

Green Structures

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— Tom Lipinski
Founder, MD and CTO
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The Autodesk Clean Tech Partner Program supports clean technology innovators with design and engineering software they can use to accelerate their development of solutions to the world's most pressing environmental challenges. For more information visit autodesk.com/cleantech.

Rapid Re-Invention

Clean tech specialist Green Structures has used 3D modeling combined with conceptual building performance analysis and digital prototyping techniques to support the development of new carbon and energy-saving innovations

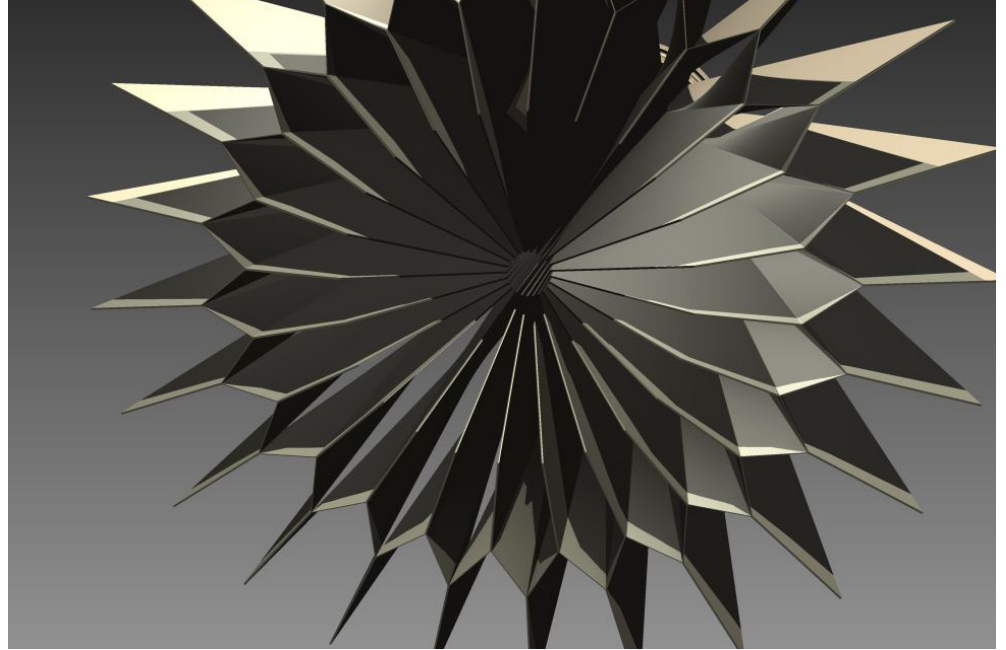


Image courtesy of Green Structures

With over 40 percent of the UK's green house gas emissions attributed to the built environment, in recent years, far greater emphasis has been put on retrofitting building stock through government-backed schemes such as The Green Deal, which aims to allow households and businesses across the UK to improve the energy efficiencies of their properties by taking out loans to have them made more energy efficient. Similarly, with the cost and availability of energy supplies never far from national and international headlines, the need for technologies and business models that drive energy efficiencies is becoming ever more urgent.

Green Structures, a London-based Autodesk Clean Tech Partner operating in the built environment sector, adopts a sustainable design approach to tackling these challenges.

Its overall aim to "dramatically improve the sustainability of the built environment, and associated energy consumption, by radically transforming the way it is planned, designed, constructed, maintained and operated" has resulted in the creation of award-winning energy-efficient and energy saving products and systems, including Passive Heat Recovery Ventilation and Thermal Energy Storage (TES).

Having been introduced to the Autodesk Clean Tech Partner Program in 2009, Green Structures decision to enrol was primarily motivated by the chance to gain access to high-quality software

for a nominal fee. Since joining the scheme, it has utilised a range of Autodesk software in its work including Inventor, Ecotect, Autodesk Simulation Multiphysics and Revit.

"The greatest advantage of the Clean Tech Partner Program has been putting us in reach of software that a company of our size and age may not otherwise be able to access," says Tom Lipinski, Green Structures' founder, MD and CTO. "Using the same professional tools as some of the UK's largest manufacturers has enabled us to further strengthen the professionalism of our design process."

Primarily, Lipinski says, Revit and Ecotect are deployed in architectural projects, including the recent development of its 'Thermal Memory House.' "The aim of the Thermal Memory House project is to build a prototype for a structure which will be able to achieve complete thermal inertia internally without the system, control or device that would normally be required," he says.

The house is built in a large proportion from phase-change materials, substances with a high heat of fusion which, melting and solidifying at a certain temperature (in this case 21 degrees centigrade), is capable of storing and releasing large amounts of energy.

“Essentially, we have taken a fresh look at zero carbon homes and are trying to redesign them to make them much simpler and self-sustaining. The approach is based on a combination of hot ice , building fabric and physics - and could remove the requirement for up to £30,000 worth of complex equipment, potentially including biomass boilers, complex mechanical heat recovery ventilation systems, energy monitoring devices and commercial style building management systems.”

