**EngPro**
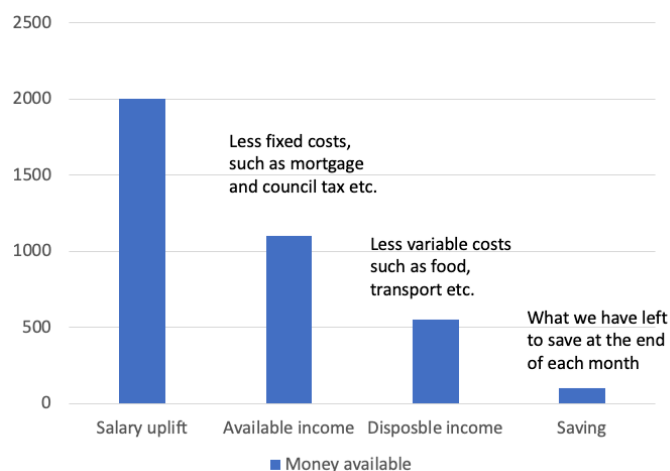Solutions

Deployed productivity –
the currency of maintenance

## Introduction

For those that know me well, know that I talk consistently about productivity and the importance it plays in having controlled management of our maintenance. In a previous article we discussed the desire to have efficient maintenance, however, desiring it and knowing we have it, are two very different things.

We can measure how effectively we are performing from the outputs we seek. Most transport industries require a number of vehicles per day to meet the service requirements, usually termed *availability*. As we discussed in the previous article service metrics, such as availability are so vital to the revenue generation of the business, they naturally take a high ranking position in the executive metrics.

### Why currency?

We all understand money. Each month we have an upload of money into our bank accounts, wages. From that we have mortgage, council tax, gas and other known charges. We then have some variable costs such as food and leisure; leaving us what we call disposable income. From this disposable income we have choices to fund holidays, hobbies, travel, gifts etc. We can of course save and invest some of our disposable income.

When our money has gone, it has gone; we can't suddenly magic extra funds, we have to wait until the next wage upload. A friend once said to me jokingly, "Why is there always month left after the money." Perhaps not spending his currency wisely?

## Deployed productivity ($P_d$), the currency of maintenance

In a similar way we can measure the currency of maintenance, which is hours of time available. Consider the fictious example below
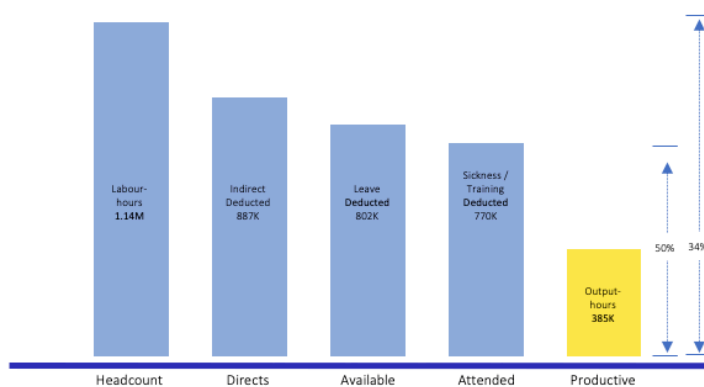


Our engineering team wage bill will buy a certain number of labour hours per year, far left hand column. The right hand column indicates the hours that we sell (or output, where there is no actual sale).

The difference between the left and the right column is called **_Deployed Productivity_**; it measures the overall efficiency of the engineering business, its processes, its headcount management, its output effort – most everything in fact. (In the example above it is shown as 34%). It is a fantastic leading indicator of profitability, long before the monthly P&L is presented. Over many years EngPro have been measuring operational performance and we know that if the Pd is not north of 50%, the engineering function will, most likely, be loss making.

At column two we deduct the indirect heads, leaving only direct heads. Often we find when discussing this point we encounter long debates as to who is a direct. Both direct and indirect heads are vital and valuable members of the business, we need both; the distinction is only important as it is the direct headcount that can produce what we sell, completed maintenance hours.

