



Workload Control at PDS Engineering

In Collaboration with Lancaster University Management School

More than just a business school

Putting theory *into* practice

Company Overview

PDS Engineering is a small precision engineering company in the North West of England. The company manufactures a wide range of complex components to individual customer specifications on a one-off and repeat basis and offers a complete solution from prototype design & development through to delivery of the finished product.

Using conventional manufacturing techniques and cutting edge CNC technology, PDS supplies many major multinational OEMs in a number of highly demanding industries where short lead times, high quality and just-in-time delivery are essential. This includes the aerospace, defence, automotive, chemical, commercial, textile and food industry sectors.

PDS is highly regarded for its engineering expertise and flexibility and has played an important role in many high profile special projects, including attempts on the land and water speed records such as by manufacturing parts for the Thrust Car, the British Steam Car Challenge Team and Miss Windermere VI. PDS was also recently involved in the restoration of Donald Campbell's Bluebird after it was recovered from Coniston in the Lake District.

Design of the British Steam Car



"In the past, with a job that we couldn't do on time, we would have been 'crashing on' unaware that we couldn't make the delivery date. Now we know where and when to add in overtime to make sure we deliver on time."

Annette Weekes | Operations Director,
PDS Engineering

"Operating in the Dark": Order Management Prior to Workload Control

Before implementing Workload Control, staff at PDS spent much of their time 'fire fighting' – running from one urgent job to the next, as is typical in many small manufacturing companies.

Details of the current order book were held in a simple spreadsheet and production was planned at regular meetings without any significant software support. Key information was often distributed across different systems and spreadsheets, taking significant time and effort to retrieve.

Bids for new work were prepared manually based on experience and by performing rough cut calculations. This made it difficult to assess the effect of accepting new work on the existing order book. When orders were accepted, they were often quickly released onto a congested shop floor and it was unclear which orders operators should be prioritising.

Some customers placed rush orders on the company that had to be expedited through the shop floor in order to meet delivery dates but without software support it was often difficult for the management team to determine how best to adjust capacity to cope with such short term disruptions. Moreover, information feedback from the shop floor to the management team about the progress of orders on the shop floor or about the utilization of capacity was sometimes delayed.



Some of the latest
technology
employed at PDS

Workload Control at PDS Engineering

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While PDS was able to perform extremely competitively using manual and relatively ad-hoc means, it was understood that if the firm was to grow, such an approach would soon become unmanageable. Moreover, it was anticipated that having a suitable software system for production and capacity planning would become an important order winning criteria with key customers in the near future. With a need for an efficient solution suitable for low-volume high-variety production environments, and one which would provide greater support for managerial decision making, PDS turned to the Workload Control solution provided by Lancaster University Management School.

"Previously, we had no idea what our capacity was at all!" **Nigel Turpin** | Production Controller, PDS Engineering

"The Light at the End of the Tunnel": Order Management Using Workload Control

PDS Engineering 'went live' with Version 4.0 of the Workload Control software system, developed in C# and supported by a MySQL database, in late 2008. The implementation has provided PDS with an end-to-end solution and dramatically changed the way in which the business operates, offering decision support at every key production stage in the order cycle. This has led to a wide range of benefits, some of which are listed below.

Improved customer quotation management:

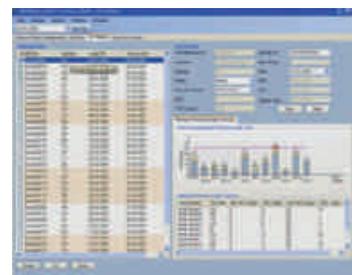
Based on basic information about a prospective job, the system proposes a lead time or delivery date, considering the current shop load, capacity, and order winning performance of the company. Using the system, PDS are able to make more informed quotations and determine delivery dates that are both achievable and competitive.

"People on the shop floor could soon see that it was a big improvement on what we were doing before ... it makes people's jobs a lot easier." **Andy Pinder** | Chief Turning Engineer, PDS Engineering

Improved delivery performance:

The system has improved PDS' ability to meet delivery dates. When the company wins a tender, the system backward schedules to check that the delivery date can still be met. If it is infeasible, the user can adjust capacity or the schedules of other jobs, or forward schedule to find a new date to support and strengthen negotiations with customers.

"A job that might only take 5 days to manufacture could take a lot longer because it was 'sat' on the shop floor waiting for key operations." **Steve Harker** | Chief Milling Engineer, PDS Engineering



The job release interface

"Planning and controlling production in low-volume high-variety job shops, such as at PDS, is a major challenge as requirements can vary significantly from one job to the next. The production planning and control functionality contained in many leading software packages is not designed for this environment but for high-volume low-variety flow shops. This is what makes our Workload Control system different –our hierarchical methodology, which begins control from the moment a quotation is made right through to dispatch, has been developed specifically for the needs of companies like PDS Engineering. It begins with determining reliable delivery dates for each order and emphasises the importance of releasing the right work to the shop floor at the right time." **Mark Stevenson** | Lecturer in Operations Management, Lancaster University Management School

“Before we discovered Workload Control, nothing out there seemed to suit our business. Other systems just didn’t seem to do what we would want them to do – they didn’t seem to have the production & capacity planning that we would need yet they had lots of other functions that we would have had to pay for but wouldn’t have used... There are lots of other small companies still out there that are in the same position we were in.”