Green Structures' creative team has also deployed the Autodesk Inventor solution for its digital prototyping work, in particular the firm's passive heat recovery installation, Ventive, – a retrofit-specific means of extracting stale air from the air in a house and supplying fresh air to it at room temperature without using any energy in the process. Lipinski believes this kind of approach will become increasingly critical as local authorities put greater emphasis on upgrading existing housing stock.

“Recently, we have been developing our rapid simulation approach which involves running multiple simulations, making small tweaks and then choosing the winners as the process evolves,” he says. “In the development of the Ventive passive heat recovery product, we used the simulation capabilities of the Autodesk software to shorten the process of running wind tunnel tests and heat transfer modeling and conducting the subsequent re-designs completed in Inventor.

“Before we had access to Inventor and the simulation capabilities of the Autodesk software, the design and prototyping process was messy, costly, time consuming and very 'hit and miss'. We could not afford wind tunnel simulations or £1,000 per day fees so we were creating mouldings out of MDF, using resins and glass fibre mesh to develop model designs and testing everything ourselves.

“Typically, after a month's worth of work on different models we would 'smoke test' them = using lighted smoke pellets to test suction levels - and get conflicting results,” he adds.

Instead, Green Structures can now test its new roof-mounted device, capable of exhausting and supplying air concurrently, on its own, in a linear

wind flow, or put it on the chimney and see what is happening. The company is not just working on the product, it is learning a great deal about the environment in which it will operate. Again, this would not have been possible without the product and the support received from Autodesk.

Tom Lipinski adds, “without Autodesk, it would typically be a case of two days of casting to do the prototype work plus jig and materials and then either some inconclusive gas tracer tests or a large fee to an academic institute for wind tunnel tests. If you miss one thing, you have to do it again. On top of that, you don't know what you've missed, where and why. The process usually takes three days plus materials plus a fee - £2,000 to £3,000 for each cowl iteration. In contrast, it would cost £200/£300 per iteration if you used Autodesk - and you could run two or three iterations concurrently until you run out of ideas (we've done about 30 so far). It is a no brainer.”

Scoping the Benefits

For Green Structures, one of the most important benefits of being part of the Autodesk Clean Tech Partner Program is the networking opportunities it provides. “In opening doors to a wider community

through networking events, it has provided valuable exposure for our work, got us in front of investors and enabled us to network with people we may not otherwise have reached,” says Lipinski.

Yet, even more important has been the role the program has played in securing investment for Green Structures and then enabling the company to get a return on that investment.

As well as the complex challenges involved in the conceptualisation, design, prototyping, simulation and testing of the end product, creating a new clean tech innovation and taking it to market requires financial backing, not to mention other logistical considerations such as collaborating with partners to develop and commercialise the offering.

In this respect, being an Autodesk Clean Tech Partner has proved advantageous for Green Structures, because it has helped the sustainable design specialist to take its innovations to a wider audience. “The Clean Tech Partner Program has given the firm real presence,” says Lipinski.

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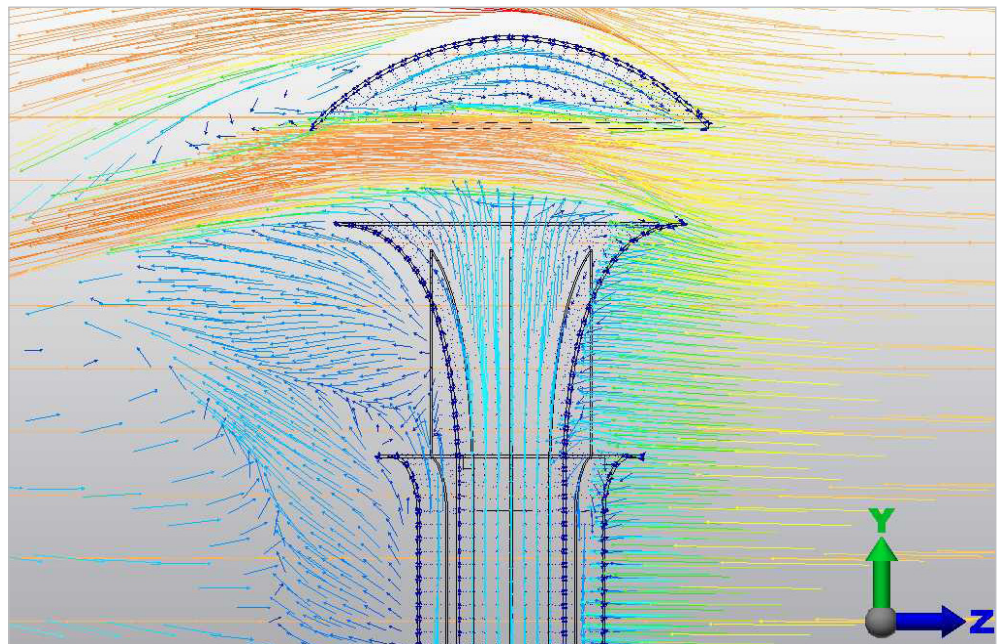


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