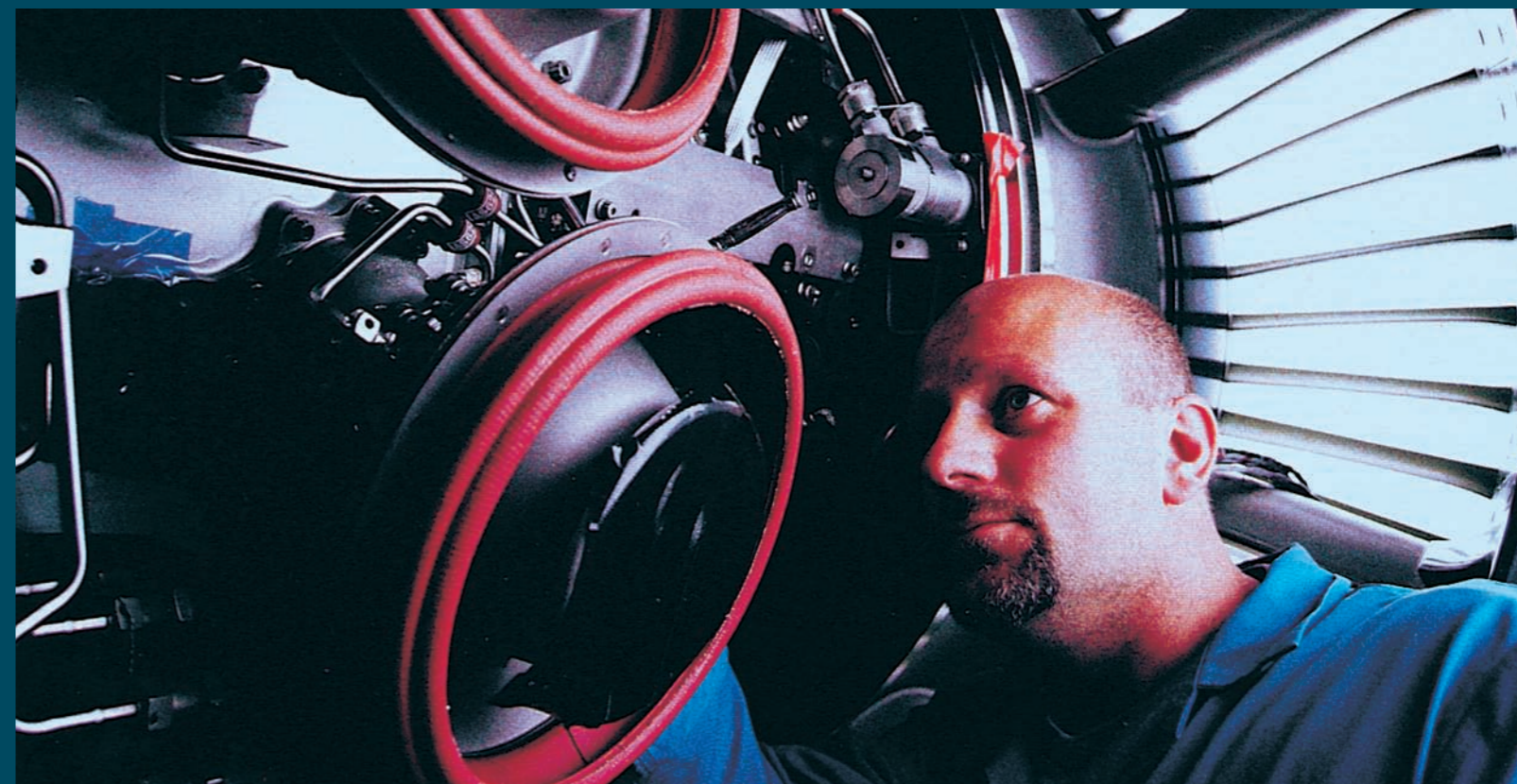


# How to excel in maintenance, repair and overhaul.



Make MRO efficient,  
maximise productivity and  
minimise surplus stock.



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Part of Collinson Grant Group Limited

## Common managerial challenges

Providers of maintenance, repair and overhaul (MRO) do try to keep their facilities full, costs down, and customers satisfied. But it is harder and harder to win new business and to compete on price.

