



— CRUISE INDUSTRY GUIDE —

HOW TO BUY LEAN CABIN REFURBISHMENT

With new market entrants, new technologies and new passenger experiences, the cruise industry will continue to change and grow. Let's explore opportunities in planning, cooperation and execution for cruise lines and their suppliers to scale profitably.

In this guide

- 1 **The business** - Trends and decision drivers
- 2 **Time for lean** - Lifecycle thinking and waste reduction
- 3 **The recipe** - Orchestration, budgeting, resources and sustainability
- 4 **Put lean into action** - Lean principles and the Train

MAKINEN

The business of cabin refurbishment

With up to 15-year cycles and long lead times, many things in cruise ship refurbishment have been done for the first time. It's not a secret that major refurbishment decisions can come from the gut based on incomplete information. It's something we, as a whole industry, should question. Why do we make refurb decisions, what do we contribute and are we taking unnecessary risks?

Strategic decision-making must evolve

Refurbishment is often closely tied to major strategic decisions about operations, itineraries, branding and revenue generation. While booking records are often broken after refurbishment, a delay in the dry dock is unthinkable. Historically, budget details dominate planning.

There is a human factor to decision-making on such massive projects. It's stressful enough already for our industry's decision-makers, with such vast resources and investments at stake. If we can make projects and the vessel lifecycle more predictable, we can benefit every business and better support cruise line business leaders.

Risk balance in refurbishment projects

Long-term ROI

As a cruise line CxO, if you don't have access to relevant data and insight, decisions are harder and riskier. Matching wish lists with budgets can dominate planning. Risk and inefficiency increases with repeated bidding, especially if the cruise line budget is hidden until late in the process. Cruise lines can reduce the risk of cost overruns with better cabin knowledge and more detailed planning.

Single-digit-minute scheduling

It's not sustainable practice to hide faults or make last minute inspections. Single-digit-minute scheduling will become the norm. Schedule risk is reduced when you can control more knowns and eliminate unknowns.

Continuous quality control

Modern lean projects include quality control throughout to eliminate defects and take the pressure off client inspections. Providing a quality product that is free of defects diminishes the risk of viral negative passenger reviews and ensures customer satisfaction. Better collaboration in design and material selection also helps the whole supply chain deliver at scale.



Dry dock projects that are successfully completed on schedule, on budget and on quality bring value, strengthen reputation and increase revenue for cruise lines.

MAKINEN VIEW

Our industry niche has grown up fast

Budget and time pressure have never been greater, especially for new owner-investors and new fleets. At Makinen, we want to encourage sharing of best practice in, for example, cooperation models and lean methods, to help cruise lines take more informed decisions to reduce risk in refurb projects.

What's the secret to success?

As the industry keeps growing, it is important to find ways to keep improving what we do. When we work openly together and build trust, success will follow. At Makinen, we hope this guide can make a positive contribution to our mutual success.

We must adapt to scale successfully

I believe the adoption of lean methods is essential to the future success of our industry. Our lean journey at Makinen began in 2012. Lean helps us deliver complex international projects on budget, without delays and with high quality. I hope this guide opens up what lean means to us - and what it could mean for our industry.



Mikko Mäkinen
COO
Makinen

How are industry trends affecting refurbishment?

Cruise trend	The refurb business
New owners and investors	New owners want faster ROI with zero schedule risk tolerance. New models and fleet renewals lead to new design concepts: exclusive, no-frills etc.
Expedition and river sector growth	More experienced passengers, exclusive concepts, specialist itineraries lead to bespoke interiors and specialist new builds
New markets	Demand from China for refurbs and new builds, plus location changes leads to new requirements from electrical to entertainment
New demographics	Refurbs and new-builds with diverse concepts e.g. family-free, family-friendly, entertainment-oriented etc.
Data and analytics	Customer behavior data-driven concepts, cabin condition data-driven decisions all affect planning decisions, materials and logistics
Focus on hygiene	New normal of anti-microbial materials and demand for changes to HVAC, hygienic surfaces and health facilities
Sustainable thinking	Long-term steering towards carbon neutrality means new focus on waste reduction

Battles to win together

Cruise line decision-makers and suppliers have opportunities in key areas to scale refurbishment profitably.

Date systems and integration

Your cabin inventory is your most significant asset. In future, every cruise line will have situational awareness data on their fleet-wide cabin inventory to enable more long-term, predictive planning decisions.

