P&B Retrofit Switchgear

Outline

“Issues to be considered during the decision making process of retrofits; just what can be achieved, the challenges posed during the site survey and managing any arising issues during commissioning and post-commissioning”

About P&B

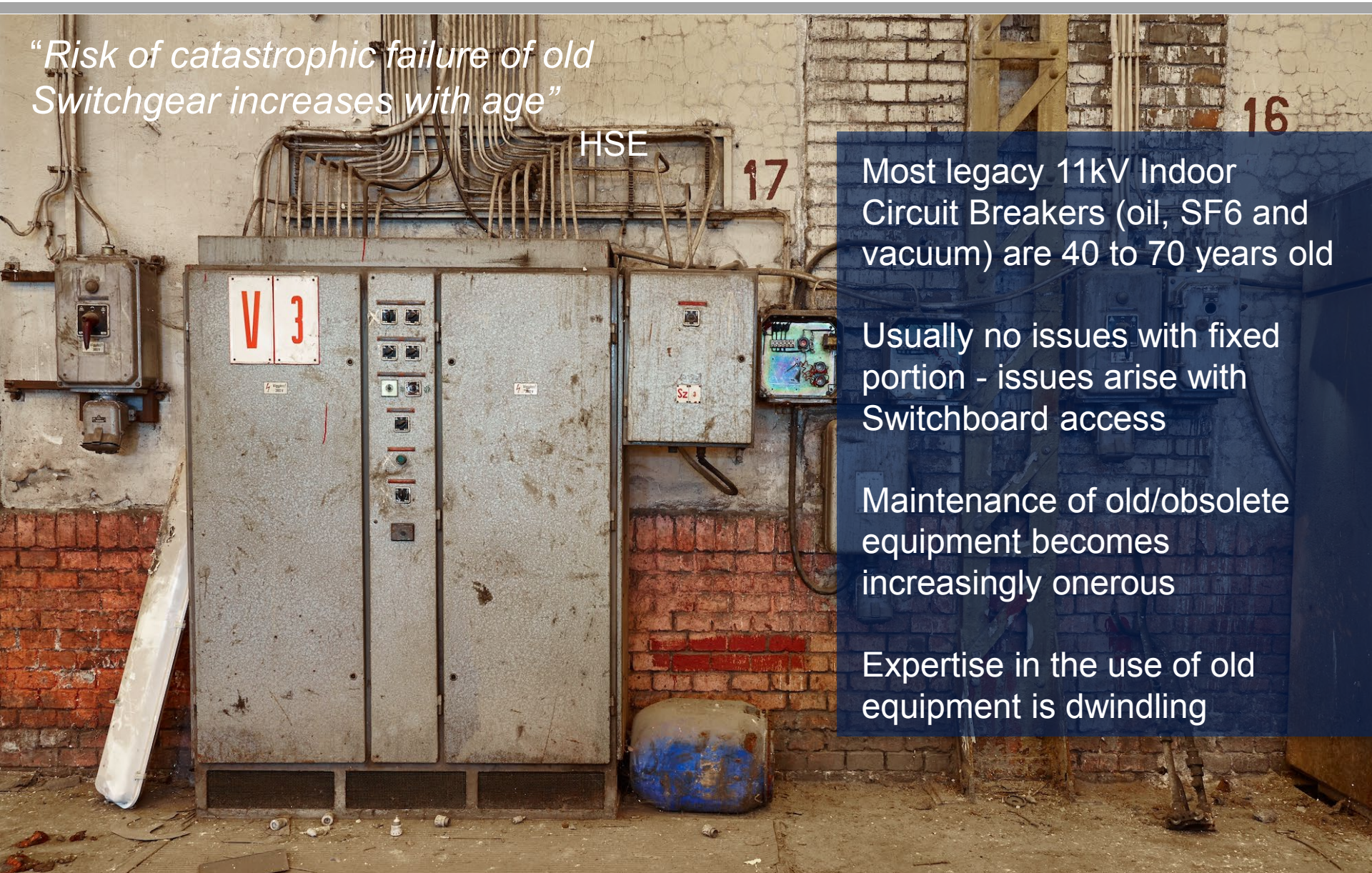
- PBSI Group – engineering electrical protection and control equipment in the UK since 1932
- Pioneered the development of the P&B Gold relay in the 1940s
- All Switchgear and Protection Relays are fully designed, manufactured and tested in-house at our Manchester, HQ
- We employ a specialist experienced team of technology designers, engineers and operatives