Worse, lots of fleet operators are slashing maintenance – a strategy of ‘defer, delay, destock’

To survive as revenue shrinks, managers are trying:

- to speed up the introduction of ‘Lean’
- to cut down the staff and facilities
- to strengthen ties with original equipment manufacturers (OEMs)
- to set up operations in cheaper regions.

### MRO – how Lean is applied

The Lean techniques first developed in the car industry have since been applied in many manufacturing firms and more recently in MRO. Methods such as Value Stream Analysis and Rapid Improvement Events are used to find and eliminate any activity or process that absorbs time and cost but does not add value for the end user or customer.

To reduce complexity and achieve sustained savings, employers need to inspire the entire workforce to adopt Lean thinking. Collinson Grant helps organisations in many sectors – throughout the United Kingdom, Europe and the United States – to do just that.



## Rolls-Royce – Aero Repair and Overhaul

Rolls-Royce AR&O provides services for airlines throughout the world. Collinson Grant helped to review how time was spent and cost incurred and recommended how to improve both. Together, we drew up a plan to tackle the short-term needs and to make the business more efficient.

“Collinson Grant was instrumental in reducing operating costs at Rolls-Royce Aero Repair and Overhaul. The main outcomes were to consolidate skill groups with fewer resource owners and locations, to change key processes and to improve operations. The results have been very useful. The business has continued to grow revenue from a far more efficient cost base, while the staff cost has reduced by 10%.”

Huw Treharne – Director of Human Resources

### Lean 'pulse lines'

The 'pulse line' is an application from Lean that provides particular benefits for MRO.

Flow lines were pioneered by Henry Ford. He realised that rather than move skilled tradesmen, equipment and materials (the 'agents' of production) from one stationary car to the next, it would be more efficient to keep them in one place and move the car (the 'item' of production) to them.

#### In MRO, 'flow lines' have evolved into 'pulse lines'

In a pulse line, maintenance is divided into a series of equal packages of work. The staff, equipment and materials required for each package are calculated and placed in position. And the 'item' to be maintained is moved or pulsed from one area to the next.

Each area is like a pit-stop in Formula One. And the item flows rapidly from one pit-stop to the next. This radically reduces turnaround time; maintenance time; cost; and the activities that do not add value, such as re-setting schedules, re-coordinating operations, and 'progress chasing' in general. But it boosts managerial control; the forecasting and use of personnel, equipment and spares; and the proportion of value-adding maintenance.

