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Engineering acceleration using Project Production Management

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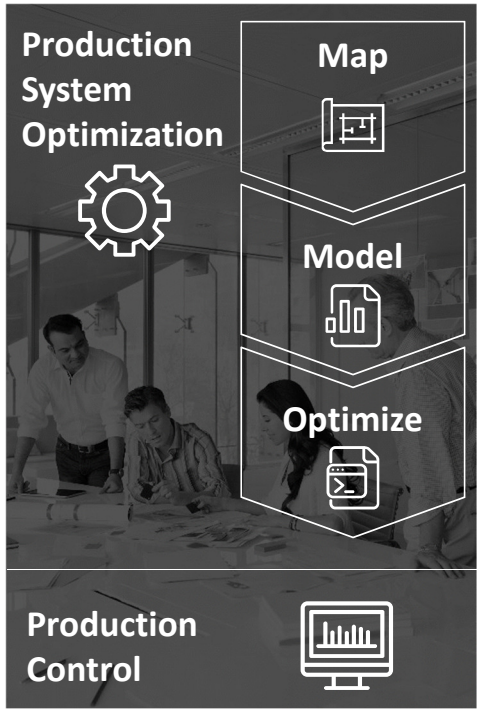
Client struggling to deliver engineering as per schedule

Context

- Advanced Industries client in **engineering phase of major project** in Europe
- **Engineering scope critical** to unlock long lead procurement activities
- **Challenging regulatory environment** with design inputs from multiple stakeholders
- **Low clarity on overall engineering process**
- **Challenges to deliver** on customer requirements and schedule

❯ Our approach

- Deploy Project Production Management:



- Define standard engineering process
- Develop simulation model of process performance
- Optimize engineering process
- Deploy Project Production Control

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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Challenges experienced by project team

Tasks needed to complete engineering **not fully defined, aligned or, worst case, known**

Siloed approach with too infrequent or inefficient interaction and alignment between individuals and/or sub-teams

Fragmentation of resources leading to sub optimal prioritization at working/ task level

No early warning or visibility on (risk of) delays

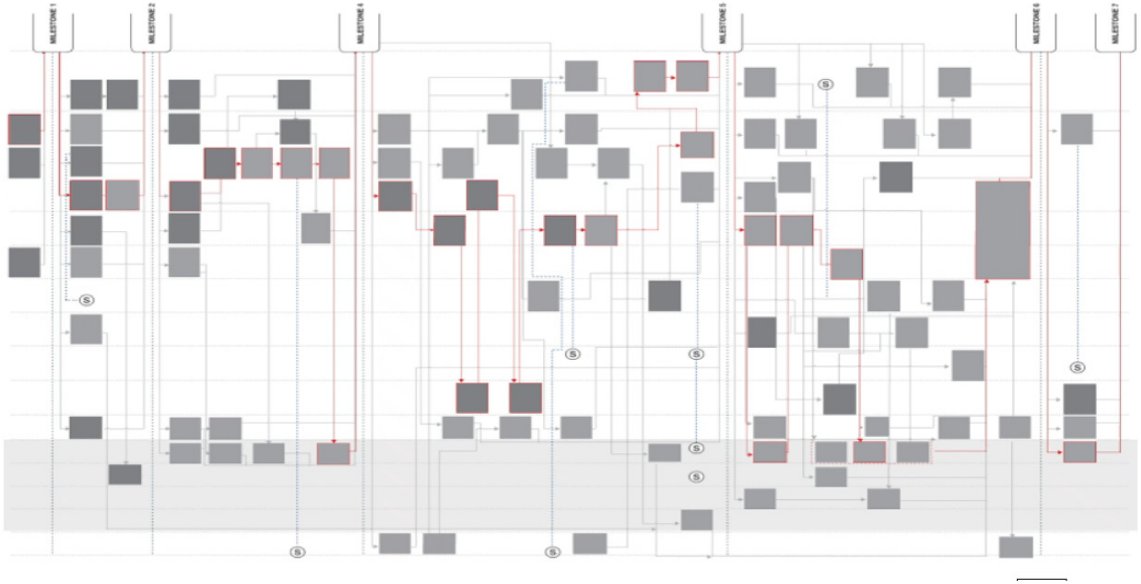
Focus on excuses and blame, not on addressing the root causes for delays in task execution

Build up of work-in-process resulting in deliverables taking longer and longer to complete

