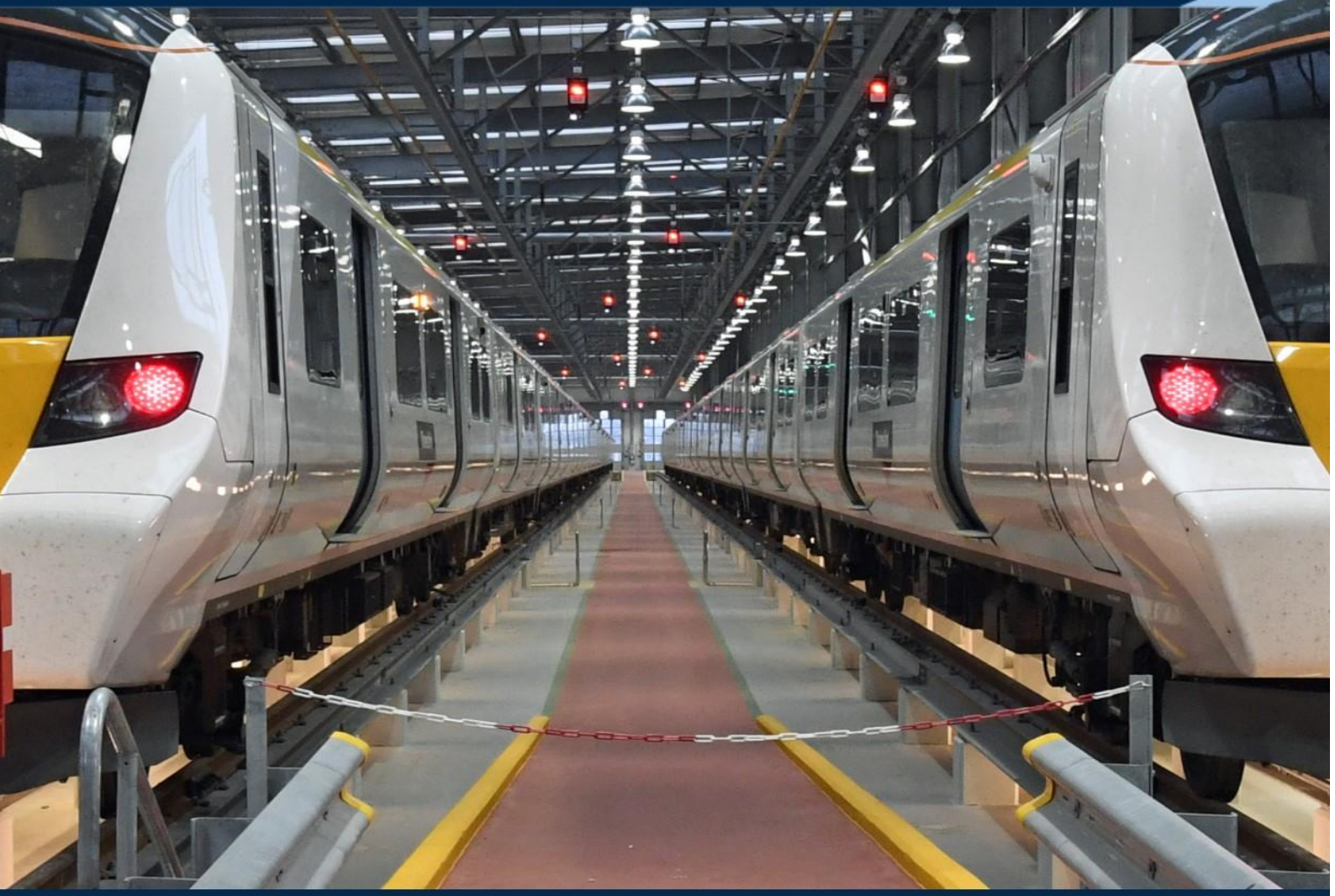
7. The Depot



This section covers the frontline resources needed to maintain reliable trains including motivation training, skills development and competence assessment.

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 vehicles and 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 the quality of maintenance and thoroughness of fault-finding to address the root cause (in addition to various management activities). Work on vehicles 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.