Optimize from design-bid-build

Collaborative design processes and partnership models provide new and more efficient ways to optimize the current multi-tiered design-bid-build process. In a rapid growth industry with finite resources, we can utilize new agile processes to lower costs and reduce the schedule risk from current processes, while increasing sustainability.

Orchestration and cooperation

Experienced cruise lines have improved coordination and pioneered long-term supplier relationships. Better architect cooperation can avoid redesigns. More partnerships will mean resources for value creation and innovation, rather than repeated bidding.

Budget details are overvalued

Strategic and design decisions can be more holistic, taking into account the cabin lifecycle, schedule risk and the hidden costs of processes and faults, rather than focused on making budgets match the wish list. Open book supplier relationships will become more popular.

Resources for planning and PMs

As more operators and larger fleets enter the waters, the refurb industry will need to make rapid efficiency gains and maximize all available skills. Client-side ops and supplier-side PMs require more resources to process vast details and cooperate more productively. Every minute and every kilogram is precious on site. With a lean approach to cabin refurbishment there is transparent documentation, rolling cabin inspections are made on time, and no unwanted surprises come up at the last minute.

More predictive refurbishment helps maximize lifecycle ROI

"Let's say a stateroom has a 30-year lifespan. In that time, we can predict there will be 2 major refits with wet work and 2 minor. From vessel launch we know the timeline and can make quite a reliable cost estimate. As an industry we have this knowledge, and yet refurbishment projects seem to always come from the sky – and every project has the familiar intense battles over scope, timeline and budget. We have to change that to sustain growth."



Jaakko Mäkikalli
CEO
Makinen

ARE YOU NEW TO THE INDUSTRY?

What triggers cruise ship refurb projects now?

Condition-based refurbishment

is driven by extreme wear and tear, like luggage damage. May include upholstery replacement, fixtures and fittings, bathroom refits and upgrades to electrics, HVAC etc.

Public areas and special venues

may require refurbishment, modification or conversion (that can also lead to layout changes and adding/removing cabins with possible affects on vessel stability and weight)

Repurposing older vessels

e.g. to extend vessel lifespan, change class up/down, for new ownership or new branding, or to match a ship with a new class or with new builds

Changing behavior

e.g. a new location/itinerary, new service offerings, new public areas and revenue streams, adapting to competitors etc.

Read more about the cabin lifecycle and eliminating waste in section 2, and about orchestration and resources in section 3. There's more on lean and the flow of work in part 4.

Time for lean

There is no room for slip-ups in the schedule. If contractors are on time, the ship sails and revenue generation starts on time. Yet, there are too many stories of canceled launches, massive contractor riding crews and incomplete facilities.

The traditional approach of short-term budgets, design compromises, on-site changes and last-minute inspections adds layers of risk to the schedule.

The lean approach is designed to change that.

There are a million commercial cruise cabins afloat. But, what condition are they in – do their owners know?

The cabin inventory is a cruise line's most significant investment towards revenue generation. Taking control of the cabin inventory is key to long-term planning and ROI. However, cruise lines face a lack of concrete information about the state of their cabins. This is a particular challenge for fleets of older vessels with unique non-modular cabins.

In cabin refurbishment, friction can be reduced by combining reliable cabin data and by design cooperation. Shared tools and processes with contractors can help client-side managers handle the huge volume of details they face. We should also aim for planners and architects to have more information in advance about material selection, suitability and availability.

By working together to optimize from design-bid-build, we can avoid repeated budget rounds, redesigns and material substitutions. We can create more efficient and ultimately more successful projects.

Expert contractors know, for example, that a bathroom wall panel has a lifespan of 16 years. There are tools and the expertise available now to help cruise lines reliably predict long-term maintenance needs. Modern software and reporting processes can drive cost and efficiency gains.

Software to control the cabin lifecycle

To track the cabin lifecycle key you need cabin data, but also reliable data collection and evaluation.

The first inventory control systems are now in use by dedicated staff with iPhone apps. These new software tools can seamlessly cover periodic cabin reviews, refurb planning and refurb quality control.

Access to accurate data on cabin configurations, commonalities, features and material use is crucial to revolutionizing the design-bid-build process.

