Shutdown and turnaround excellence:

Doing shutdowns well is crucial to maintaining profitability in difficult and uncertain times

Global inflation is at record levels and economic growth is slowing, placing pressure on margins for many businesses[1].

Excluding energy markets, most asset-intensive businesses are already experiencing this dual revenue-cost squeeze and are trying to lock in revenues while reducing costs.

Meanwhile those in energy markets are experiencing high but extremely volatile prices on the back of a global energy supply crunch. For these assets, being available at the right time is key to capture periods of high pricing.

1. Gloomy and More Uncertain – World Economic Outlook Update (IMF, July 2022)

Against this backdrop, doing shutdowns well is crucial to maintaining profitability. Shutdowns[2] are often the most capital-intensive exercise in a given five-year window and consume between 30-50% of an asset's maintenance budget. Poor execution is immediately devastating and can reduce both uptime and operating rates by 5-10% until the next shutdown.

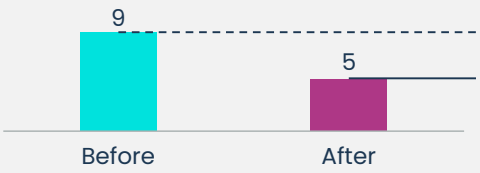
That said, great shutdown execution can have the reverse effect and can improve asset performance and extend equipment life. Across a portfolio of assets this can add up to tens of millions of dollars in just a few years making shutdown excellence a worthwhile endeavour.

Value achieved by a pulp and paper producer through shutdown excellence

$42m

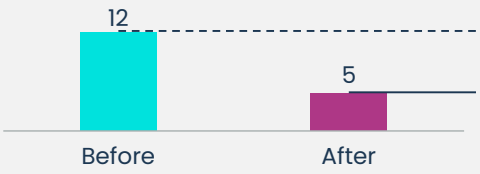
11 shuts

Average duration overrun, days



-4

Average cost overrun, %

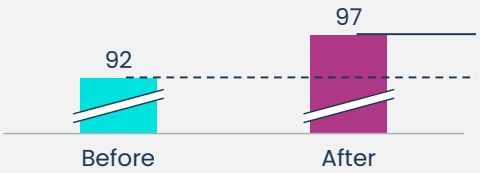


-7%

$48m

per year

Uptime, %



+5%

2. Also commonly termed 'turnarounds' or 'outages', collectively known as STO (Shutdowns, Turnarounds and Outages)

Understanding what makes a great shutdown

Great shutdowns are characterised by 'zero harm' (and zero near misses), adherence to schedule and budget, with completion of all essential scope required for high reliability when the asset is returned to operation.

These outputs are driven by five key success factors:

1. Shutdown frequency drivers are known and problem solved

The drivers of shutdown frequency are well understood (e.g. regulatory, inspection, fouling, wear profile) and continually problem-solved by the organisation.

2. Only essential scope is included in the shutdown

Only essential scope is included which starts with maximising online inspections to minimise unplanned scope and running a rigorous scope discovery and freeze process to prevent a 'moving target'. Then operational return for each work scope is challenged to justify inclusion. Where possible, scope is redesigned so that work requiring shutdown is minimised to reduce execution risk.

3. Shutdowns are well planned

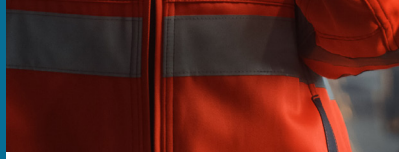
Shutdown planning for the essential scope follows a well-defined, standardised process with clear responsibilities and timed milestones. Regular, structured reviews are conducted to ensure readiness and incorporate contractors early in the process. Critical Path Reduction sessions are conducted to minimise time offline and Interactive Planning Sessions are held to increase executability of the plan.

4. Shutdown performance is actively managed

An optimised meeting and information cascade is used to actively manage shut performance. Best practice visual management acts as the 'single source of truth' where bespoke metrics are used to objectively track progress in each area. Daily shutdown review meetings are used to 'manage by exception' (i.e. issues and actions) and look forwards to proactively manage risk.

5. Post-shutdown reviews are held

After each shutdown, performance is reviewed against key metrics (HSE events, work completion %, duration, cost). Multi-discipline root cause analysis workshops are held to generate improvements which are then are implemented through a robust continuous improvement process.



Our approach

For leaders taking a 'hard look' at their shutdowns against these success factors it can be hard to know where to start. In our experience, we generally see four initial steps when clients start their shutdown excellence journeys:

1. **Establish dedicated shutdown resources** within a 'Centre of Excellence'
2. **Develop a planning and readiness 'playbook'** centred around collaboration
3. **Start utilising 'shutdown control rooms'** and streamline execution communication
4. **Launch independently-led shutdown reviews**

1 Establish dedicated shutdown resources within a 'Centre of Excellence'

For one of our clients with multiple assets distributed across North America we uncovered a lack of resourcing for shutdown planning that impacted the quality of shuts. Asset teams lacked 'muscle memory' to plan shuts well and struggled to dedicate the time required due to competing operational priorities. Because of these constraints, contractors were often used to develop work scopes. Over time, asset teams lost the ability to appropriately manage shutdown planning. High cost work scopes combined with tight cashflow conditions led to triage on essential scope that eventually impacted uptime.

For this organisation, we helped establish a small Shutdown Centre of Excellence (SCoE) comprised of one third internal roles, one third retired alumni and one third external SMEs. The SCoE gave asset teams the leverage to plan shutdowns well and enabled benchmarking across sites that helped drive competitive work scopes. In addition, the SCoE helped asset teams redesign and justify essential scope to ensure the right work was being executed for high reliability and uptime.

