

LINEAR COMPOSITES LTD

QUICK DEVELOPMENT OF APPLICATIONS FOR HIGH
PERFORMANCE COMPOSITES WITH SOLIDWORKS,
SIMULATION AND CFD



Long-established, reinforced plastic composites are being
launched into modern, high precision applications with
SOLIDWORKS and SOLIDWORKS Simulation

Challenge:

A larger product portfolio serving many industries demands high precision applications to be developed with confidence and in less time.

Solution:

Implement SOLIDWORKS design, SOLIDWORKS Simulation analysis and SOLIDWORKS Flow Simulation to expand in-house capabilities.

Benefits:

- Integrated 3D modelling and Simulation environments are intuitive and easy to use for faster development
- Eliminated dispute with third-parties on volumetric material requirements
- Ability to perform aerodynamic analysis so cutting times and costs for outsourcing
- Enhanced communication of designs through realistic visualisations

Linear Composites initiated as a development division of Imperial Chemical Industries over 35 years ago, charged with the task of producing and marketing reinforced plastic composite materials which could be used in various applications. One of the most famous materials which was born from Linear Composites work is Polyester. Since then, Linear Composites have matured into a specialist subsidiary of Maccaferri Industrial Group, producing high-specification technical fibre products.

Linear Composites already has a successful history, creating long-lived products for a variety of purposes - off-shore and under water products within the oil & gas industry through to agricultural and large scale civils applications. This impressive and established portfolio of products were created as flat CAD drawings in AutoCAD or only recorded in Datasheets. The need for an intelligent CAD system became increasingly apparent as projects demanded higher degrees of engineering risk to be taken. At the same time, there was the inherent need to comply with current and evolving quality standards. Linear Composites wanted to achieve this by bring all elements of design and reporting in-house.

Linear Composites evaluated a number of packages to try and meet their mechanical design and fluid dynamic analysis requirements, some of which included SolidEdge and AutoDesk. Technical Developments Manager, David Cheer, assessed the different systems and commented that "in a lot of cases they were separate modules that didn't work together, or the solutions offered limited capabilities. SOLIDWORKS had a range of extensions that are essentially the same system and from a user point of view, that makes a very big difference."

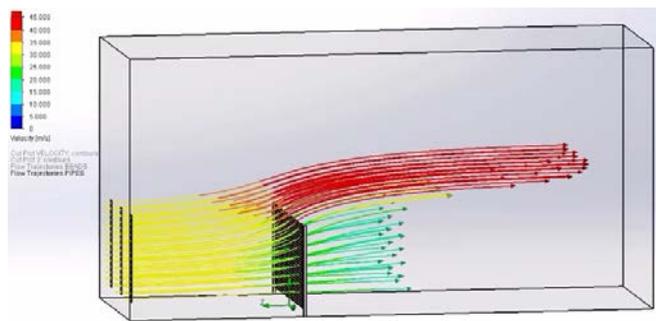
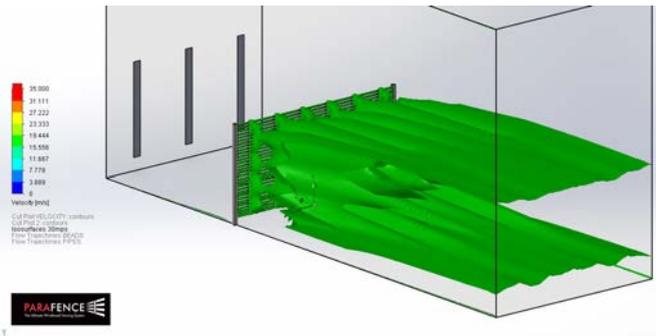
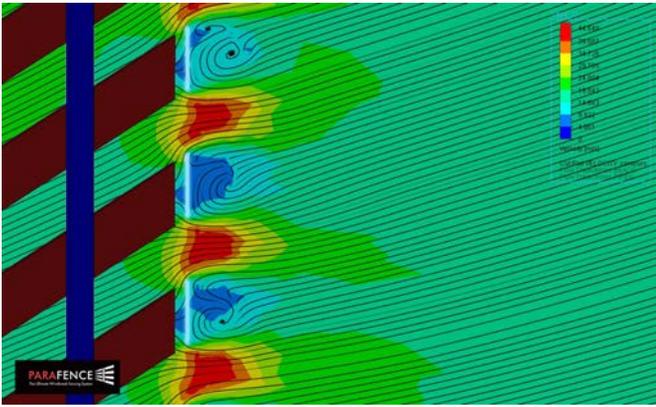
The effortless integration and transition between modelling and simulation, within a single workspace was a big deciding factor. Now, SOLIDWORKS is accelerating projects into modern, precisely engineered presentations for clients, helping to win contracts and significantly cutting approval times.

Two of Linear Composites's products which have shown vast benefits from the use of SOLIDWORKS and in particular non-linear Simulation capabilities and computational fluid dynamic (CFD) studies, are **ParaFil** and **ParaFence**.

REDUCING RISK WITH SPEEDY ANALYSIS

The **ParaFil** product is a range of high-tenacity TECHNICAL FIBRE ropes with nominal breaking loads of up to 1500 tonnes force. The ropes are connected to third party infrastructure using proprietary terminations to allow efficient transmission of the forces. SOLIDWORKS has vastly reduced the time required to design customer-specific terminations and also allowed a greater range of simulations to be performed during the optimisation stages of the design process. Designs experience very large loads so there is a need to be precise as the result is critical. SOLIDWORKS allows engineers to know not only if a design will fail but the behaviour and deflection characteristics. The speed and ease with which different loads and different scenarios can be analysed has reduced production time. Engineers can quickly reach the best design and with confidence.