The human factor in cabin inventory reporting

Stateroom attendants have a vital role on board. However, be wary of giving them an XLS and no training, and relying on such assessments in major planning decisions. In future, digitizing and applying cabin data collection will mean new opportunities for stateroom attendant engagement.

Contractors and specialists will also perform more independent snapshot reporting on cabins and public areas. Cruise lines will use reliable cabin lifecycle data, in concert with passenger data, for competitive advantage.

MAKINEN VIEW

Change course to predictive-based maintenance

Condition-driven projects will always be important. However, in future, all players, especially vessel owners, can benefit from more predictable long-term dry dock planning and production.

Makinen helps cruise lines get reliable cabin data, combining predictive with condition-based planning to reduce excessive maintenance, and enable just-in-time refits. We offer software and reporting solutions that contribute to long-term vessel lifecycle optimization.

What's the secret to success?

More resources for cabin situational awareness will cut costs, reduce schedule risk and support quality. The cruise companies that combine digitizing the cabin inventory with great insight will gain the most.

Accurate and timely cabin condition data

"Longer-term planning has great benefits over projects triggered just by cabin wear and tear, where timelines are not optimal. In cases where the dry dock happens long after the previous review, cabin conditions may have changed. If some things are renewed, others changed, others unaltered, quality control can be challenging – it puts pressure on claims numbers. Instead, a predictive, data-driven approach helps cruise lines manage investments and helps us deliver in the dry dock."



Tommi Tuusa
Director, Refurbishment
Makinen

How does lean help eliminate wasted time, budget and resources?

The lean approach means breaking down work into small units, removing friction from the flow of work and transparent documentation. One of main lean principles is eliminating waste. When we look at a standard list from lean best practice it is striking when we reflect that against common problems in the dry dock.

Lean focus areas	In the dry dock
Unnecessary transportation	Warehousing and deck logistics issues
Unnecessary movement	Planning and executional errors, riding crews
Waiting	Idle staff and e.g. crane, lift and corridor queues
Unused talent and ingenuity	Skilled workers with backlogs or doing unskilled work
Over-production/processing	Wrong actions planned from poor cabin data
Defects and cost of correction	Faults, claims and their required resources and costs

You may come across the idea in lean of "striving for perfection". This is not something intimidating or an extra cost. Rather, it's the basic pursuit of eliminating this waste that costs – you – time and money. Read more about lean principles and the Train in chapter 4.

How to spot a lean project in dry dock

Lifts and corridors

Detailed schedules, well in advance of the dry dock, make it easy to plan on-board supplier logistics. Lean contractors can be trusted with exclusive lift slots as there is the documentation to prove exactly how they will be maximized.

Warehousing

Detailed advanced planning makes it straightforward to specify and agree warehousing requirements, which is vital in projects with 500-strong teams and thousands of production items.

Inspections

The rolling cabin model means rolling methodical daily inspections. The detailed status of completed cabins and fixes is always transparent and easy to report.

Cabin worker occupancy

In lean projects, works continue while workers are staying in cabins. While this seems revolutionary at first, as more suppliers adopt lean this will become standard.

Housekeeping coordination

A rolling model, with a predictable number of completed cabins every day (rather than at the end of the dry dock slot), means workers use the cabins overnight and free up other areas for other contractors. This requires coordination with housekeeping to prep rooms for works and again for bedding.

Contractor riding crew

Lean projects are characterized by continuous quality control, avoiding repeating mistakes, minimal defects, and a small cabin refurbishment contractor riding crew.

Towards zero schedule risk

"Lean has had such a positive effect on our long-term customer relationships. Better, more timely, more cost-effective, data-driven cabin refurbishment decisions – with less guesswork, less waste, on time, every time."



Sameli Lähdesmäki
Partner, Board Member
Makinen



The recipe for lean cabin refurbishment

Collaborate to win

By maturing from design-bid-build we can have a more healthy industry in future and see architects' visions realized, rather than lost in budget rounds. This requires an evolution in the way we cooperate and we must embrace new models.

The cruise lines that foster the most successful cooperation between suppliers will be most successful. Long-term partnerships can help maximize innovation and resources, both material and human.

A new era of transparency

Our industry is relatively small with a lot of friendly faces. Much of the business is built on personal relationships and trust. New owners and new fleets are introducing new models, competencies and expectations.