- New and retrofit equipment is supplied throughout the world through our extensive global network of distributors and agents

The current state of electrical protection in the UK

AGEING ELECTRICAL EQUIPMENT

Ageing electrical equipment



"Risk of catastrophic failure of old Switchgear increases with age"

HSE

Most legacy 11kV Indoor Circuit Breakers (oil, SF6 and vacuum) are 40 to 70 years old

Usually no issues with fixed portion - issues arise with Switchboard access

Maintenance of old/obsolete equipment becomes increasingly onerous

Expertise in the use of old equipment is dwindling

The case for ensuring replacement of ageing electrical equipment

WHY RETROFIT?

Risk to life

A fault in ageing oil Switchgear is always a catastrophic failure

Health & Safety obligations

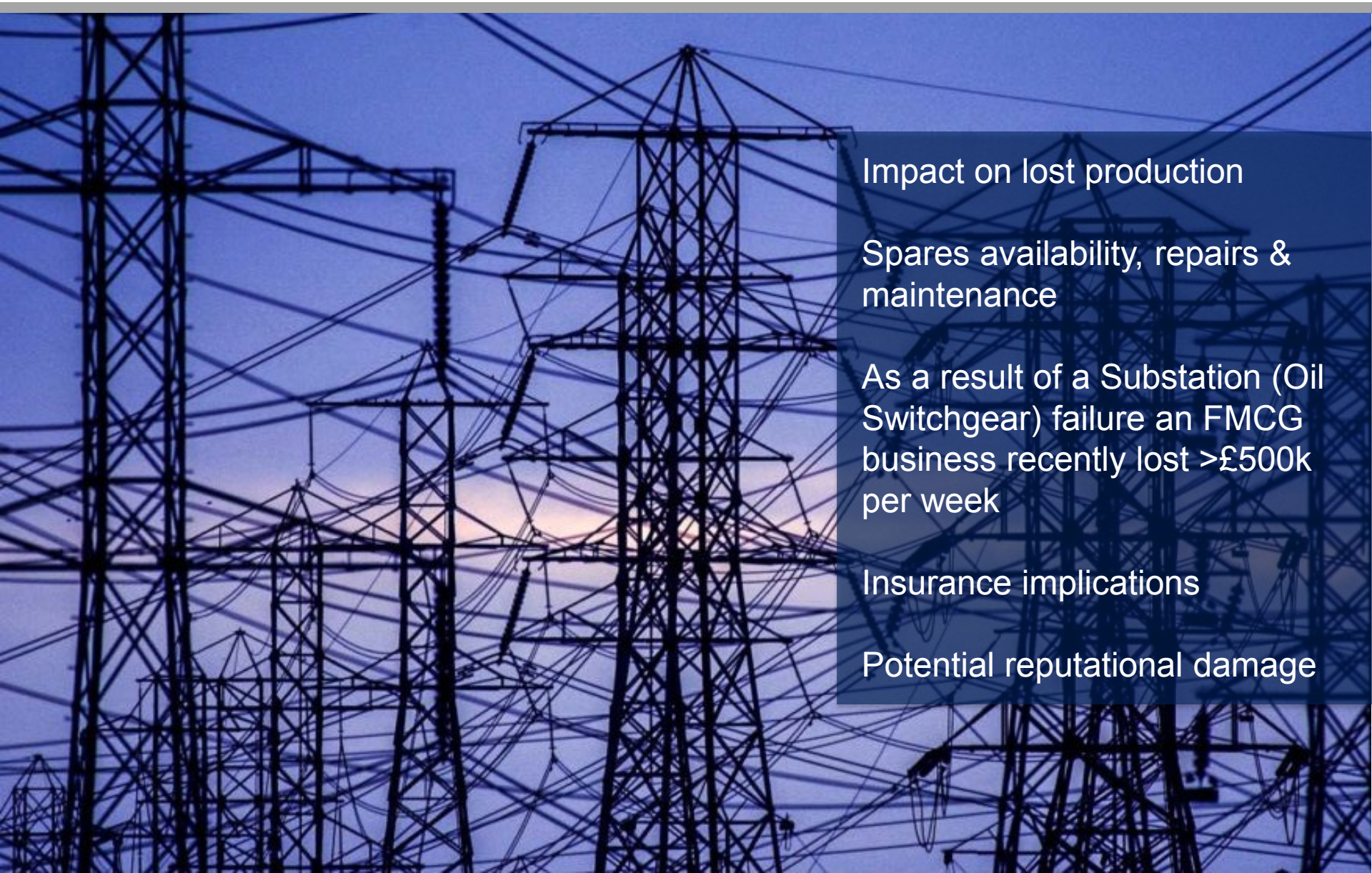
H&S Act 1974

H&S at Work Regulations

Electricity Safety, Quality & Continuity Regulations 2002

