING THROUGH INNOVATION

Lightweight Materials and Structures

COLLABORATIVE RESEARCH AND DEVELOPMENT

product without compromising cost, performance or safety is necessary to compete in today's global market. New or improved materials that could contribute significantly to speed of travel and fuel-efficiency, to meet consumer expectations, military needs and regulatory mandates, are of particular interest for transport applications. The need for innovative lightweight materials, however, goes far beyond transportation needs. There is a fast moving trend towards lightweight materials and structures for body armour and protection, building and construction, mechanical engineering, sports and leisure goods, packaging, retail and publishing.

Although lightweight materials, which include composites, aluminium, magnesium alloys, titanium, nickel alloys, advanced high strength steels, metal foams and polymers, have been the subject of many development programmes for years, their high cost of manufacture and the need to balance reduced mass of materials with structural integrity has prevented their take up in many of these key sectors. Recent progress with research into lightweight alloys, composites, polymers and recycled paper point to the readiness of these developments for industrial pull-through. Higher costs can be offset if the manufacturing process is made radically simple. Though the cost of lightweight materials is relatively high, the ability of these materials to integrate several functions in a single component can reduce the overall cost and weight of a structure. Developments in lightweight materials would also benefit the paper and publishing sector through the development of lightweight recycled papers with high bulk and stiffness, using nanotechnology and transfer of learning from the packaging sector.

Technology Priority

The focus for this competition will be on the development of lightweight materials and structures. This can be achieved through the reduction in the mass of the material or the reduction in the weight of the final structure, e.g. by employing clever design techniques or using combinations of lightweight materials and/or hollow or sandwich structures. For these solutions to be acceptable for commercialisation by business and for defence applications, the following technology areas must be addressed. The scope will cover the production and processing of the material, the design, fabrication, assembly and performance in service of the structure. It will also cover novel reuse and recycling technologies to meet with end of life legislation and to reduce the life cost of these high-performance materials.

Scope for Application

This call will support research and development focused on:

- development of lightweight materials and structures to withstand more arduous operating conditions; including higher temperatures, dynamic loading, thermal and mechanical stresses, enhanced resistance to blast and shock, enhanced ballistic/spall performance without structural degradation.
- understanding of how lightweight materials degrade in aggressive environments to enable increases in lifetime, reliability, efficiency and reduce the impact of the harsh conditions on the structures, components and the operating environment, including improvement in smoke and toxicity levels.
- development of novel production, manufacturing and inspection processes aided by the utilisation of on-line process control, condition monitoring and NDE, which will lead to significantly enhanced quality, improved properties, reduced cost, increased output and product reliability.

- application of nanotechnology and biomimetics to develop small lightweight structures for components and smart devices and the development of the next generation raw materials, e.g. lower cost carbon fibre replacements, and renewable materials.
- technology transfer between sectors and novel design of lightweight structures.
- optimisation of structural integrity through use of protective coatings, honeycomb or bonded structures, joining techniques including attention to interfacial corrosion effects, improvement in wear and fire resistance.
- a special focus on the development of ceramic matrix composites and nickel alloys for high temperature applications, magnesium, aluminium, titanium alloys and plastics for ultra lightweight applications, advanced high strength steels and metal foams, high tensile polymers and composites for lightweight high tensile structures, lightweight paper and board for packaging and publishing.
- improved commercialisation opportunities through effective metrology and standards support.
- novel reuse and recycling technologies for to reduce the life cost of this high-performance materials.

A key aspect of this competition will be the engagement of materials producers and end-users in order that new ideas can be developed and exploited rapidly. The commercial potential of the idea must be demonstrated and also the wider spill over benefits identified. For those targeting defence applications, the development must be suitable for both military and civil use.

The Military of Defence (MOD) will co-fund these dual use technologies and will count as the end-user for the military applications. In such cases, the MOD will be signatory to the collaboration agreement and will, most likely, reserve the right to be the first to exploit the outcome of the research.

Funding Allocation and Project Details

The Technology Strategy Board advises on the selection of priority technology areas and the allocation of funding for the Technology Programme. The Technology Strategy Board is currently being established as an executive non-departmental public body and will in future be responsible for the development and delivery of the Government's programme of technology support, including the Technology Programme.

An indicative £15m of Technology Programme support, including £3m - £5m of MOD support, has been allocated to Collaborative Research and Development projects that address one or more of the areas indicated above and involve science-to-business and business-to-business interactions.

Typical projects would have 2-3 year duration, require support around £500k-£2m, although no project will be rejected on the grounds of size alone, and generally aim to implement significant business change in a 5-7 year time frame rather than shorter-term payback. Larger projects will be considered but the case must be exceptional. In particular we would encourage projects that can demonstrate benefits to a number of business sectors, and ideally should include at least one partner with defined end-user needs.

Additional funding from EPSRC may be available for projects where there is a significant high quality academic component and in particular for those projects that demonstrate added value to its existing portfolio; by building on or being complementary to existing research programmes.

Projects can range from small, highly focused basic research aimed at establishing technical feasibility, though to applied research, and to experimental development projects. It is anticipated that most of the funding will be allocated to proposals in the applied R&D (attracting 50% public funding) or experimental development (25% public funding) categories.

Projects involving industry oriented basic research (75% public funding) will also be considered but a robust case must be made to support the requested level of funding. Definitions of the above categories of research can be found in the Guidance for Applicants - see http://www.dti.gov.uk/innovation/technologystrategy/index.html

The Technology Strategy Board will require all projects to provide a non-commercially confidential summary, at the start and the conclusion of the project, for dissemination.

Contacts

If you have any queries about the technical scope of the competition or the application process, please contact the Technology Programme helpline on **01355 272155** or email **info@technologyprogramme.org.uk**

Key Dates

Competition opens: 24 April 2007

Competition event in London - 25 April 2007. For more information about this and other events use the web address below.

Deadline for registering your intention to submit an application: 11 June 2007

Deadline for all Academic Finances through the Je-S systems: 14 June 2007

Deadline for all Outline applications: 18 June 2007

Full stage opens: 16 July 2007

Deadline for receiving full stage applications: 11 September 2007

Decision and feedback to applicants: October 2007

For details on how to register and apply go to:
http://www.dti.gov.uk/innovation/technologystrategy/index.html

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