### How 'Lean' has been applied in aircraft maintenance

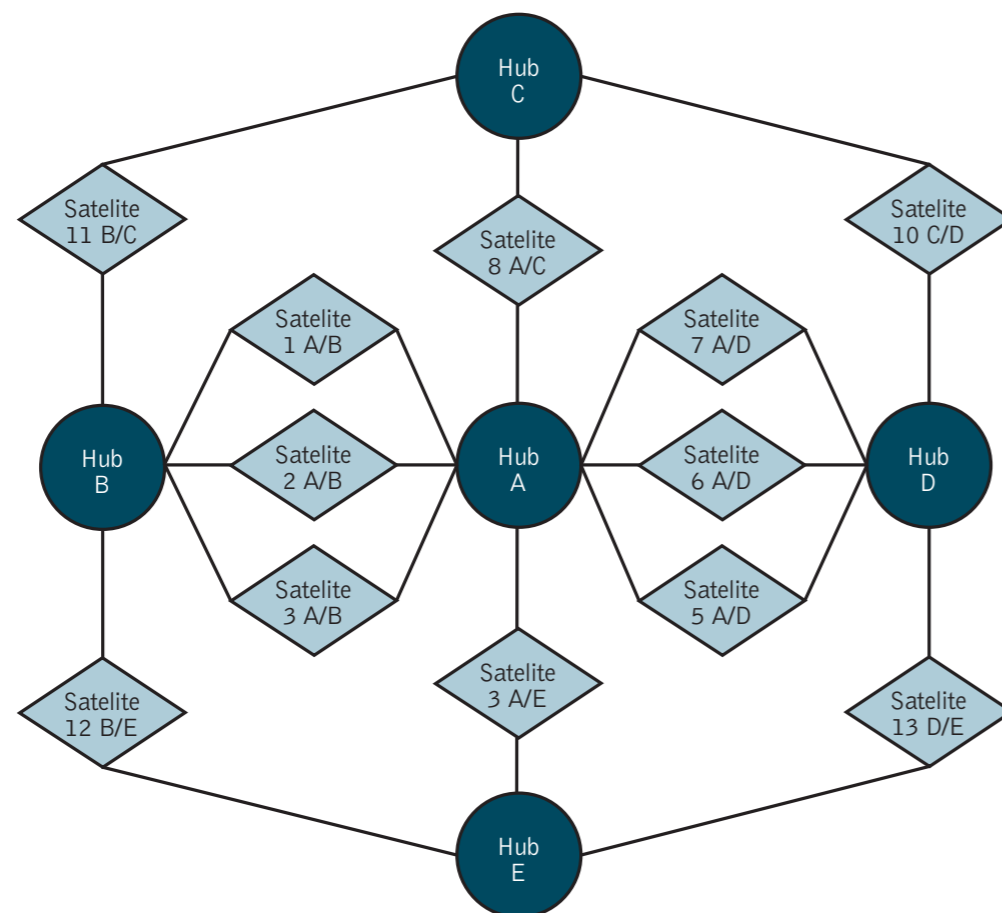
- Maintenance cycle time is the time taken to receive a component, repair it, and return it to stock for re-use. Reductions of 75% - 90% are achievable.
- As the quality of repair rises, fewer components are rejected as faulty or require re-work. Improvements of 40% have been reported.
- The longer a repair takes, the more spares need to be held. Lean can cut inventory by 75% and the number of items under repair at any one time (work in progress) by 95%.
- Lean helps organisations to sustain output while cutting the staff by 30 - 50%.
- More efficient processes, with reduced waste, should need less space and infrastructure. Applying Lean to the design of MRO firms has reduced the space needed by 50 - 75%.

## Structuring operations

MRO services have traditionally been set up to offer all activities at most depots. But now, to reduce costs, companies are reorganising their facilities, equipment, inventories, and staff for each fleet, as far as is practicable. A 'hub and satellite' model can operate two distinct, specialised capabilities in unison:

- The 'hub' – for infrequent primary maintenance, complete overhauls and any fleet-wide modification, located in a few larger facilities.
- The 'satellite' – for forward maintenance, frequent minor maintenance and operational repair in more but smaller facilities. Each unit can be shared between neighbouring areas to increase the use of and reduce the investment in fixed assets and inventory.

### Example of a hub and satellite model



## The forgotten principle of productivity – wringing out the costs

The profit and loss statements for most MRO firms usually show two primary costs.

The first, usually the largest, is the cost of purchases. But this is usually determined by OEMs and global commodity prices, and so is similar for all competitors in the sector. It can be very difficult to create a competitive advantage here.

The second is governed by the number of people it takes to run the operation, and is reflected directly in salaries and indirectly in the buildings and facilities required to house the staff – IT, utilities and so forth. The largest internal cost is people: and the factor that determines the number of people is productivity.

Productivity is the most controllable determinant of cost, profitability and competitiveness. Usually, productivity is calculated by dividing output by input. In MRO, it is the total worked hours (direct and indirect) required to produce one unit of output.

As a general guideline, MRO organisations should split their efforts to improve as follows:

- 50% on raising productivity
- 30% on speeding flow and reducing inventories
- 10% on enhancing quality
- 10% on developing people.



## Manchester Airports Group

“ In looking for opportunities to reduce cost whilst maintaining service, we studied the number of passengers moving through the airport terminal and found areas of potential ‘waste’. Collinson Grant helped us to improve processes and to work more flexibly to match capacity more closely with demand. Their expertise in Lean operations provided us with fresh ideas and real challenge. And the costs saved were well beyond the original targets set. ”

Simon Whitby – Operations Director, East Midlands Airport

## Cash on the shelf – and its hidden impact

Stock turns are a function of the different control systems managers choose to run, such as SAP, MRP, purchase quantities, re-order points etc. If a replacement part has a purchase order lead time of two weeks and yet it turns at a rate of 4 times per year, you may be well advised to ask: ‘Why is it not turning at a rate of 20-25 times per year’?