For contractors, strong references and a history of reliable delivery remain important, but openness is vital. To navigate ever larger and more complex projects, to build relationships with new owners, and to enter deeper collaborations, contractors that can negotiate and operate transparently will flourish.

Orchestration from traditional to transformative

Client supplier relationships are changing. There are some key trends evident in the decision-making of the major cruise lines that show the direction the industry is heading:

Pitch to partner

Is multi-supplier pitching sustainable during rapid growth with finite resources? There will be new partnership opportunities between cruise lines and suppliers, and between suppliers themselves. Lead suppliers that can coordinate other suppliers will be in demand.

Wish list to lifecycle

Design-bid-build prioritizes widgets and budget-based compromises. With more lifecycle thinking and design collaboration, cruise lines and contractors can empower architects and help realize their visions.

Outside to in-house

There will be more supplier staff at client offices during the design process. As more systems are digitized, expect more real-time software collaboration between clients and suppliers, shared systems and systems integrations.

Broad strokes to details

In large projects, even the smallest details of design and functionality make a big difference. Empowering in-house design teams to vet designs earlier and ensure functionality reduces barriers to the flow of work and helps avoid costly repeated design steps.

Push to pull

Cruise lines will create design packages and more concrete RFPs. There will be more pressure on architects to provide more coordinated designs, so that suppliers can focus on coordinating the works. Cruise lines are expected to put more pressure on all suppliers to coordinate better from the beginning.

What to look for in a lead supplier

How to choose a main supplier for lean cabin refurbishment

Transparency	Open approach with detailed planning
Quality	History of low claims, certifications for governance, processes and production, software-enhanced quality assurance
References	Track record of successful projects, customer advisories
Resources	Open sub-contractor network, in-house production, relevant toolset
Reach	Global supply chain capabilities and relevant experience
Finance	Detailed PM costs, budget models e.g. cost plus and open book

MAKINEN VIEW

There is no one-size-fits-all solution

Makinen is part of a global supplier pool and we all have to constantly adapt to market conditions. We serve massive public companies and shareholder value, and also serve start-ups that need to get to market fast to generate revenue.

Lean, transparency, open book, proprietary software, sustainable materials, partnerships and embedded staff are all signs that we are agile and flexible.

What's the secret to project orchestration?

Choose the right long-term supplier relationship to fit the cruise line's operating model, and the right roles for the right resources. Get suppliers involved early. Be transparent with budgets, monitoring and reporting to remove hidden costs and reduce the risk of delays.

How do industry leaders orchestrate suppliers?

"Royal Caribbean coordinates suppliers on massive projects. The Celebrity Millennium refurb was a great case. We worked with the design team and architect from the start. It made sourcing and production so much more efficient."

In future, I expect more cooperation earlier in the process as the benefits are so great."



Elina Inkinen
Manager, Business Development
Makinen

How to budget lean cruise ship cabin refurbishment

It's the question everyone wants answered – what's the cost? You can spend \$1-25m on smaller vessel maintenance, or upgrade 50 luxury staterooms, or refurbish 2000+ passenger cabins plus 500+ crew cabins plus all the entertainment areas. Projects and budgets vary. There are opportunities in budgeting to remove known unknowns and scale successfully.

Financial planning

Quarterly budgets and 3-5 year plans should be in concert with the 7-15 year cabin inventory lifecycle.

Supplier model

Open book and cost plus pricing (with a transparent profit markup) can streamline budgeting. A lead supplier can price for coordinating other suppliers and reduce the burden on client-side resources. Long-term partnerships can increase ROI via systematic cooperation, longer-term planning, innovation, and shared systems and data. Lean projects are typically loaded more on project management costs with gains in efficiency.

Client resources

In the same way that transparent supplier budgeting and resourcing benefits projects, in cruise ship refurbishment transparent client-side resources, especially for admin and coordination, help avoid bottlenecks.

From SOW to SOV

Design-bid-build refurbishment projects have typically involved a Scope Of Work that bounces backwards and forwards between suppliers and the client. The cost may be indirectly passed back to the client as the process eats project preparation time. A Schedule Of Values can be a better solution for change management and to encourage more detailed schedule planning earlier.

Quality

Faults and defects that lead to delays and reputation damage may cause direct costs. Fault correction and contractor riding crews incur additional indirect costs that may be passed on to the cruise line.

