A Leap of Faith

The business case for harnessing High-Performance Computing in Engineering and Manufacturing is growing.

Can you afford not to join the revolution?

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES

Whether you're engaged in consumer or industrial product design, mechanical, electronics or structural engineering, you have a wide choice of packaged simulation/CAE software products at your disposal. Most offer decent functionality for general purpose Finite Element Analysis (FEA), and to some extent Multiphysics Simulation/ Computational Fluid Dynamics (CFD).

But to maintain a competitive edge, your ability to perform increasingly complex simulations must be a constant priority. Are these being completed as quickly as you and your team desire? What about the fidelity? Achieving the right balance between productivity and cost per simulation can be a challenge. You need to make informed decisions on whether to spend on more computing resources for faster results - or wait longer to reduce costs.

For dealing effectively with the above challenges and opportunities, your available compute resource is increasingly pivotal. It directly impacts the following:

Simulation runtimes

Cost per simulation

Simulation fidelity

User productivity

Scalability

Competitive edge

These days multi-core processors (CPUs) are specified as standard in off-the-shelf PC laptops, desktops and workstations. However, each core must be utilised fully all the time to maximise simulation accuracy and minimise runtime - the serial, sequential processing architecture of PC hardware restricts this. An obvious sign will be if simulations are taking longer to process which is caused by insufficient CPU, memory and storage capacity.

The answer could be to acquire yet more powerful multi-core hardware but before too long this too will become overloaded. It's a vicious circle and navigating a way out can be challenging.

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES

Making the leap

The choice comes down to whether to carry on indefinitely with PC-based hardware or make the transition into true High-Performance Computing (HPC).

With HPC, massively parallel processing across several interconnected servers (nodes) is involved. These utilise multiple CPUs and several hundred or even thousands of GPUs (cores) apiece. These huge compute resources are aggregated enabling complex problems to be broken down and solved much faster and more efficiently than on standard hardware. The net result: accelerated simulation runtimes and unprecedented accuracy.

While this offers significant productivity gains through faster design cycles, crucially, it also allows engineers to access higher end Multiphysics Simulation and Generative Design tools. Ultimately this will result in even better and more reliable products.

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES

HPC Benefits

- **Gain access to higher end Multiphysics/Generative Design modelling**

- **Achieve greater user productivity with faster workload turnaround**

- **Benefit from higher fidelity simulation**

- **Speed up design cycles, bringing products to market faster**

- **Improve product functionality and reliability**

- **Increased competitive edge**

Despite such benefits, the cost and complexity involved with HPC can be daunting. This is why migrating all workloads into the public Cloud is often the best approach, especially for smaller engineering firms. Here you can access the power of HPC and market leading simulation tools on a subscription basis without capital expenditure, either via software as a service (SaaS) or platform as a service (PaaS).

Larger departments or firms, providing they have sufficient IT support, could consider retaining their existing on-prem compute resource while outsourcing to the Cloud for HPC on-demand simulation services. This could be a solution to addressing overload situations, or for running specific short-term projects.

Cloud HPC Simulation

- **Fund compute resource from Opex instead of Capex**

- **Easily scale usage up or down on demand**

- **Wide choice of simulation software tools available**

- **World-class public Cloud security and resilience/back-up**

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES

In our view:

Many engineering service providers and manufacturers – large and small - remain unsure about making the leap into HPC. This effectively excludes them from taking full advantage of more sophisticated simulation and generative design solutions. This could potentially impact their future competitiveness in a constantly innovating sector.

The barrier to moving forward is often the potential additional investment entailed, not to mention the level of additional IT engineering complexity. While these concerns are understandable, there are viable options and solutions available to accessing HPC in a way that best suits your business. While by no means the only solution, Cloud-based on demand HPC integrated with world-class simulation software is an avenue worth exploring.

> **Ultimately, the decision comes down to cost effectiveness, determined by user productivity and cost per simulation.**

Clearly, maximum compute is required to drive maximum results for your users but this needs to be aligned to their cost overhead - investing more than necessary in compute resource, either on-premises or via the Cloud, will impact on cost-effectiveness.

