

**OVERVIEW:** Human factors can affect the success of a project. In 1997 the Clair Southern Development project was investigating novel design concepts for the well and drill floor areas of the platform. The success of this project, involving the development of a complex offshore installation, required that human needs were fully integrated with the systems hardware design. As expected, the project had the added complexity of drilling activities running in parallel with production activities. The key steps in identifying and controlling the potential hazards are described in this Safety information bulletin. Ian Hamilton (Human Engineering <http://www.humaneng.net>) explains.

## workspace modelling

### Well bay layout activity modelling

Workspace modelling of the well bay layout was conducted, in this case, using the Mannequin 3D workspace modelling tool.

The purpose of the modelling was to specify the height of walkways in the well bay area, examine the feasibility of maintenance and intervention work around the Christmas trees, and to specify the height of any additional steps required in the area.

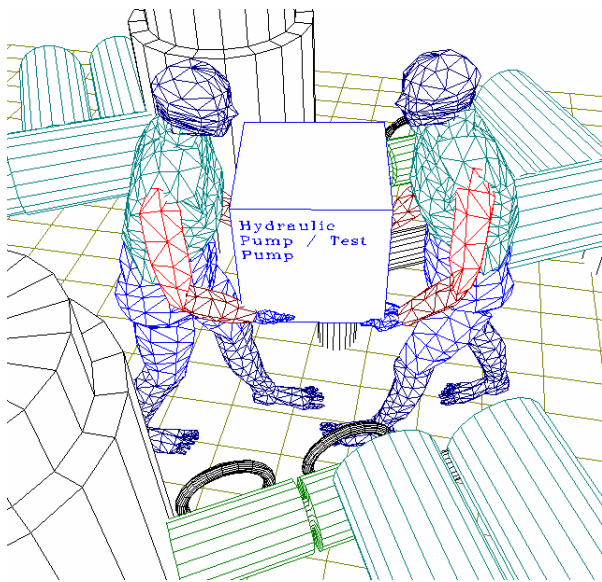


Figure 1 Two heavy build 97,5 percentile US males carrying a hydraulic pump/ test pump

Several activities were modelled including transportation of parts through the well bay and agreed tasks with the use of specified tools. Tasks were analysed with an emphasis on operating forces at varying heights. These were then compared to the user population to determine whether additional equipment was required to ensure safe operation without interfering with other activities, particularly production.

### The challenge

The challenge in the modelling phase of the work was to ensure that the user population, both US and UK workers, ranging from the smallest to the largest worker (5<sup>th</sup> percentile UK male to a 97,5 percentile US male) could be accommodated and yet keep the distance between Christmas trees to a minimum of 2,4 metres (see Figures 1 and 2).

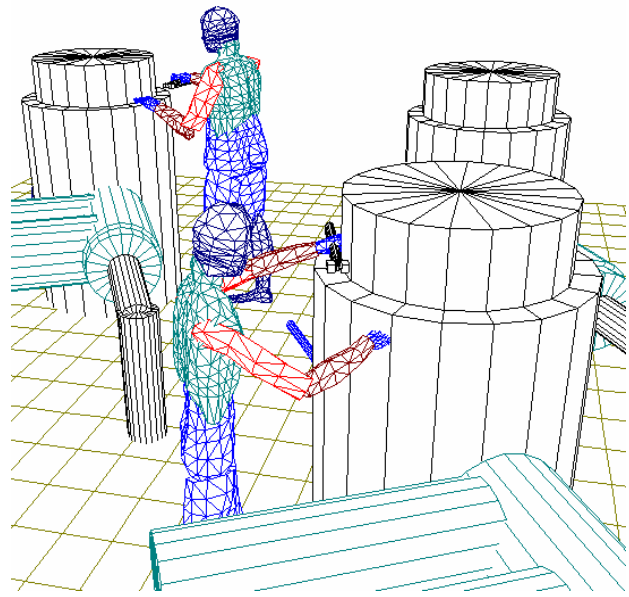


Figure 2 Light build 5<sup>th</sup> percentile UK males working on Christmas tree cap bolts

## Workspace modelling (continued)

### Valve operation and placement modelling

Valve operation and placement were also considered. Factors examined included operating forces, positioning of valves with respect to walkways and the use of steps for shorter stature operators (see Figures 3 and 4).