Annette Weekes | Operations Director, PDS Engineering



Putting theory *into* practice: Workload Control at PDS Engineering

Reduced work-in-process:

Under the Workload Control concept, the level of work-in-process is restricted. Jobs are held back from the shop floor in a pre-shop pool based on the principle that the date on which a job is started can be delayed without delaying its completion. The system helps management at PDS to find the latest date by which a job must be released if the delivery date is to be achieved and has led to a reduction in the level of work-in-process. Whilst jobs remain in the pool, PDS are also better able to cope with specification changes.

"In the past, there would have been a lot of fire fighting because they [PDS]weren't able to control the influx of orders and did not have the capability to accurately reschedule... when you are fire fighting, you're not as focused on quality." **Mark Parker** | Supply Chain Development Partner for a key customer to PDS Engineering

Improved product quality:

Key customers have noted an improvement in product quality. Less time is spent 'fire fighting', meaning more time for innovation.

Clearer priorities:

By providing a latest release date, the system's scheduling and order release methods have helped managers at PDS to ensure that operators are working on the most urgent orders. Meanwhile, the leaner shop floor means that the shop floor supervisor can maintain a 'big picture' understanding of the shop floor and make quick frontline sequencing decisions.

- ✓ Improved customer quotation management
- ✓ Improved delivery performance
- ✓ Reduced work-in-process
- ✓ Improved product quality
- ✓ Clearer priorities on the shop floor
- ✓ Increased shop floor transparency
- ✓ Understanding of capacity constraints
- ✓ Enhanced ability to meet customer audits
- ✓ Increased efficiency and responsiveness
- ✓ Improved information integration

Increased shop floor transparency:

Information is regularly fed-back from the shop floor to the system, which monitors schedule adherence, meaning management in PDS have greater awareness of the current state of the shop floor and the progress of jobs. Awareness is also heightened using the performance management module of the system.

Understanding of capacity constraints:

The system shows the distribution of workloads and capacities across resources giving management greater understanding of where capacity is needed. Users can adjust the allocation of human resources in response to short and medium term events, simulating the effect of changes before taking decisions in reality.

"We do a lot of flow analysis now ... the system helps us to move orders through the shop better than before, avoiding bottlenecks." **Steve Harker** | Chief Milling Engineer, PDS Engineering

Ability to meet customer audits:

The system has helped PDS pass the audits of important customers who are increasingly looking for suppliers to have a comprehensive production management system.

Increased operating efficiency:

The software has sped up several administrative tasks. For example, it produces route cards, planning sheets and dispatch notes that used to be created manually, saving the company time on every order.

Information integration:

The system has significantly increased the availability of information within PDS, providing a database of the key information needed to make informed and consistent decisions and to be more responsive to customer queries.

“PDS Engineering have been excellent partners in this project. They have really embraced the principles of Workload Control and reaped the benefits. In return, we have been able to enhance our solution to more comprehensively meet the needs of practitioners.”

Linda Hendry | Professor of Operations Management
Lancaster University Management School



Meet the Research Team at Lancaster

Linda Hendry



Linda Hendry is Professor of Operations Management in the Department of Management Science at the Lancaster University Management School (LUMS). She has been researching Workload Control for over twenty years. Linda is a member of the Institute of Operations Management and the Supply Chain Management and Modelling Research Centre at LUMS. She is a regular speaker at international conferences, has published extensively in academic journals and has collaborated with a wide range of companies. Her main research interests are in production planning and control in customised production contexts, Six Sigma, and Manufacturing Strategy.

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Mark Stevenson



Mark Stevenson is a lecturer in the Department of Management Science at the Lancaster University Management School (LUMS). His doctoral research, completed in 2006, focussed on Workload Control and included developing an earlier version of the Workload Control software. He is a member of the Institute of Operations Management and the Supply Chain Management and Modelling Research Centre at LUMS. His main research interests are in production planning and control in customised production contexts, ERP systems, and supply chain management.

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Planning and control for low-volume high-variety manufacturing

"The system and its output look very professional, and it provides traceability. It is easy to follow and an auditor can quickly look at it and evaluate the business... they are more confident that we are doing the right things."
Annette Weekes | Operations Director, PDS Engineering

"The system has made them more 'fit for purpose' to supply the leading aerospace companies ... it's a good tool and meets the needs of a typical SME."
Mark Parker | Supply Chain Development Partner for a key customer to PDS Engineering

"It's so easy for our Production Controller to use... if I ask him a question, he's got the answer ready for me very quickly."
Andy Pinder | Chief Turning Engineer, PDS Engineering