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

Where possible, ownership should be extended to depot (or maintenance team) responsible for these units. This can include following up what other depots/outstations do/do not 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. These techniques can help identify and remove frustrating parts of the job, such as walking to stores or waiting for parts. (Note that a culture of wanting to better use staff and not cut jobs is required for such programmes to be effective, i.e. incremental continuous improvement rather than big-step changes.)

Example: ScotRail used lean techniques at Haymarket to free up a person on each B exam to devote 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 and 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. A project plan charts progress. Actions arising from the events are carried out within 30 days by other people. There is a '30-day action list showing who is dealing with what by when. There have been 25 events so far at Longsight, and each of them has identified at least a 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, 2-way communication and encouraging collective focus on shared goals. Best practice is to use communications rooms (also called information rooms, reliability rooms, war rooms) sited somewhere that people actually use 24/7, e.g. mess rooms, clocking-on points.

These rooms should display up-to-date data and action plans AND be actively used in start-of-shift 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 a 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 featured articles about the proposed scope of the refresh and 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 colleagues for the best suggestions.

7.1.2 Skills

Depot staff have traditionally been provided with skills that are directly related to work on vehicles. It is however now recognised that these skills, although vital, are 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 enables 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 train technicians in 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 on 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 specialisation of skills rather than asking people to be jacks of all trades. Specialisms tend to be focused on systems, e.g. traction, doors.

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

Examples: SWR 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 find faults, 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 the 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 sustain continuous progress. Production managers must facilitate 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 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 who 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 for training delivery to staff.

Example: GWR at Exeter Depot use on-the-job coaching 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 on 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 at the 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

Competence should be assessed when the condition of equipment can be closely associated with an individual and their activity. (Depending on the task, this can be assessed 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 there are sufficient frontline maintenance staff (assuming optimal management, etc.).

7.1.6 Location

It is important to deploy staff effectively. Line of route support should be carefully thought through to avoid giving drivers and fitters an excuse to delay a train in traffic (rather than doing cut and run), unless outbased maintenance staff are only at 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. The role the depot will play in the real-time railway should fit with scheduled work commitments. As *Section 6* explains in detail, the process for planning maintenance work and ensuring that trains are diagrammed to return according to an achievable work plan should be agreed.

Depot capacity does not just depend on the number and type of vehicle berths and equipment. The progression of vehicles through the facility and the sequencing of work and vehicle downtimes are equally important, as are team structure and their working methods.

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 frontline managers to effectively execute the processes outlined in *Section 3*, which are critical to improving reliability, and it will be harder to identify root causes whilst resolving the depot's latest emergency. Overall, inadequate or inappropriate design will encourage a depot organisation to be increasingly reactive and this should be monitored using appropriate KPIs (e.g. deferred work level, number of vehicle moves around the site between routine arrivals and departures). *See Appendix K.*

Example: TfW Rail quantified necessary depot capacity in South Wales and restructured the workforce to introduce well-organised team arrangements. The depot's operational role was also reviewed and an improved planning process was drawn up with operations colleagues.

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

In simple terms, there should be no trains in the depot(s) unnecessarily to ensure the right units are at the depot for long enough to rectify them properly.

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

A depot may be filled with units for stabling, making it difficult to access units 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 arrangements must 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 it out, to capitalise on economies of scale)
- VTWC Longsight: can we bring critical component overhauls in-house? For example, HVACs, cardan shaft balancing, most bogie repairs, toilets, pantographs, traction auxiliaries, traction interference testing (to reduce travel time and number of bits needed, 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*)

- Detailed depot maintenance work planning can optimise 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 the detailed occupation of individual depot slots to be pre-planned and shunts to be done at the same times each day, in accordance with the plan, enhancing the capacity of the site.

Example: GWR has improved depot efficiency without loss of traceability by placing inspection measuring and 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 internalisation of heavy maintenance has enabled the depot to take greater ownership of vehicles as well as improve staff understanding of systems and increase availability through no lost time moving trains to an outside workshop.

Example: At Longsight, planning of the workload on nightshift is a well-developed 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 for capacity gains.

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 wash-plant
- 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 for viability.

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), and developing plans accordingly.

Again, 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. Guidance Note for the Development and Design Considerations of Passenger Rolling Stock Depots (GIGN7621), sets out considerations which seek to support the commissioning of a useful and operationally efficient depot.