

# Forging simulation on demand

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The simulation of hot and cold forging with the help of QForm V8 brings huge benefits to the companies in the UK and overseas who use it in their everyday practice. Our program is based on the most innovative computational methods and has a pioneering visual interface. Altogether its advantages can be summarized as follows:

- Very short introduction time to any forging manufacturing chain.
- Easy-to-learn, easy-to-use due to its outstanding user-friendliness,
- Outstanding facilities for identifying typical defects and problem areas.
- High accuracy and robustness of the simulation.
- Short simulation time
- Fast and highly qualified engineering support located in the UK.

Meanwhile there are many companies who still hesitate to implement simulation, not because they doubt simulation will benefit them, but because they believe they do not have enough new jobs to justify the cost of the annual license. Some companies may have produced the same similar products for years and the technology is well established. Nevertheless when a customer requests a non-typical product or some unusual order is placed simulation may have great impact on development time and cost reduction and provides a much more professional look of the company.

## New cloud solution for forging simulation

Ideally, forging and fasteners companies should have immediate access to simulation whenever they need it. Thanks to innovative development of QForm V8 we can propose a new service “**Simulation on demand**” based on a cloud solution. The simulation itself is run by a computational core on a high-performance server in the cloud while the program interface can be run on any computer or even a tablet at the user location. The interface and server communicate through the Internet.

The cloud solution is very flexible and scalable. You just have to install QForm V8 Cloud on your computer or tablet with Windows 8 (Fig 1). This program is identical to standard QForm V8 except that it has no simulation core. It can work in two modes: either connected to the server (on-line mode) or not connected (off-line mode). In the latter case you can prepare a new project for simulation and playback the results of previously run files. To run the simulation you should be on-line!



Figure 1. A tablet running QForm V8 Cloud

### **Safe and confidential**

The server on the cloud runs the simulation but doesn't store any source data or results. We have no access to your data thus cannot disclose your confidential information. Because results are stored locally on a client computer the simulation can be run only when you are connected to the server. As soon the Internet connection breaks the simulation stops while all the results are safe on your computer. If you re-establish the connection you can proceed with the simulation from the point of break.

Even while the simulation is running you can playback and analyze the results going forward and backward up to the point where the simulation is currently going on. After completion of the simulation all the results are with you and you can analyze them anywhere at your leisure in off-line mode.

### **How it actually works**

When some company is interested in cloud solution we offer them a certain amount of "simulation time" and provide them with login and password. They download and install QForm V8 Cloud and can start whenever they need it. The usage of simulation time is counted by actual performing of the calculations and not by the time you are on-line. As soon as the limit of simulation hours expires you will not be able to proceed with simulation but you will still be able to run your QForm V8 Cloud off-line and use the results of simulation for any kind of analysis or presentations. To resume the simulation you just need to ask for additional "simulation time".

The time required for simulation of a particular job depends on its complexity (as any simulation does) but also on data transfer speed and how busy our servers are with other jobs. Two latter parameters are difficult to predict so this is a limitation compared to running the simulation locally. If the data transfer speed is low the simulation core may wait for completion of the data transferring of the previous step before starting a new simulation step.

The Cloud solution is very flexible and scalable and it is a very good option to get started with simulation. Meanwhile if you need more intensive simulation work you can easily switch to the local simulation option where you have more control and are not dependent on communication lines. In any case "Simulation on demand" allows use of this powerful software tool when you actually need it. Such demand may occur unpredictably depending on the market situation.

A new user is required to pass our standard training course to learn the most efficient methods of simulation implementation in forging practice and how to get the most benefits from a simulation however the interface of QForm V8 is so clear and simple that you don't have to worry about forgetting how to set up and run a simulation even if the program is unused for some period of time.

Some typical simulation implementations in forging practice are listed below.

### **Forging competitive advantages: Production cost estimation**

Before production even starts you can begin to save money. Proper estimation of the manufacturing expenses provides firm background for the offer proposed to the customer in

terms of accurate estimation of required equipment capabilities, material use and necessary development time.

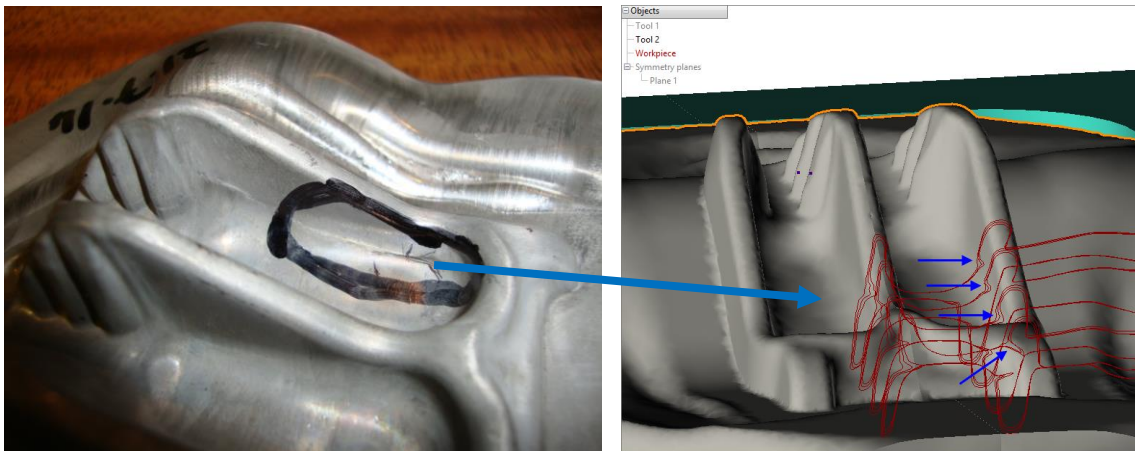
### Tooling cost savings

When developing the tooling set, several variants of the die design are usually required before the final die configuration is found. Eliminating such iterations not only reduce the cost but also reduce time to the market. Extending tool life by design optimization and implementing the most suitable tool materials is another way of saving tooling costs.

Using simulation we can generally reduce the cost of a tooling set by 2'000-3'000 pounds depending on its size and complexity. In case of big dies for the forging of crankshafts and axle beams the cost savings can be much bigger.

### Reducing production line downtime

The use of simulation reduces the number of trial forgings on the production line that in turn shortens the line's downtime. Again, its economic efficiency very much depends on the production capacity of the line, but typically the gain of operating time may reach 5 to 8% with respective cost savings. (Fig. 2).



**Figure 2. Flow-through defect in hot aluminium forging : a – photo of the forged part with defect location, b – loops of flow lines showing defect propagation in the simulation (Courtesy of DMM, Llanberis, Wales).**

### Material saving

This material saving is more significant when forging relatively expensive titanium and nickel alloys although even with quality steels it can save quite a bit. Typical weight saving as a result of simulation varies from 5 to 10% so depending on the material cost simulation can save up to 35'000 pounds per line in case of products in the aerospace or automotive industry.

The brief analysis above does not cover all aspects of the simulation profitability but shows that the collective savings by using our software is considerable. We also have to mention the increase of human capital because simulation provides much faster skill improvement of the staff and easier introduction and training for new generations of die designers and workers.