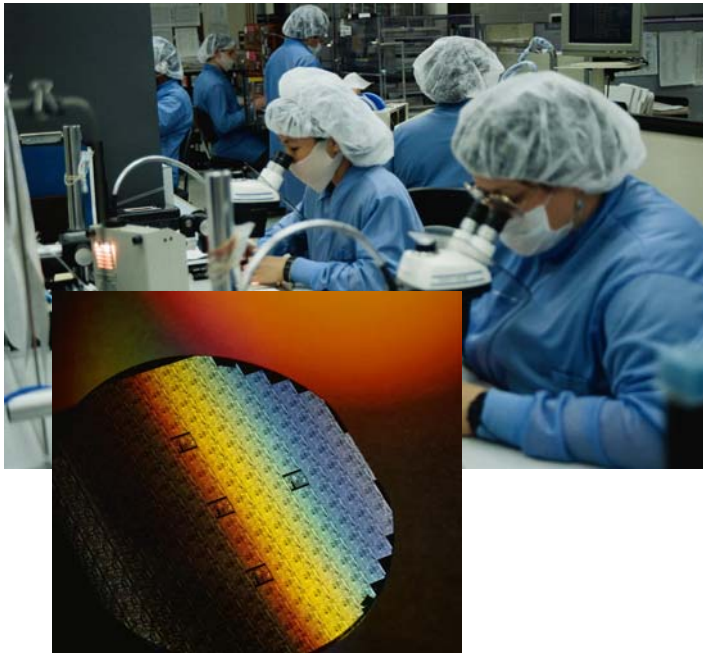


Simulating Fab Business Improvement at BAE SYSTEMS

BAE SYSTEMS

Process simulation and modelling using Lanner's WITNESS application has helped BAE SYSTEMS to make dramatic improvements to the production of advanced imaging devices at its semiconductor-type manufacturing facility (known as a FAB) near Towcester, Northamptonshire.

WITNESS has been integral to a business improvement programme that has halved product cycle times and increased capacity of some processes by more than 50 per cent.



"At first we did not believe the improvements that WITNESS was showing we could make," says Miles Wallis, Process Engineer at BAE SYSTEMS. "About 50 per cent of the business improvement can be directly attributed to WITNESS."

Success Leads to Increased Production Requirement

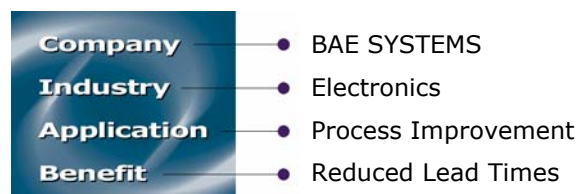
BAE SYSTEMS at Towcester design and manufacture pyroelectric uncooled infra-red detector arrays for use in a range of civil, industrial and military applications. The arrays incorporate a combination of silicon and ceramic based chips and are amongst the most advanced of their kind in the world. A typical application is in the detectors used by rescue teams to locate survivors of recent earthquakes buried alive under collapsed buildings.

We have reduced the overall cycle time from 90 to 35 days," says Miles Wallis. "Identifying key steps has led to a 60 per cent increase in the capacity of the ceramic stages of the process alone".

Production volumes at the FAB are relatively low compared with semiconductors used in consumer products, although demand for the high value devices has been increasing as more applications have been designed around the product's unique performance characteristics.

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To meet this increased demand BAE SYSTEMS needed to identify ways of increasing production at the FAB without a significant increase in machinery and equipment. Experience at other plants within the group suggested that simulation and modelling using Lanner's WITNESS would provide valuable insight into the manufacturing process that could be used as part of an overall business improvement programme.

Modelling a Complex Process

The manufacturing process involves up to 150 individual steps and takes a number of weeks to complete for each device. The company recognised that saving time at each stage or reducing the number of steps would have an immediate and dramatic effect on the overall length of production and free resources for additional capacity.

"The advantage of modelling is that every bit of data we use is real so the models are accurate simulations of our processes," says Miles Wallis. "I produced a capital justification to prove the business case for the investment and we decided to go ahead."

Once the decision had been made, Miles Wallis attended a one week training course at Lanner to learn how to use the new system. This was followed by two and half months spent designing and perfecting the model while continuing his other duties for the company. Building the model involved defining each step in the production process and entering a number of measurements and parameters. The objective is to provide enough information so that the application can produce an accurate replication of the processes in the real world. The completed model provides a visual representation of individual products as they pass through the manufacturing process using colour coded icons and data to represent separate pieces of equipment, holding locations, stores and operators in a 'virtual' layout of the real facility.

"Lanner provides a lot of insight into how to configure and use the program so that you can get up and running quickly," says Miles Wallis.

Immediate Business Improvement

Since installing WITNESS during the second half of 1999, BAE SYSTEMS has used it in its business improvement programme to analyse and adapt the processes involved in the FAB. The model has been used to check the capabilities of equipment and identify where bottlenecks are occurring to see if improvements can be made. This analysis has gone further than simply focusing on machines by looking at how staff use various pieces of equipment to see if additional training or different shift patterns would help improve productivity. The overall effects have been dramatic.

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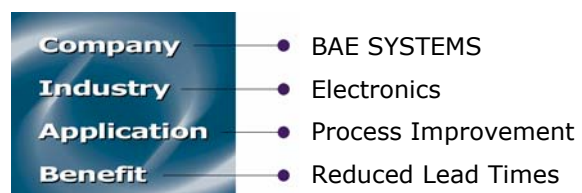
"WITNESS helped us identify which machines could be optimised to remove bottlenecks. In one case, the queuing time for a machine was reduced by 48 hours. We were originally making 30 block moves a week, but changes have resulted in vast improvements and we are now working at about 60 a week."

Additional Benefits

These improvements are impressive enough but there have been other advantages to the business. The reduction in cycle times has increased the potential capacity of the facility without any need for additional capital expenditure. It has also lowered the amount of stock in progress, reducing the amount of cash tied up in production.

The new 35 day cycle time also allows BAE SYSTEMS to introduce process changes more easily because design modifications have an effect over shorter timescales.

Simulation and modelling has also helped the company to assess the potential for investment in new equipment. The decision to purchase a new machine recently was supported with evidence from WITNESS that showed shift time savings would result. Similar techniques also



highlighted that training more operators to use the machine on an extra shift would increase overall productivity and accelerate return on the investment.

Adapting to Changing Business Conditions

The model was designed with flexibility in mind and has been refined gradually to reflect new ideas. One of the strengths of the application is that it can model the implementation of changes very quickly, enabling Miles Wallis and his colleagues to gauge the impact of any proposals before they are implemented for real in the FAB. The company has already used the model to see how introducing some prototype detector chips will affect production of existing products.

But experience has shown that getting the model correct is vital. When WITNESS was used to model one part of the manufacturing process it did not lead to any improvements.

"It showed us that the model was wrong," says Miles Wallis. "So we went back to basics to see what was wrong. We are now building a new model."

Although simulation and modelling are based on complex mathematics and numerical analysis, Miles Wallis does not believe that spreadsheet based systems can provide the level of accuracy or sophisticated analysis provided by applications such as WITNESS because defining the calculations and formulas to create the model from scratch would be too complex.

Future Utilisation

"We will use WITNESS in future for all new projects and changes," says Miles Wallis. We can quantify time savings, capacity requirements and the need to upgrade specific machines. It's raised expectations and helped us prove the best way of operating the plant."