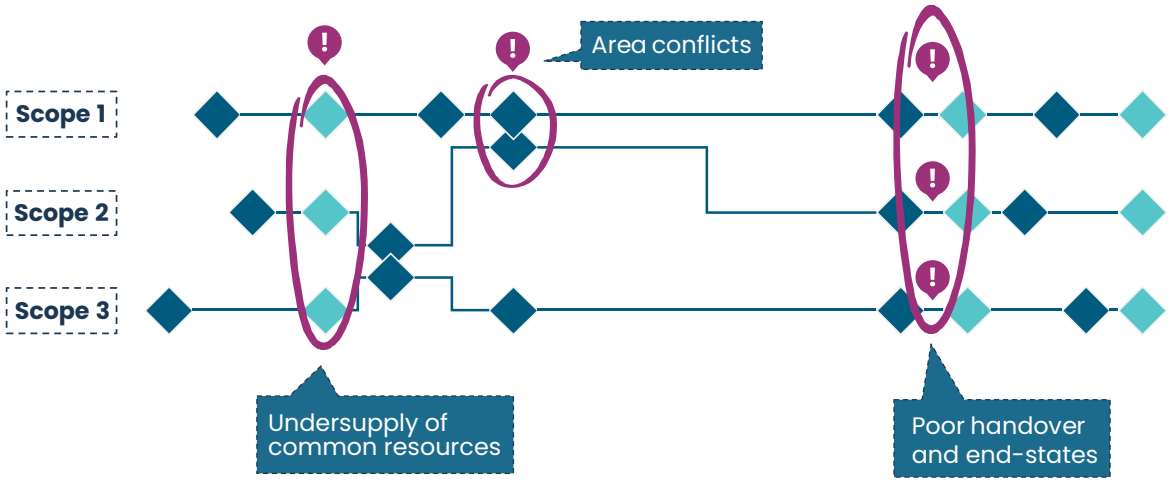
2 Develop a planning and readiness 'playbook' centred around collaboration

Conventional shutdown wisdom will tell you that it's all about 'planning, parts, people and preparation'[3]. However, this is not accurate enough to describe the issues which lead to most shutdown overruns (time and budget).

In our experience, there are three main issues which can be solved through collaborative planning and readiness management:

1. **Interface management** – when parties 'hand-over' from one to another
2. **Area management** – execution teams working in close proximity to one another
3. **Common services management** – resources shared across many work scopes and teams (e.g. isolations, cleaning, engineering support, QA/QC)

Three main planning issues that impact shutdown performance



We believe that these issues manifest because of the siloed nature of shutdown planning, where those planning the work either don't have the responsibility, resources or forum to resolve issues at scope boundaries.

Continuing with the previous example, our clients' SCoE team established 'Interactive Planning Sessions' for each asset shutdown to address these three issues impacting shut performance. These sessions required large plots of the relevant critical path, associated work branches and maps of the work areas – where operations, engineering, maintenance, contractors, and other support teams would review:

1. The **workflow choreography** – step by step
2. The individuals **completing each step** and their physical locations
3. The **timing** of those steps
4. The **end-states** after each step

As the cross-functional team works through each critical path, potential issues and conflicts are raised and actions are recorded to mitigate them.

As each Interactive Planning Session needs to be held well in advance of the shutdown – a certain level of detailed planning is required for the visual aids to be effective. To ensure this, our client implemented a 'planning and readiness' playbook that defined milestones to be achieved each week for area and work scope, and how to deliver on them. This playbook also included a shutdown 'readiness' tracker – an objective, transparent measurement of shut planning progress which kept work teams on track.

3. Planning meaning the scoping and approach to executing the work, people meaning an understanding of the resources required to execute the work and preparation meaning site preparation

3 Utilise ‘shutdown control rooms’ and streamline execution communication

To lock-in the benefits of great shutdown planning and readiness, shutdowns need tight execution management. Timely, fact-based reviews of performance keep areas accountable for delivery and drives issue escalation and action-based discussions.

One of the largest power stations in the UK was entering a lengthy outage during the start of COVID, where we were asked to help develop a meeting cascade for the entire shutdown (daily progress, weekly steering committee, weekly management review) including supporting dashboards that would enable a ‘virtual shutdown control room’. The ‘virtual shutdown control room’ integrated with contractor performance reporting systems and removed the need for contractors to learn a new reporting system and avoided reporting duplication. Through this approach the average shutdown meeting time was reduced by 50% and the outage itself resulted in a 100% and 60% reduction in schedule and budget overruns respectively.

Virtual shutdown control room

One source of truth, continuously updated

Progress reports and action-tracking are integrated across execution teams and data-points, automatically flagging key issues against the critical path.

One web-based access to the dashboard and information

Real-time remote access, anytime, 24/7, anywhere, any time, completely up-to-date.

Applied at various levels to deliver common objectives

‘On-the-ground’ daily operations meetings to enable quick, accurate tactical decisions and weekly leadership meetings to inform forward planning.

“We are way better informed now than at any time in the past … the virtual control room and your team have enabled us to put a fix in very quickly, a fix for future years too. “

– Plant Director, Europe

4 Launch independently led shutdown reviews

Having a third party conduct post shutdown reviews provides objectivity on shutdown performance. An SCoE is ideal for this role and helps navigate potential tensions between plant areas, support groups and corporate functions. In addition, they bring consistency and provide a comparison between shutdowns across the portfolio – as they are all assessed according to the same approach. Lastly, any actions and improvement initiatives from these reviews are captured by the SCoE and facilitated centrally, allowing for cross-pollination of ideas across sites and higher levels of improvement accountability.

Conclusion

> Given emerging downside risks, unpredictability in todays' markets and acute skills shortages, significant value can be created by improving shutdowns. This relatively small investment helps control costs, reduce downtime and ensures the right work gets done for enhanced asset reliability.

About the authors

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