

# Smart scheduling gives 120 more operations per year



Marie Högberg, Head Planner; Jonas Skoog, Method Engineer and Stefan Skoog, Operator, with a component destined for one of the ovens in Heat Treatment.

GKN in Trollhättan has recently gone live with a project to optimise scheduling in the Heat Treatment area, SOLV. The project is aimed at increasing the rate of utilisation by 2% or, put another way, to be able to run 120 more operations per year.

**KARIN THÖRNBLAD** has been the project manager and is pleased to see the project go live.

"It's taken a lot of work to come this far. The calculation model is complex because there are special operations in heat treatment such as solder and titanium operations which involve special calculations."

It all began when Karin did her PhD studies on optimal scheduling in the multitask cell 2008-2013. The objective was to come up with a scheduling method which, using mathematical optimisation, would create a production schedule for the coming 24 hours within around 15 minutes. Marie Högberg in Heat Treatment heard about the work:

"The workload in Heat Treatment is expected to increase which will stretch capacity, so we wanted to test if Karin's calculation model could help us to make more efficient use of the furnaces," says Marie.

A concept study started in March 2014 and was completed by December 2014. Now, less than a year later, the system is up and running.

Heat Treatment has seven furnaces of which six are in use. The seventh is new and will start being used in the near future. A new schedule is created for the furnaces every day for which the optimisation model takes into account which components are in the queue, which programs are to be run, and which furnaces and fixtures are adapted to the programs and whether or not a cleaning cycle is necessary prior to the operation. All requirements and limitations are to be adhered to while making the flow as efficient as possible.

A new schedule is produced each day. An operator with a planning role produces the schedule in the morning which is used until the following morning when a new schedule starts. Knowledge of the

type of work on its way into Heat Treatment was not previously easily available. It was also difficult to plan all the work in the area at times of high workload. When creating a schedule, the calculation model takes into account all work expected to arrive within a stop time, i.e. all the work present in the Heat Treatment area and work which has started its preceding operation.

Batching, to have several products in the furnace at the same time, is a possibility and is highly advantageous because heat treatment usually involves long process times.

"The schedule provides optimised utilisation and even looks to use the unmaned time between 18:00 and 22:00 on Sundays as far as possible," says Karin.

**GKN IT** has been involved in the project and, among other things, has created the user interface for presenting results. The operator retrieves information on incoming products from SAP, as a text file which is entered into the planning tool which manages input data for the optimisation calculations. The planning tool is linked to the furnaces' control system and thus has information on work in progress at the start of the schedule. The operator then enters times for planned maintenance of the furnaces,

for example, before the optimisation calculations are launched. A few minutes later, the complete schedule is published on a web page provided by GKN IT. The schedule is presented both as list sorted on start time per furnace and as a graphical calendar. One positive aspect is that the operators can log into the operator menu and start orders directly from the web page. This allows operators to see all the work to be done and what next should be loaded into the furnaces.

"We have trained operators in the system and there has been both positive and negative feedback. Some feel that it is complicated, others that it is simple. We hope of course that all will find the system easy to use in the end and that it contributes to a better workload," comments Karin.

Ten people in total will be trained; five operators and five planners, two per shift as Heat Treatment is operated by a five shift system.

The project objective is an easy-to-use functional planning tool which provides an overview of incoming work and a practical schedule. In numbers, it's about reducing queue times by 5%, delays by 5% and increasing the rate of utilisation by 2%, which equates to 120 more operations being able to be run per year.

**STEFAN SKOOG** is an operator in Heat Treatment and has been involved in the project since the very start:

"It's been an unbelievable journey and probably the best project that I've worked with. The system helps us to work smarter by loading the right component in the right furnace. That means that we can maximise the use of the furnaces and avoid unnecessary cycles. We can also run the furnaces unmanned as the system keeps a check on things. It's a living system that is updated on a continuous basis."

Jan Dippe is manager of the Heat Treatment area and is also very pleased with the project.

"This is great for us. We gain control over what components to work on and when. We have a whole other level of predictability compared to previously. This means that we can increase volumes and bring in external customers, and thus reduce our hourly cost. Put simply, SOLV helps us to plan our work and fill the business."

**THE PROJECT** is not yet formally completed. Among other things, Karin will write a project report and results are to be evaluated, as well as some IT work that remains to be done. The results need to be evaluated over a long period of time so the project will not be finished until March 2016.

It's not just Engine Systems in Trollhättan who can use the calculation model. The principles of the model can be applied to other machines and adapted as required.

The next step for Karin and her calculation model is already under way as she has been asked to carry out a concept study in the measurement centre in C-workshop.

"It will be interesting!" ■



Karin Thörnblad and Jonas Karlsson from IT view the schedule for the day on the new computer in Heat Treatment.