Business impact of non-compliance is far reaching

Risk to business



- Impact on lost production
- Spares availability, repairs & maintenance
- As a result of a Substation (Oil Switchgear) failure an FMCG business recently lost >£500k per week
- Insurance implications
- Potential reputational damage

Improved system reliability

Assured business security and continuity

IEC Standard Asset Management

ISO55000 and BSi PAS 55

Faster operating times

Improved visibility

Remote controls

LCDs and data communication enables more intelligent operations

Long term cost saving

- Improved operational efficiencies
- Maintenance costs escalate with ageing assets – retrofitting minimises maintenance regimes
- Reduced risk = reduced insurance premiums
- Removal of switching restrictions

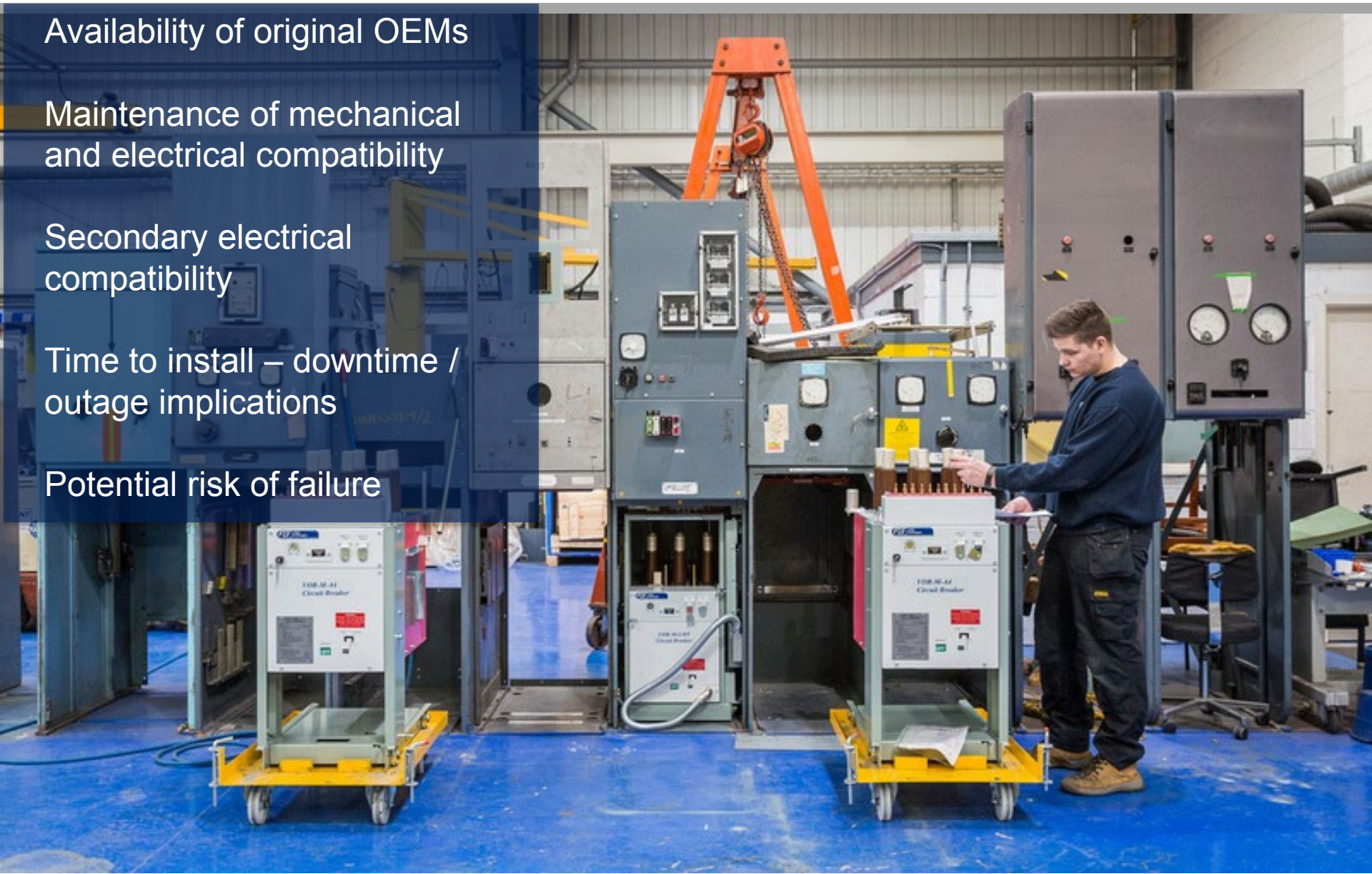
- Full system replacement is impractical
- Cost benefit maximised
- Mechanical and electrical compatibility is maintained