Lean helped us scale cost-effectively

"Lean has had a big impact on our ability to deliver large projects. The work is split into smaller pieces and workers at all levels can carry out tasks that match their competence. We have a big advantage with experienced project managers. The right competence and lean-mindedness has been vital and helped us scale."



Jaakko Mäkilä
CEO
Makinen



Streamlined material selection and sourcing

Focus on weight in the design phase

Design-bid-build involves repeated material changes in each bidding step in order to satisfy budget demands. When bidding has finished, only then does attention turn to weight.

Refurbishment projects may bring unexpected weight gains that have the potential to affect vessel stability, mobility and fuel consumption.

With more information flow in the design phase, architects can better design solutions that avoid weight increases.

Cut the costs of repeated sourcing rounds

The norm is that contractors get design specifications and then get tasked to substitute materials with the same function and aesthetics – that are lighter – and cost less.

Repeated compromises occur and it's a painstaking process, eating into already long lead times, especially for e.g. fire retardant materials.

Budgets can be more easily controlled when the design team and contractors coordinate material selection earlier in the process.

Take advantage of new material technologies

Hygiene requirements used to be based on cleaning being easy and manageable. Anti-microbial materials will become standard. Of course, there are other safety, combustibility and durability criteria that come into play, depending on the design, area and use.

The effects of the pandemic also mean new demands on HVAC to isolate different areas, and changes to medical areas, with hospital berths increasing on some vessels.

How do lean suppliers source materials?

There are several steps to take to support more efficient sourcing:

- **Long-term plans** Fleet-wide designs, materials and finishes
- **Design collaboration** Empower architects and reduce redesign
- **Supply chain** Use an established global network
- **In-house production** For agility and quality assurance
- **Logistics plans** Low weight materials reduce emissions and freight costs

CRUISE LINE VIEW

"Partnership-centric is inherent in Makinen's DNA. They have been a reliable partner for collaboration, including identifying the best solutions for scope, time and cost challenges."



Carmen Gil
Senior Manager
Royal Caribbean Group

Sustainable choices for the refurb business

Refurbishment is by definition part of a circular economy. That's a good starting point. However, there is untapped potential in resources and regeneration: how we re-use, recycle and up-cycle. The industry will evolve, partly due to new passenger demographics, PR and changing regulations. There are also many business opportunities in waste infrastructure, creative re-use, material development and technology solutions.

Sustainability as standard in future itineraries

The target passengers for new high-end and expedition brands will make sustainability a competitive differentiator in future. The industry will continue to address the end-to-end impact of cruising with LNG and other new fuels, engine technology and CO₂ compensation.

In the refurbishment business, we can make an impact with material selection and lean processes that reduce waste and improve waste management.

How does lean affect the on-site environment?

Minute-by-minute scheduling means that there are no unnecessary people, tools or materials in work areas and precise control over on-site flow.

This accuracy leads to a more optimized and safer work environment and less waste overall. Waste removal is also part of the detailed schedule, so waste is not neglected and does not end up in the wrong location. The most progressive companies will benefit from following benchmarked best practice.

Sustainable material sourcing

Weight is an important factor in cabin refurbishment. Excess weight can mean failure to pass class inspections. Conversely, if you cut weight, there are savings on vessel fuel consumption and also on the impact and cost of refurbishment airfreight.

Refurbishments will always require hazmat materials for e.g. glues and metal paint, but we can constantly and consciously promote lighter, more sustainable materials, for example:

Composites

Replace metals and plastics in furniture and fittings with non-combustible composite fibers, designed for recycling.

Boards

Particularly in public areas, source lightweight alternatives to cement boards, plastic laminates and certain mineral wools that are difficult to recycle.

Finishes

Water-based varnishes are cheaper to transport and better for the environment. The drying time is longer than polyurethane varnishes, but this is not an issue in the lean Train with Takt timing.

Read more about lean in the dry dock, the Train and Takt times in part 4 of this guide.

We care for the whole team

"We will complete DNV Corporate Social Responsibility Level 3 Certification in 2021 and plan to reach Level 4 in 2023. We are among the first in the global shipbuilding industry to achieve this."

"We've aligned with UN sustainability development goals, like good health and well-being, responsible procurement and sustainable innovation. We want to make a positive contribution to a low carbon economy."

"At project level, we use multi-language workers' manuals, we focus on health and safety in briefings and our goal is zero harm with no fatalities and no injuries."