Inventory in a Lean context is really about the rate of flow. The lower the inventory, the more flow there must be.

Most MRO organisations start with poor flow: the time spent on actual repair work is often a fraction of the total time that an item is inside the depot. Usually there is inventory in the organisation’s flow paths, but it is not moving quickly enough.

Inventory doesn’t lie. It is one of the best indicators of whether managers are really getting somewhere in implementing Lean. As a starting point, there should be excellent measures to track movement in inventory for separate flows of work.

Many maintenance organisations measure and track stock turns as a key performance indicator. But often the results fail to attract managers’ attention. The problem is that improving stock turns from 3.26 to 3.59 may not sound like much. In fact, it may point to a significant reduction in working capital. Reducing inventory improves cash flow and return on assets.

Some organisations do not report cash flow at depots but in a consolidated, corporate statement. It is then vital to track and report local movements in cash flow as a ‘cash contribution’ to the corporate group.

Inventory drops as you get Lean, flows of work accelerate and turnaround times reduce. Revenue grows as customers become more and more pleased with how fast things flow through your organisation.

## Fleet availability

For operators and maintainers of fleets, availability is as important as reliability. An independent, world-wide review found a wide variance in the cost, efficiency, reliability and availability of maintenance for rolling stock in the rail sector and in the performance of passenger carriers.

A pragmatic definition of availability is the number of vehicles ready for use on peak, revenue-earning services. Non-availability can be categorised as:

- The number or percentage of vehicles needed as an 'operational reserve' for exceptional traffic.
- The number or percentage of vehicles not available because of planned and unplanned maintenance, including ancillary activities – the so-called 'workshop reserve'.

The cost of capital represented by the excess fleet in the workshop reserve is sometimes hidden – neither explicitly analysed nor managed. The capital costs of holding a large workshop reserve can add as much as 50% to the unit maintenance cost for a given fleet. From the operator's perspective, it is worth managing this cost as effectively as the maintenance process itself. For the maintainer, there should be scope to charge higher prices for maintenance that reduces significantly the proportion of the fleet out of service. Lean has been successfully applied in the UK's rail and bus sectors to tackle these problems.

### How 'Lean' has improved MRO operations in transport

#### Train maintenance

- 25% reduction in waiting time
- 20% decrease in turnaround times for train examination
- 20% increase in depot capacity
- 20% reduction in train movements.

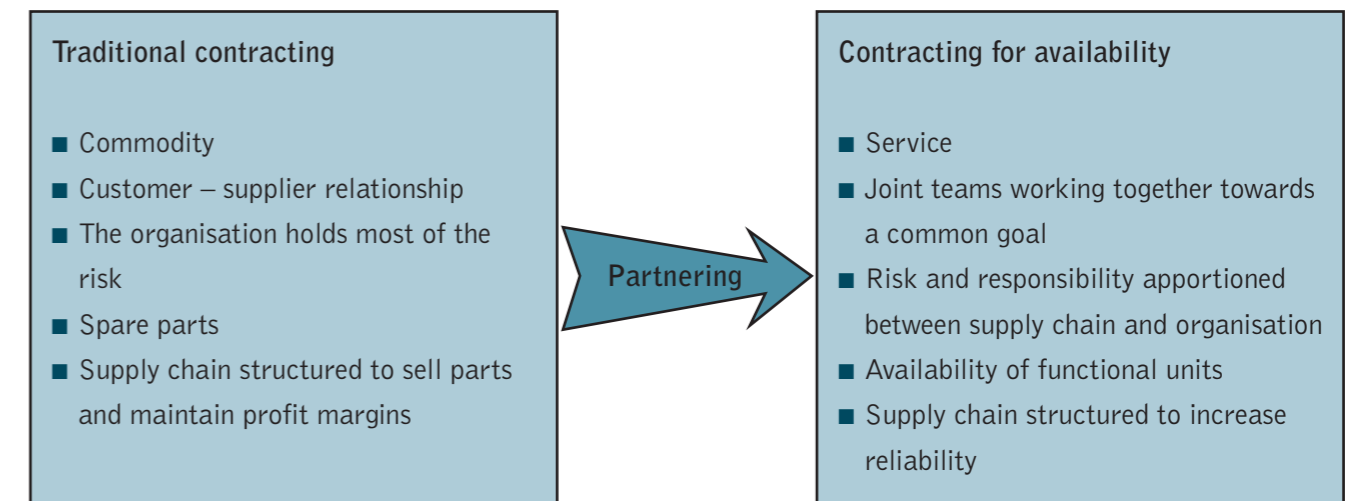
#### Bus maintenance

- 30% reduction in inventory
- 50% reduction in external engineering costs
- 20% reduction in lost mileage.

