# 7 **The Depot**

This Section covers the frontline resources needed to maintain reliable trains:

7.1 Human resources – staff motivation and skills, staffing level
7.2 Depot capacity – sufficient for outputs required, optimal use
7.3 Depot facilities – for the vehicles and for the people

Much of this Section emphasises that the above are part of managerial design. The design process must reflect reality and it must enable frontline managers to perform their day to day duties effectively.

## 7.1 **Human resources**

### 7.1.1 Motivation

As stated in Section 3.1, reliability depends on quality of maintenance and thoroughness of fault finding to address root cause (in addition to various management activities). Direct work on vehicles in turn depends on having sufficient people with the right skills and other resources (see below), but also on the effort of individuals. Rail vehicle maintenance is often carried out in difficult conditions e.g. shifts are designed to suit vehicle downtime, not family life; much work is done at night; even with good depot facilities, access to relevant parts of vehicles is often awkward, compared with working on a bench.

Example: If it is possible to diagram maintenance into day shifts, do so.

Well-established management best practice is evidenced by recent human factors assessments of UK rail vehicle maintenance – people work better if their inputs are appreciated and acted on. For example, local 'ownership' of maintenance instructions enables prompt incorporation of feedback from maintainers e.g. to correct for errors and develop where improvements are identified.

Where possible, 'ownership' should be extended to painted number of vehicles e.g. this depot (or even this maintenance team) is responsible for these units. This can include: following up what other depots/ outstations do/ don't do to these units; focus on long term repeat intermittent defect resolution; undertaking deferred work.

Example: At Soho depot, they are developing benchmarking of maintenance team performance against KPIs which include the reliability of the trains they have worked on. This is possible with a self-contained fleet of Class 323 units, most of which return home each night.

Techniques such as **lean maintenance**, **Kaizen** and **6 Sigma** are being adopted, both for the outputs they deliver and for the impact that engaging people in improving their work has on their morale and application. These techniques can help identify and remove frustrating parts of job, such as walking to stores, waiting for parts. (Note that you need a culture of wanting to better use staff, not to cut jobs, for such programmes to be effective. You also need to recognise that this provides incremental continuous improvement rather than big step changes.)

Example: ScotRail used lean techniques at Haymarket to free up a person on each B exam who was now devoted to repairs/ deferred work/ mods.

Example: At Longsight, a full time Kaizen Promotion Manager is backed up by an (almost) full time Kaizen Technician. They have a high quality facility permanently set aside for Kaizen on site at the depot. A 5-year plan of strategic objectives is backed up by a plan of projects for the next 12 months

drawn up by the Directors. Each project is supported by a 5 day Kaizen Event, releasing staff from the maintenance teams, involving 2 or 3 people who are familiar with the tasks involved, supported by other groups, such as stores, or even a Director. Experience shows that the more varied the makeup of the team, the better the result. The aim is to hold a Kaizen Event around every 6 weeks. There is a project plan displayed, to show progress against this plan. Actions for improvements arising from the events are carried out within 30 days, by other people. There is a '30 Day Action' list, which shows who is dealing with each one, and when they will be completed. There have been 25 Events so far at Longsight, and each of them has identified at least 30% saving in time, plus 3 or 4 safety improvements. The whole Kaizen process has a very beneficial effect on staff morale, as they appreciate being listened to, and developing their own ideas. Any saving in staff time is re-invested in quicker processing of outstanding repairs, never in staff reductions.

Maintenance work (especially defect management) should be a closed loop process: enabling learning, 2way communications, and encouraging collective effort focused on shared goals. Best practice is to use Communications rooms (also called Information rooms, Reliability rooms, War rooms). These rooms should be sited somewhere that people actually use 24/7 e.g. mess rooms, booking on points.

These rooms should be used to display up-to-date data and action plans, AND be actively used in start-ofshift staff briefings and management progress meetings.