Kirsi Orava
VP, Sustainability & Brand
Management
Makinen

How to put lean into action

The lean approach is proven to reduce risk, reduce waste and enable scale in complex cabin refurbishment projects. Lean requires commitment and a shift of emphasis and resources. The key concepts and tools are highly adaptable to different operating models.

How do the lean principles apply to cabin refurbishment?

Flow principle

The value stream, including raw materials, works, people, products and data, is monitored, harmonized and made predictable, while removing barriers and waste.

Takt planning

Each activity's Takt time is planned and adjusted to meet customer demand to ensure a constant workload and performance with no last minute firefighting.

Pull system

Production only of what is needed, when it is needed, in the amount needed - with no unnecessary queuing and storage (i.e. not based on forecasted demand).

Zero defects

Errors are prevented or promptly resolved. Errors and their cost are made transparent. No faulty or unfinished units are transferred to the next process.

MAKINEN VIEW

Everything we do is for the Train



From chaotic production

Work units run at different speeds and block, overtake and collide with each other. This is a high latency, inflexible, inefficient system with stockpiles and downtime.



To the lean Train

Work units run at the same speed, accident-free. No buffers are required. It's a pull system, from the client and from what the client wants, starting with the dry dock schedule.

We are committed to lean

To adopt lean successfully, you need stakeholder commitment. We give our project managers strong support and training.

It helps that our company culture is pragmatically Finnish and lean is a familiar and positive concept. For our clients, the rewards are full transparency, efficiency and reduced risk - on time, on quality and on budget.

What's the secret to lean?

Take lean best practice from other industries, select things that work in our world, tune the approach on a variety of projects to get excellent results. You are not stuck with it. You do not always have to use it. It's adaptable.

No surprises and total trust

"Lean has so many advantages. Clients notice a little more in PM costs. With the Train everything is controlled at all times and we always know if we have derailed. There are no unpleasant surprises. We never risk delaying the ship. It means we get the client's total trust."



Elina Inkinen
Manager, Business Development
Makinen

Why use a Train?

- Controllability, easier daily management and accountability
- Improved procurement planning
- Improved logistics planning, both off-site and on-site
- Improved manpower requirement planning
- Improved schedule predictability and transparency
- Built-in mechanism for constant improvement

Lean glossary

Train A series of processes required to complete production. A Train is made of Wagons.