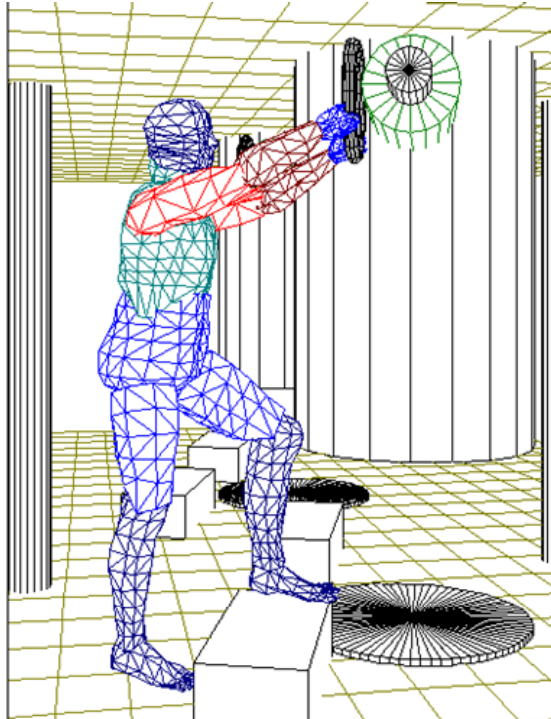


Figure 3 Heavy build 97,5 percentile US male operating valve

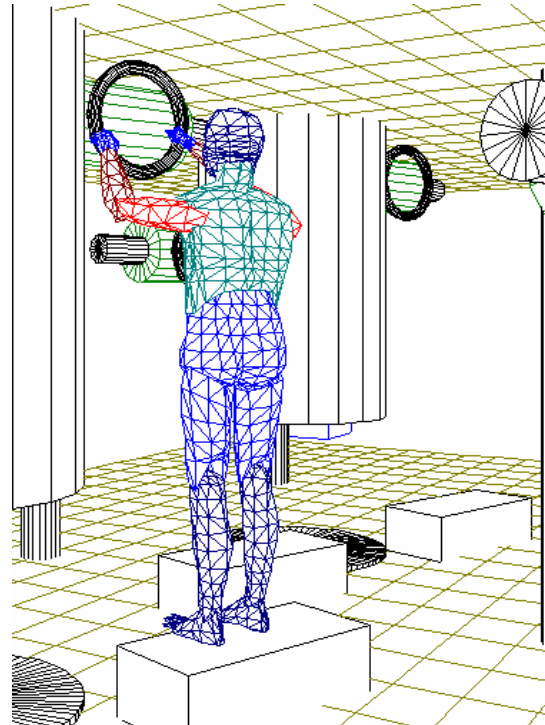


Figure 4 Light build 5<sup>th</sup> percentile UK male operating valve with the use of step

### Conclusions

The modelling was successful in representing credible and realistic work activities. As well as proving the feasibility of a reduced Christmas tree separation, the work also contributed to the specification of some details of their design and accessibility. The data from the project were used by the BP team to design the well bay layout with the assurance that the capabilities of the human operators had been taken into account. Furthermore, the minimum spacing of the Christmas trees necessitated by the project was able to be achieved without compromising the parallel production and drilling activities envisaged. The use of early human factors analysis in this project clearly demonstrated the cost saving in material and operations as a result of properly exploring human performance and its limitations.

Whilst this case study refers to early application of human factors in a project, a similar approach can be applied to the integration of human factors into existing installations. A suitable time to do so is during Hazard and Operability Study (HAZOP) reviews (or when using equivalent hazards identification/risk assessment tools).

### References

NexGen Ergonomics Mannequin 3D workspace modelling tool <http://nexgenergo.com>.