Typical questions for staff briefing meetings might be:

- how is the fleet performing? (what happened in traffic yesterday? how did maintenance go last night?)
- what are the trends? (is reliability improving? why are trains unavailable?)
- what issues are we keeping an eye on? (rogue units, repeat defects)
- staff issues – training plan, progress with issues raised

A corporate team spirit should also be encouraged: this can be hard work with change of franchise owning group: but can also be seen as an opportunity for a positive step change with an incoming franchisee.

Example: At EMT, the scope of a refurbishment programme for the Class 153 and 156 units was discussed extensively with the staff. The resultant spec was fed back to them, through the drivers reps, and in an Ops Newsletter, which has had articles about the proposed scope of the refresh, inviting people to send in further suggestions.

Some TOCs have staff suggestion schemes, with all engineering suggestions going to the Engineering Director. Best practice is to respond within one week, with a close out in 3 weeks. Small cash awards are then presented every 3-6 months in front of people's colleagues for the best suggestions received.

### 7.1.2 **Skills**

Depot staff has traditionally been provided with skills that are directly related to work on vehicles. It is however now recognised that these skills are vital but not sufficient. For example, effective change projects depend on the contribution and insight of staff throughout the organisation. Hence best practice includes soft skills e.g. quality systems, improvement techniques (such as Kaizen), lean maintenance and the use and presentation of data.

Example: Northern has trained all depot staff in quality improvement techniques. They use these skills daily to improve their production processes and use data rooms to monitor and validate their changes.

Another change from more traditional approaches is to understand and define all the skills and competency needs of all staff. Best practice uses the results of a vehicle/train risk assessment model and includes enabling staff to understand:

- The connection between sub-standard equipment condition and operational performance/ risks
- Specific material and component degradation processes and how to identify them on train equipment, particularly on exams
- Vehicle/ train system behaviour under normal and degraded equipment conditions

Example: Southern now trains its staff specifically in different fixing methods, and the degraded mechanism associated with each type, to ensure structural integrity and performance throughout service life.

Another best practice is to actively develop technicians capable of root cause investigation through structured programmes, rather than hoping talented individuals will develop themselves.

Example: C2C are developing a new competence assessment module for staff going out to attend to trains, based not only on their familiarity with repairing the vehicles, but based around understanding what can be done in the minimum time in a failure situation, the effect on the train service, how to communicate effectively with the drivers etc.

Modern vehicles are increasingly complex and this is being recognised in increasing specialisation of skills, rather than asking people to attempt to be "jacks of all trades". Specialisms tend to be focused on systems e.g. traction, doors.

There is also increasing specialisation in the sorts of work undertaken and where. For example, some depot staff work only on routine exams, others need high levels of fault finding skills to deal with defects arising in service and to really find root causes.

Examples: SWT simply says "Don't dabble with doors at outstations. If there's an issue, lock the door out of use and report it so it can be planned for later (skilled) attention." Southern use a core group of people to do fault finding, 'team technicians' who support each maintenance team.

### 7.1.3 **Training**

Training Content: Best practice is to create the syllabus necessary for a modern depot workforce, based on a thorough analysis of skills needed and using both core traditional technical materials and new sources. Training materials should be aligned with Maintenance Plan instructions and quality system techniques by trainers working closely with accountable professionals in these areas.

Example: Southern treats all its engineering training material as Engineering Standards, ensuring they are aligned to Maintenance Plan instructions and subject to the same controls, updating mechanisms and professional oversight.

Training Delivery: Best practice is to roster training days for all staff. This is essential to deliver a defined development plan within a specified timescale and hence to sustain continuous progress.

Production managers must facilitate robust training programmes to support team leaders with a balanced range of skills to reliably deliver production and quality targets.

Many organisations have found that new entrants benefit from mentoring by an experienced member of staff. Best practice suggests that someone like a trainer is ideal for this role, providing an unbiased guide where peer pressure may not always be constructive.