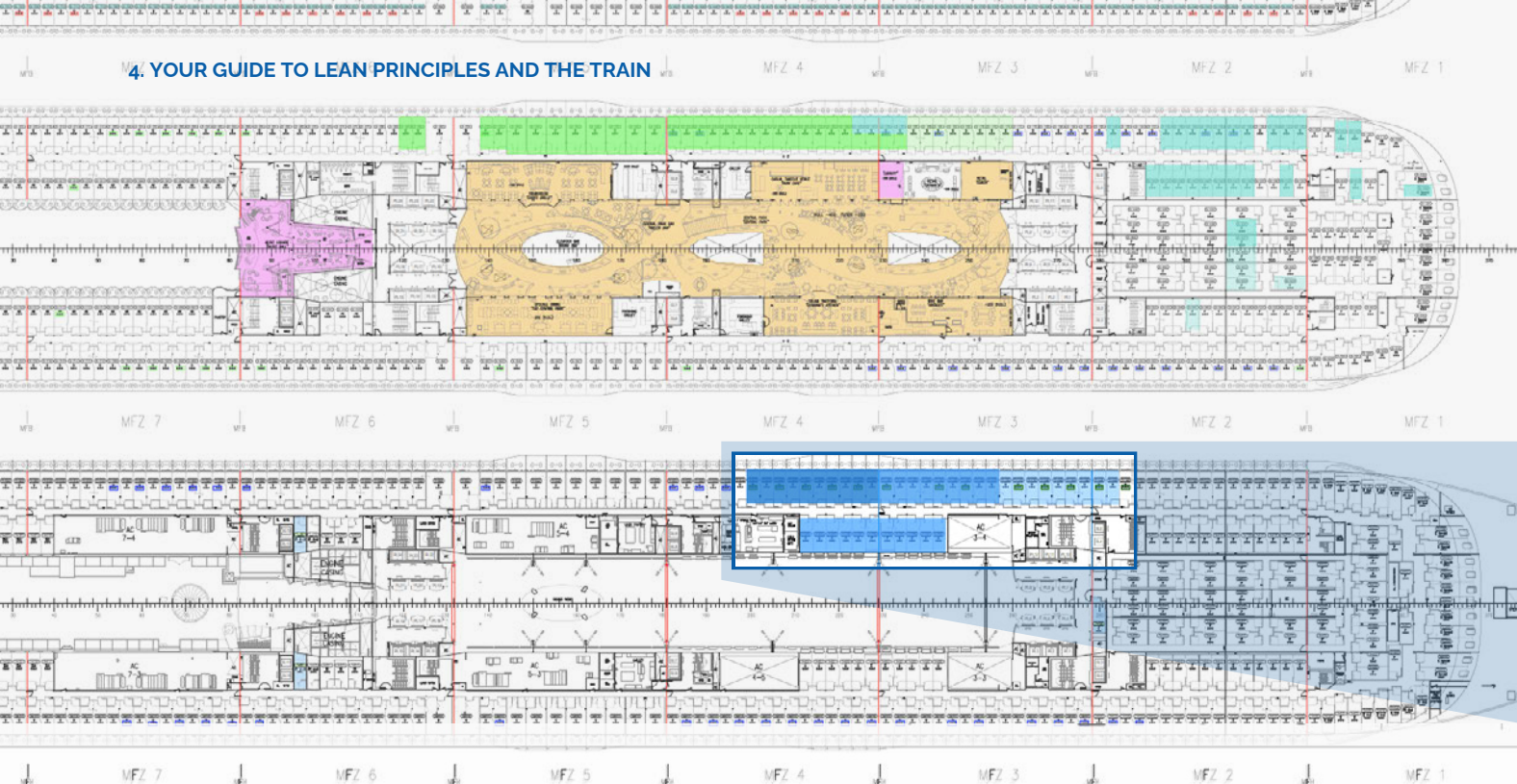
Wagon A repeated activity with a group of workers and clear scope of tasks e.g. ceiling panel installation, tile grouting, carpet fitting etc.

Takt Time The time frame to complete a wagon's tasks and move to the next area.

Takt Area A cabin or, in a public area train, e.g. medical center, casino etc.

LPS The Lean Production System is Toyota's original system of relentlessly eliminating waste and non-value added activities from the production process.

4. YOUR GUIDE TO LEAN PRINCIPLES AND THE TRAIN



MAKINEN VIEW

The lean effect on work in the dry dock

Site safety

The Train and task breakdowns help improve people flow and mitigate risk.

Weight management

Detailed planning removes surprises from refurbishment. We are also able to concentrate more efforts earlier on sourcing lighter alternative materials.

Speed

We are able to start dry dock later and finish earlier than other contractors.

Upstream quality control

We have moved away from the inspect-re-inspect cycle with internal quality control in the Train and client inspections 1-2 times per day.

Schedule monitoring and reporting

We use our own IS Master software, including schedules, cabins/scope, PM tools, resource flows etc.

Adapt on the fly

If a Takt time is too short for a Wagon we adjust by adding/removing works or adjusting Takt time. This is part of our Train drivers' everyday work.

Contractor coordination

With a minute-by-minute schedule provided a month in advance we help the client space manager with coordination and eliminate conflicts with other contractors in the same areas.

Rolling cabin completion

The Train completes cabin areas daily. Quality control is continuous. There are daily final inspections and claims are minimized. Workers can return to cabins overnight solving another logistics headache.

Detailed plans make dry dock decisions easier

"Lean makes coordination decisions much easier for the cruise line's technical works and supply chain people. We have detailed plans so far in advance that decisions can be made without argument. We get exclusive elevator access because we have the evidence in front of everyone. It all contributes to the daily cabin completion rate."



Mikko Mäkinen
COO
Makinen

Efficient refurbishment scheduling with the lean train

Order	Cabin number	Cabin type
1	707	Typ.5
2	705	Typ.2
3	703	Typ.2
4	701	Captain room
5	702	Chief engineer room
6	704	Typ.2
7	706	Typ.2
8	708	Typ.5
9	710	Typ.5

The lean approach involves minute-by-minute wagon scheduling with specific cabin groups marked for night work. Detailed scope by wagon task lists, combined with continuous Takt time tracking, help keep the Train on time.