## Supply chain

Maintenance technicians who are short of a part often take one from another vehicle. But such 'cannibalization' masks delays and should be limited. Poor performance in the supply chain should be highlighted and appropriate measures taken to rectify systemic deficiencies.

The evolution from traditional repair and spares to availability contracts requires a fundamental change in the way an organisation works with its suppliers. Frequently, relationships with suppliers of logistic support are adversarial, to mutual loss. Partnering with carefully selected providers and offering the right incentives to optimise availability is becoming a more common and realistic way to support fleets. It offers availability contracts that deliver an agreed number of units (be it buses/trains/aircraft/engines etc) at an agreed capability over the length of the deal.





## Hanson – America

We worked with Hanson for several years to set up robust processes, better controls and more efficient organisations. One project introduced Lean and good managerial practices throughout the company's activities.

“Collinson Grant was instrumental in supporting us as we set out on our 'Lean' journey. Their expertise in how the tools and techniques can be applied to best effect gave us the initial momentum we needed to pursue improvements in processes and practices. Figuring out where to start can be quite confusing. Collinson Grant offered us practical advice based on a thorough analysis and understanding of our business. And the ongoing project support was a key part of our success.”

Richard Manning – President, Hanson Building Products

## Putting our knowledge and experience to work

Every organisation should adapt Lean to its own operating environment and priorities. Off-the-shelf packages rarely work. So we dig deeply to unearth the root causes of problems and the potential solutions – immediate and longer-term. We galvanise managers and their staff to make real improvements in their everyday work.

Collinson Grant has been helping managers to achieve better operational results for almost forty years. Our work concentrates on improving processes, reducing costs and restructuring. Lean thinking is a big part of our overall approach. We offer practical solutions, based on rigorous analysis, and then help managers to apply the plans to enhance performance.

Our support is tailored to the circumstances of each business, be it:

- a localised problem – a complexity or bottleneck that is proving hard to solve
- an operating process – a review to transform the performance of a complete product line or service
- organisational transformation – tackling all primary and supporting processes to transform radically the organisation's overall performance
- extended improvements – improving processes upstream into the supply chain, or downstream into the customer's distribution network, to improve performance further and increase the customer's satisfaction.

Our consultants have all been senior managers in large organisations. They understand the day-to-day pressures on managers, and how to achieve results despite them. Our collective experience includes many assignments in transport – air, road, rail and sea – often reviewing the arrangements for maintenance and repair.

## Providing a broader perspective

Using Lean to improve how organisations work is only one part of what we do. Collinson Grant is also good at designing organisations, establishing rigorous managerial controls and reducing complexity in everything from supply chains to the management of people. We have restructured large companies in the United Kingdom, mainland Europe, and the United States. Our consultants also advise on relocations, shared services and reducing costs. We work alongside senior managers to increase profits and strengthen competitiveness.

Collinson Grant's emphasis is on results and value-for-money. We expect to give a first class return on the investment in us. So we do not recommend action unless we are sure that the outcome will be worth it. We are not afraid to give bad news, or to champion ideas that may not be welcome.

**Skills** – most of our work is on three themes – organisation, costs and people. We use this simple framework to manage complex assignments - often with an international dimension - and to support managers on smaller, more focused projects.

**Experience** – it takes a good team to make lasting gains in large and complex businesses. Our consultants have very different skills and experiences. They can manage operations and get the best out of processes and people. They offer sound knowledge, fresh angles on old problems, and the personal skills to take hard decisions.

**Scope** – Collinson Grant works with large companies in transport (air, rail and road), chemicals, engineering and many other process, service and manufacturing sectors.

## Even the largest projects start with a simple conversation

If you'd like to meet us, hear more about our services and perhaps discuss your own business needs, then please contact:

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