**Directs** – In our diagnostic tools we class a direct as anybody that is directly involved in producing the maintenance output. So, Technicians, Mechanics are naturally included; so too are Technical Team Leaders, Stores personnel, and some of the front-line admin staff. Engineering (Technical Services) fall into two camps, generally if they are directly supporting the production effort they will be directs, if more 'back-room' they would be indirects.

**Indirects** – are those other equally vital roles such as Human Resources, Technical Support, Management, Admin Staff, Planning, Procurement etc.

# 3: The currency of maintenance

## What is a good direct to indirect ratio?

In a large organisations, such as, some of our bigger airlines and rail operating companies, a ratio of 5:1 is not uncommon. These organisations can benefit from economies of scale and so can successfully keep a high ratio. In smaller/medium sized organisations we typically see smaller ratios; with the average being roughly 3.25:1. It is hard to give a specific 'golden ratio,' as it depends on the complexity of maintenance undertaken, geography and other factors.
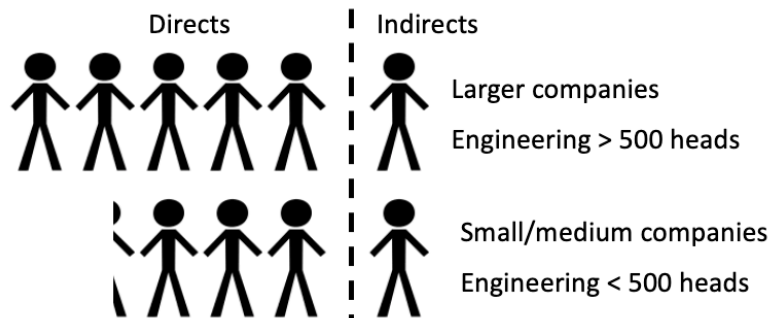


## Output productivity ($P_o$)

After you start measuring **Deployed Productivity**, the next challenge is how do you control it, who is held accountable? Well, that is not easy as it touches many areas of the business and so ultimately the accountability sits with the COO or MD, Finance Directors are very interested in this overall figure as it is such a good leading indicator of profit.

The management and control of **Output Productivity** falls fairly and squarely onto the production team, the management and team leaders. To get the output productivity figure, in columns three and four we subtract the known and estimated losses we expect to see. Losses from leave, sickness, training, briefings etc. We can collect and trend this data and in doing so give a reasonably accurate forecast.

We now have a clear indicator of the number of heads attended, on-tools, able to work each day or shift even. We then simply measure the hours of completed work off our asset management system reports – the rest is simple maths.

$$P_o = \frac{\text{Output hours}}{\text{Input (attended) hours}} \times 100\%$$

## What is a good productivity figure?

The first thing to consider is that gaining good control over productivity is a marathon not a sprint. For sure there are some big wins in process definition and being more plan-led, with longer-term improvements in productionising the workflow. To give some idea of the prize:
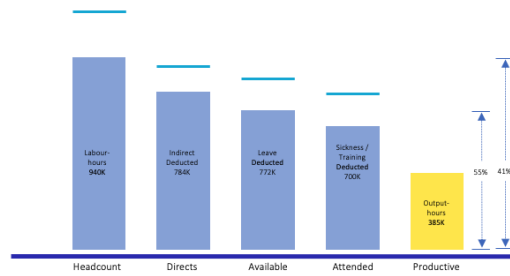
# 3: The currency of maintenance

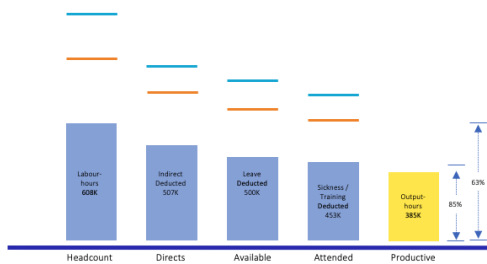**850 maintained units | 600 FTE | 3.5:1 Ratio | £38.7m**
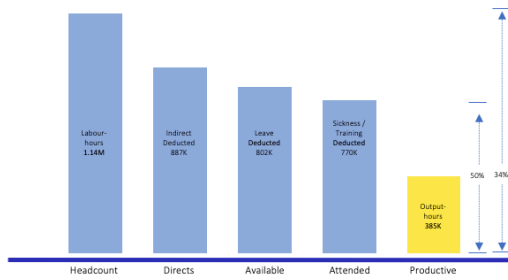


This is our baseline model, we discussed earlier, with the wage bill converted into hours of labour in the left hand column and the output hours - the bit we sell - in the right hand column. Deployed Productivity measures the losses.