What are the barriers to adopting lean?

Pushback can come from familiarity with the design-bid-build process, rigid supplier relationships and the tendency to overvalue money over time in planning. Some players also fear that lean is inflexible, which is not accurate, or that it will bring transparency, which is the case.

Other industries, like manufacturing and construction, have faced the same evolution. For example, being locked to the aging design-bid-build process has been a key factor in cost overruns and expectations mismatches in public sector construction.

How can you prove the case for lean?

Look at the numbers:

- Reduced dry dock time and no delays
- Fewer project days to completion
- More completed cabins per day
- No lost sailing days or cancellations
- Minimal claims and contractor riding crew
- No negative social media sentiment
- Less material and resource waste
- Material, logistics and resources cost savings

Is lean the next leap forward for our industry?

Leading cruise lines, like Royal Caribbean, and leading contractors, like Makinen, have proven how the lean approach, transparency and enhanced collaboration can transform complex dry dock projects and enable delivery on budget, on time and on quality.

If we look at trends from other industries, like construction and automotive, and the predicted growth in the cruise industry, we can expect increasing demands on budget, time and quality to continue to drive the adoption of lean methods in cruise ship refurbishment.

CRUISE LINE VIEW

"Makinen's commitment and perseverance, and our lean approach implementation, resulted in a significant increase in number of cabins per day modernized and reduction of days out of service."



Carmen Gil
Senior Manager
Royal Caribbean Group

MAKINEN VIEW

What makes Makinen different?

We welcome long-term partnerships and projects of all shapes and sizes.

- Transparent, data-driven, lean methods
- Experienced, passionate and flexible
- Finnish roots, global reach and a trusted supplier network
- High quality, low claims and in-house production

Take the next step

What do you think will transform our industry? How could you benefit from lean? Would you like to see how lean projects are planned and budgeted?

As the lean pioneers in the cabin refurbishment industry, we are continuously learning from our clients, partners and stakeholders as we strive to improve.

We would like to hear your thoughts and questions about the future of our industry and the lean solutions and opportunities presented in this guide.

Let's grow profitably together

"Makinen started as a small family business and we now run massive dry dock projects around the world. So much has changed, but the intense demands on quality, time and money have remained constant."

"We believe that, for our industry to succeed, we need to share our insight and evolve fast. We have told a little about our story here and we wish you all the best with your lean journey."



Jaakko Mäkikalli
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MAKINEN

Step Ahead

Refurbishment | New builds | AMS antimicrobial systems
THE LEAN CRUISE SHIP REFURBISHMENT COMPANY



CELEBRITY EQUINOX 2019
NORWEGIAN GETAWAY 2019
MARELLA EXPLORER II 2019
CELEBRITY SUMMIT 2019
NORWEGIAN SKY 2019
NAVIGATOR OF THE SEAS 2019
CELEBRITY MILLENNIUM 2019

NORWEGIAN JEWEL 2018
MARINER OF THE SEAS 2018
INDEPENDENCE OF THE SEAS 2018
NORWEGIAN STAR 2018
NORWEGIAN SUN 2018
ADVENTURE OF THE SEAS 2018
CARNIVAL FASCINATION 2017

SERENADE OF THE SEAS 2017
ENCHANTMENT OF THE SEAS 2017
GRANDEUR OF THE SEAS 2017
HOLIDAY INN, CITY CENTRE 2017
SOVEREIGN 2017
SILJA EUROPA 2017
MEIN SCHIFF 6 2017

ADVENTURE OF THE SEAS 2017
OCEAN DIAMOND 2016
AZAMARA JOURNEY 2016
AZAMARA QUEST 2016
NORWEGIAN STAR 2016
MAJESTY OF THE SEAS 2016
JEWEL OF THE SEAS 2016

EMPRESS OF THE SEAS 2016
VIKING GABRIELLA 2016
VIKING AMORELLA 2016
SILJA SYMPHONY 2016
SILJA SERENADE 2016
MEIN SCHIFF 5 2016
OVATION OF THE SEAS 2016

HARMONY OF THE SEAS 2015-2016
NORWEGIAN EPIC 2015
NORWEGIAN GEM 2015
EXPLORER OF THE SEAS 2015
MEIN SCHIFF 4 2015
MS MARIELLA 2015
CARNIVAL MIRACLE 2015