Additionally, for many, The Internet of Things (IoT) and Artificial Intelligence will be important considerations. If you are contemplating these no doubt a move to HPC is already an integral part of your plans. Even so, this will need to be carefully evaluated and managed to efficiently leverage huge volumes of data from all manner of sources, be they individual consumer or industrial products, factory floor machinery, whole production lines and much more besides. Being able to quickly process that data into razor sharp market intelligence to inform your future product designs could be a game changer. Greater productivity and efficiency can enable faster routes to market, lending a potential leading over the competition and ultimately more revenue.

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES
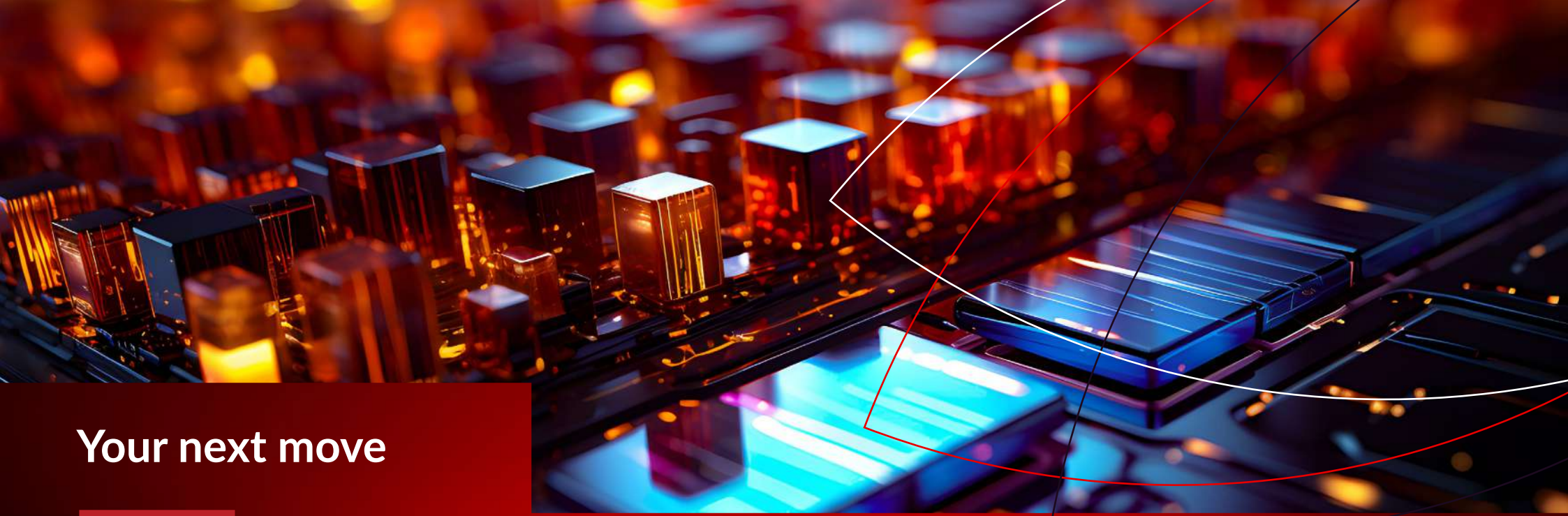
Your next move

We understand the path to HPC is a major decision. The business case needs to be carefully considered on an individual requirements basis. There is no one size fits all solution.

While a move into the Cloud will certainly meet the criteria of many practitioners, the choice of simulation tools can be bewildering. For others it may still prove advantageous to remain on-premises or adopt a hybrid on-premises/Cloud solution. In any event, if workloads are becoming too large to handle and more complex simulations are a growing requirement, it makes sense to consider HPC.

For impartial vendor-neutral guidance on your potential route to HPC, please contact us.

Find out more

Visit our website: redoakconsulting.co.uk

Red Oak Consulting
Expert advice, exceptional delivery

RO MS MANAGED SERVICES