Example: Northern Rail appoints a personal mentor to each new entrant. The mentor guides the individual's progress and ultimately decides when the individual is fully capable of performing her/his responsibilities.

Example: London Midland has trained the technical team as trainers, to join up training delivery to staff.

Example: GWR at Exeter Depot use 'on the job' coaching of staff by technicians.

#### 7.1.4 **Competence Assessment**

Competence assessment is the industry's principal mechanism for assuring work on vehicles. Most schemes use on-the-job observations, focused on inspection tasks as the main source of evidence. However, best practice is to base competence assessment on fundamental risk assessment (see Section 3): this means concentrating on tasks that most influence operational performance and safety, as well as occupational risk. Intrusive tasks are therefore more important than inspection tasks.

When staff turnover is high, some staff will not be registered as competent in all the tasks expected of them. Some depots manage this by regularly publishing current staff competence profiles, so production managers can deploy balanced teams and arrange oversight by fully competent staff where necessary. Published staff competence records also tend to encourage all team members to support the assessment programme.

Complete reliance upon on-the-job competence assessment may lead to an insurmountable workload. Many organisations try to group tasks into those requiring common skills and knowledge, but there is a risk of compromising professional standards. Alternatively, competence can be evidenced by looking at finished work i.e. using equipment condition audits. The results may be used more widely too, e.g. to:

- Validate the accuracy and appropriateness of maintenance instructions and their periodicity.
- Validate training materials and the effectiveness of staff development programmes.

Assess competence, when the condition of equipment can be closely associated with an individual and their activity. (Depending on the task, this can sometimes be assessed sometime after the work is done, making it easier to manage the assessment workload).

#### 7.1.5 **Staffing level**

The need here is to ensure sufficient capacity – enough to enable and sustain long term reliability growth. ReFocus studies support the finding that depots with more staff per unit deliver higher levels

of reliability. Deferred work trends can also be a good indicator of whether you have sufficient frontline maintenance staff (assuming optimal management etc).

#### 7.1.6 **Location**

It is important to deploy the staff you have effectively. Line of route support should be carefully thought through – there is a risk that you give drivers and fitters an excuse to delay a train in traffic (rather than doing cut and run), unless your outbased maintenance staff are only at your terminuses, where there is sufficient downtime to fix issues which might otherwise cause cancellations or delays. Best practice is for fitters to meet and greet all drivers only at terminuses where there is enough time to make repairs without causing service delays (and still don't dabble with doors!).

### 7.2 **Depot Capacity**

#### 7.2.1 **Sufficient for outputs required**

Depot capacity is a matter of design. Franchise obligations, fleet mileage, structure of the Maintenance Plan and availability targets must be used to quantify the capacity and capability needed from the depot(s) to maintain the fleet and to support out-of-course activities, including potential fleet modifications. Work out the role the depot will play in the real-time railway and ensure this fits with its scheduled work commitments. As Section 6 explains in detail, agree the process for planning maintenance work and ensuring that trains are diagrammed to return according to an achievable work plan.

Depot capacity doesn't just depend on the number and type of vehicle berths and equipment. Progression of vehicles through the facility, sequencing of work and vehicle downtimes are equally important, as are team structure and their working methods.

Fleet managers must recognise that inappropriate depot design is likely to: jeopardise the quality of defect investigations; encourage the deferring of work to ease production pressures; and risk not meeting availability targets with serviceable vehicles. In these circumstances, it is difficult to expect front line managers to perform diligently and effectively execute the processes outlined in Section 3, which are critical to improving reliability. Furthermore, it is likely to get harder to identify root causes since more effort is required to resolve the depot's latest emergency. Overall, inadequate or inappropriate design will push a depot organisation to be increasingly reactive. Trending in this direction should be monitored using appropriate KPIs (e.g. deferred work level, number of moves vehicles do around the site between routine arrivals and departures).