Replacing Switchgear and Protection Relays

SOME COMMON CONCERNS

Some common concerns

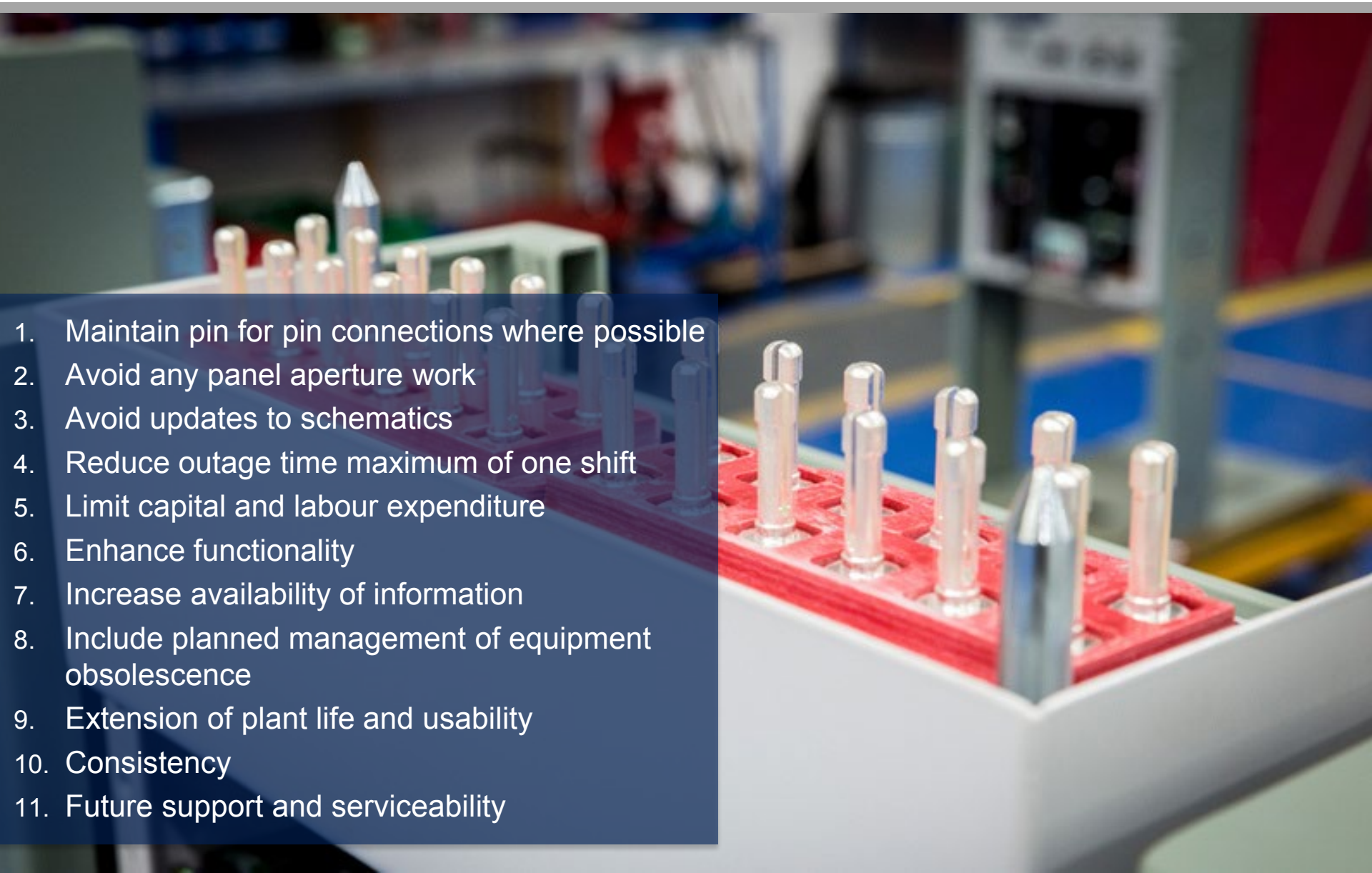
- Availability of original OEMs
- Maintenance of mechanical and electrical compatibility
- Secondary electrical compatibility
- Time to install – downtime / outage implications
- Potential risk of failure