COMPLETE CONTROL AND UNDERSTANDING OF PRODUCT DEVELOPMENT

Another of Linear Composite's products, **ParaFence**, used to be out-sourced to Aerodynamic specialists, causing delays in product development and additional costs which were passed on to the client. Now, with SOLIDWORKS Flow Simulation, engineers are able to have a complete understanding of the product performance. Computational Fluid Dynamics can be simulated in the same environment as the model and displayed in an easily to understand, visual and raw format. This brought another factor to the attention of engineers, they realised that they had better knowledge of not only the product but the forces in the surrounding environment and how any changes effected the vicinity as a whole. Additionally, the interface between the CFD and 3D CAD environments in SOLIDWORKS allow the results from the CFD to be fed back into the mechanical design of the fence structure. This was a massive breakthrough for the company. Bringing this analysis in-house means there is no longer a back and forth workflow between engineers and external contractors, each project can be optimised in a shorter time period, more cost effectively and with better products as an end result- good news for both Linear Composites and their Clients.

REVERSE ENGINEERING TO IMPROVE AND SOLVE

Having SOLIDWORKS 3D CAD and SOLIDWORKS Simulation has led to the development of not just products but machinery also. Flow Simulation has been used to enhance the effectiveness of extrusion heads. Also, if any problems are encountered in production, investigation is now conducted using SOLIDWORKS Simulation. Engineering knowledge can be used to make intelligent steps to rectify a problem or to optimise a machine design but the knock-on effect of these changes is not so easy to calculate. This is particularly the case with multi-component machines encountering multi-directional and, rotational forces. Adding stiffness in one area may cause localised deformation in another area. Judging the overall effect of these experimental changes is totally transparent when first testing in a virtual environment. Linear Composites even use Simulation to make models deform. They can then ascertain the forces required and the degrees of deflection - "being able to visualise is really valuable and to then quantify, it's excellent" – David Cheer.

ACURATE, INDISPUTABLE RESULTS

Linear Composites works on **Civils projects** with large corporations and teams of quantity surveyors. Problems were often encountered as parties would argue the amount of bulk material needed for structural fills. SOLIDWORKS has removed any cause for debate with its evaluation features. Once topographic information and 3D site survey data is received, the data can be imported into SOLIDWORKS. A design can be generated and the volumetric output function provides an exact measurement. A precise proposal with completely accurate results is non-negotiable. This intelligence saves Linear Composites huge losses by reducing time spent in dispute and ensures correct material ordering.



"Results of our projects are critical and the consequences of failure would be high. SOLIDWORKS allows us to dramatically reduce risk and gives us greater confidence, in a shorter amount of time. Linear Composites have to meet quality standards on all projects and follow indemnifications from insurers. With SOLIDWORKS we can quickly output reports and have complete tracability of our work."

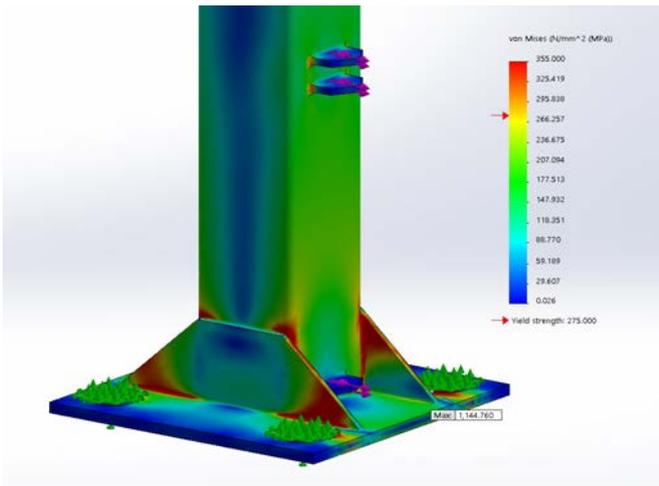
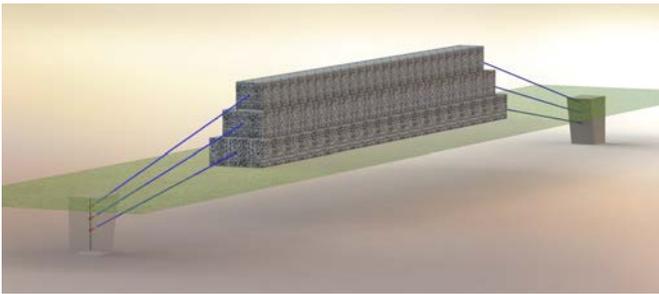
- David Cheer, Technical Developments Manager

LINEAR COMPOSITES PARTNERSHIP WITH SOLID SOLUTIONS

Pre-purchase, Solid Solutions gave Linear Composites dedicated response, personal attention and time. The service received during implementation was 'far in excess of any other software provider we have dealt with' – IT Department at Linear Composites.

The frequency of training courses and availability in numerous locations is particularly beneficial to Linear Composites, whose team is based in different geographical locations across the UK. This flexibility saves time and money. The Applications Engineers delivering the training are said to have gone above and beyond the standard content of the courses.

The Technical Support is completely invaluable to the engineers at Linear Composites. The team is not large with members frequently not able to work side-by-side. This can make it difficult to share problems and ideas easily. Having access to the support desk over the phone means engineers are able to solve issues quickly and effectively which is critical. "I haven't as of yet had a problem the (Tech Support) team isn't able to solve." – David Cheer.



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BUSINESS EVOLUTION

The decision to purchase SOLIDWORKS has proven a fantastic investment, bringing business advantages outside of the original motivations. Further uses have involved logistical and transportation planning, modernisation of dated documents and rendering and visualisation capabilities which have both improved client's understanding of projects and helped to win projects in the first place.



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