Example: ATW quantified necessary depot capacity in South Wales, and restructured the workforce to introduce well-organised and appropriate team working arrangements. The depot's operational role was also reviewed and an improved planning process with operations colleagues was defined and introduced.

Example: Northern maps the transit of every train through its facilities to ensure that all work can be fully completed and throughput matches depot capacity.

### 7.2.2 **Light maintenance**

Put simply, "do not get the trains into your depot(s) when you don't need to". Close control of defects is required to ensure the right units are at the depot for long enough to rectify them properly.

Example: SWT have fleet staff in Operations Control who take the final decision on diagram swops i.e. which units really need to go to depot tonight.

There is a risk that a depot may be filled with units just for stabling, making it difficult to access the units that are really wanted for maintenance. This is because depots are often convenient for parking defective or failed stock. Although depots should of course provide this type of support, internal working arrangements must be designed to ensure that it does not disrupt production processes beyond planned limits (see Section 6).

### 7.2.3 **Heavy maintenance**

Examples of questions to ask include:

- GTR: can we bring all maintenance in-house? (rather than contracting out, to capitalise on economies of scale)
- VTWC Longsight: can we bring critical component overhauls in-house? E.g. HVACs, cardan shaft balancing, most bogie repairs, toilets, pantographs, traction auxiliaries, traction interference testing (to reduce travel time and no. of bits needed, and to enable a common sense of urgency)
- Bounds Green depot: do we need our own wheel lathe? (to minimise vehicle downtime, and optimise wheel life)

**Optimal use** (for Rules of the Depot i.e. coordination with train planning, see 6.1)

- Good, detailed depot maintenance work planning can optimise the use of the depot, its people and facilities.

Example: Central Rivers has grouped exam work into: powered down, powered up and work arising. This enables detailed occupation of individual depot slots to be pre-planned, and for shunts to be done at the same times each day, in accordance with the plan, enhancing the effective capacity of the site.

Example: GWR have improved depot efficiency without loss of traceability by placing Inspection Measuring & Test Equipment at the point of use in tool vending machines. These controls and record the issue and return of equipment whilst having it readily available at the point of use.

Example: GWR's internalization of Heavy Maintenance has enabled the depot to take greater ownership of vehicles as well as improve staff understanding of systems and improve availability through not having lost time moving trains to a workshop away from the area of the TOC.

Example: At Longsight planning of the workload on nightshift is a very well developed, sophisticated, manual process. The plan allocates which road each set will go on at what time, for how long, what work will be done, and which staff will do it.

Similarly, detailed analysis of servicing and maintenance workflows (everything other than the exam work itself) in the depot can be effective in sizing the capacity.

Example: Neville Hill depot (East Midlands Trains) developed a bespoke computer programme to model the depot, including time to:

- Fuel and water
- Go through carriage washplant • Empty CETs
- Get into the maintenance shed
- Get out to the departure siding

The arrival and departure times for each train for any proposed timetable change are fed into this programme which confirms whether or not it will work.

Spare capacity should also be considered for contingency, testing scenarios such as out-of-course damage repair requirements on a particular unit through to the unavailability of another depot within the TOC (e.g. through flooding, from recent experience) - and developing plans accordingly.

As with most other things, the capacity delivery of the depot should be measured and trends analysed to understand changes and developments as they occur - and to identify the need/ opportunity for further changes. Suitable measures might be: berth occupancy percentage in maintenance shed, late starts off depot by cause.

### 7.3 **Depot Facilities**

Good facilities for vehicles and people aid productivity and boost morale to enhance maintenance quality. A High Performing Depot Specification was developed in 2008 to identify the ideal requirements, which acts as a checklist for existing and new facilities. It has been input to the Network RUS (Route Utilisation Strategy) Depots working group and is shown in Appendix B. It should be noted that Network Rail also produced a document, NR/PSE/SPE/00149, “Design Consideration for Rail Maintenance Depots – Guidance Note”.