What is involved in a typical retrofit program?

RETROFITTING OBJECTIVES & PROCESS

Retrofit objectives



1. Maintain pin for pin connections where possible
2. Avoid any panel aperture work
3. Avoid updates to schematics
4. Reduce outage time maximum of one shift
5. Limit capital and labour expenditure
6. Enhance functionality
7. Increase availability of information
8. Include planned management of equipment obsolescence
9. Extension of plant life and usability
10. Consistency
11. Future support and serviceability

Retrofitting Process

- Forward planning and site survey
- 3D Laser measurement/models for accurate replacement
- Secondary connections matched
- Equipment manufactured to exacting specifications, e.g. ENA, IEC 62271-100
- Rigorous testing procedures, PD inc.
- Experienced team commission new equipment on-site
- Typical downtime – 0.5-1 day per feeder!

Retrofit Switchgear

LATEST ADVANCES

Retrofit Switchgear

Replacement Switchgear extends switchboard lifespan by up to 25 years

Fault ratings and capabilities are considerably improved

Greater efficiency low maintenance mechanisms (magnetic actuators)

Mechanisms are less complex, fewer moving parts and ultimately more reliable

Retrofit Switchgear

Typically: 12kV, 400A, 630A, 800A, 1250A and 2000A with 20kA, 25kA, and 40kA fault rating options, 75kV BIL

- **English Electric:** OLX, OLX3
- **GEC:** BVP17, VMX
- **AEI:** QA/QF
- **SWS:** C4X, C8X, C12X, D4X, D8X, D12X – LP & HP, SBB, DBB also HG12!
- **Brush/HSS:** VSI (R4 & R8 etc.), VMV, VMH
- **S&C:** A4, A6, UAE4, UAE6
- **Reyrolle:** LMT, LMT2, LMT23, LSR, L* variants.
- **BTH:** JB721 (QA/QF)
- **Statter:** AC01

And others!

Some recent P&B Switchgear installations

CASE STUDIES

Retrofit experience

Local DNO Statter AC01 Retrofit of VOR-M

- No OEM in existence
- P&B used VOR-M to offer Statter AC01 to DNO
- P&B unique in wide range of ‘makes’ offered

Retrofit experience

DNO SWS C4X HP SB Retrofit of VOR-M

- P&B offered C4X as High Profile Single Busbar variant
- P&B used VOR-M base design
- P&B offer both Low and High Profile
- Also, in Single and Double Busbar configurations

Thank you!