**850 maintained units | 495 FTE | 5:1 Ratio | £32m (-£6.8m)**

In this image we have kept the output column at the same level, but have made the direct to indirect ration 5:1, and improved the output productivity slightly, to 55%. This has given us a deployed productivity of 41%, meaning a drop in FTE of 105.



**850 maintained units | 320 FTE | 5:1 Ratio | £21m (-£17.6m)**



In this image the output productivity is set at the highest level we have witnessed, 85%. With the 5:1 ratio still in place, liberates 280 FTE, heads that can be redeployed to work on customer facing defects.

**850 maintained units | 224 FTE | 5:1 Ratio | £14.4m (-£23.3m)**
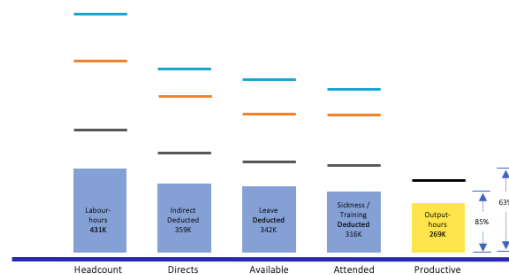
This final image additionally optimises the maintenance programme, removing (on average) 30% of wasted maintenance activity. The number of units maintained remains constant, the reduction in FTE is significant.



We have reasonable benchmark figures for output productivity:

| | Best in class | Average | Lowest measured |
|---|---|---|---|
| Aviation Running maintenance (A and B Checks) | 71% | 68% | 51% |
| Aviation Base maintenance (C and D checks) | 85% | 73% | 62% |
| Rail Running Maintenance (A and B exams) | 62% | 42% | 19% |
| Rail Heavy maintenance (C exams, overhaul) | 71% | 46% | 12% |

At present we do not have an accurate sample for auto-motive.

## Cultural challenges

As we have already said early, this transformation should be viewed as a long-term change, it is not something that can be achieved overnight.  As with all change initiatives it requires clarity of vision, and a good pressure to change as there will be many challenges along the way.  The slides in the previous section talking of the 'prize' indicate that the FTE will be altered, this doesn't mean reducing headcount, but it will mean redeploying heads, and reducing overtime and some of those other 'unattractive' options.

Some of the bigger challenges we have seen are:

**Gaining accuracy in your data.**  Most organisations that haven't been using this information to date have sub-optimal data input disciplines.  We see practices such as data recorded the day after work was completed, recorded by persons other than the on-tool worker, data not categorised properly, times not accurately recorded, etc.  Data input discipline will almost certainly need improving.

**Learning culture.** Often we observe cultures that have tended to default to blame; an interesting observation, as when examining culture at the executive level, blame is the opposite of the desired trajectory. However the evidence, the perception (and hence the reality) is one of blame often.  In this perceived blame culture, productivity is seen as a tool, a weapon almost, a method to measure individual performance, rather than improving business efficiency.  You might have a cultural challenge (even if only perceived) to overcome.  In a future article we are going to discuss organisational culture, as without a genuine learning culture in place, you will probably generate behaviours that manage the productivity figure, rather than letting the productivity figure drive efficiency changes.

**Systems** – the key to gaining good productivity figures in today's world is good system architecture and management.  Many asset management systems we view are not well-placed to give hours cleared information, they have been set up to manage the asset rather than the overall holistic task.  The best two on the market presently; SOROS and InforEAM, they have areas of excellence and some areas of overlap, but they can link to each other too.  Worth considering.

**System use** – after you have your system installed it is vital it is used.  We recommend setting take up rate statistics and measuring online times in the first instance so that you can understand who isn't using it; then find out why and remove the blockers.  Without the entire organisation using the systems, you will have patchy management information.

**Time keeping**, leave management, sickness control; are often in various states of maturity and managed in different systems or even excel spreadsheets. Bringing this into a place where management information can be extracted is important.

If you want to discuss maintenance efficiency or this article in more detail, please feel free to contact me directly.

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