SOURCE: McKinsey Capital Projects and Infrastructure Practice

Detailed process mapping set the stage

Engineering process defined and tested with project team



Process mapping captured:

- Activity sequences and handoffs
- Work load and level of effort
- Capacity constraints of team members

Engineer feedback

This exercise has been **extremely helpful** in defining required work to deliver

I don't know why we didn't have this in place earlier. It has been a **breath of fresh air** to understand what we need to get done

I really see the value this map has in **helping the team to deliver**

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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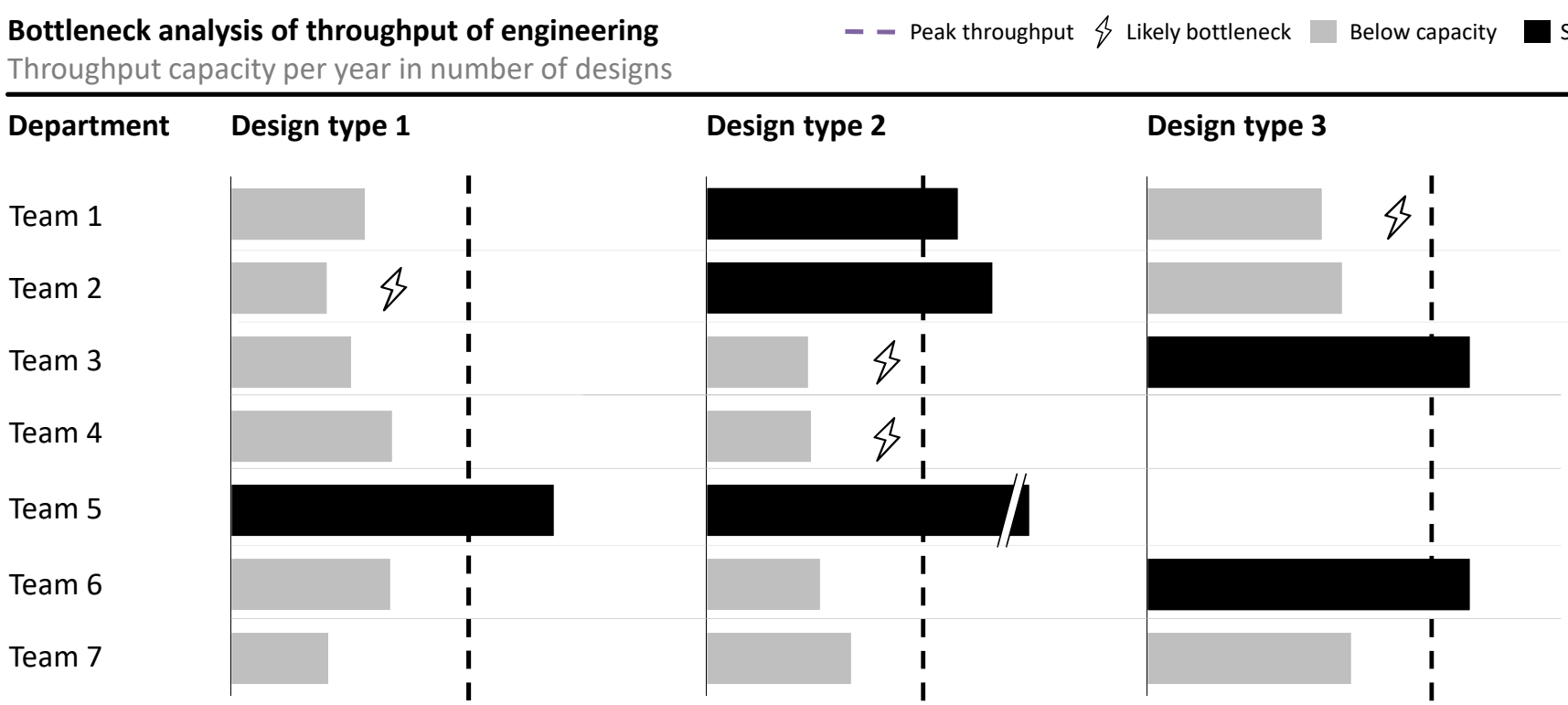
Initial analysis highlighted likely bottlenecks

Bottleneck analysis of throughput of engineering

Throughput capacity per year in number of designs



Bottleneck analysis on mapped process identified likely bottlenecks and areas of concern

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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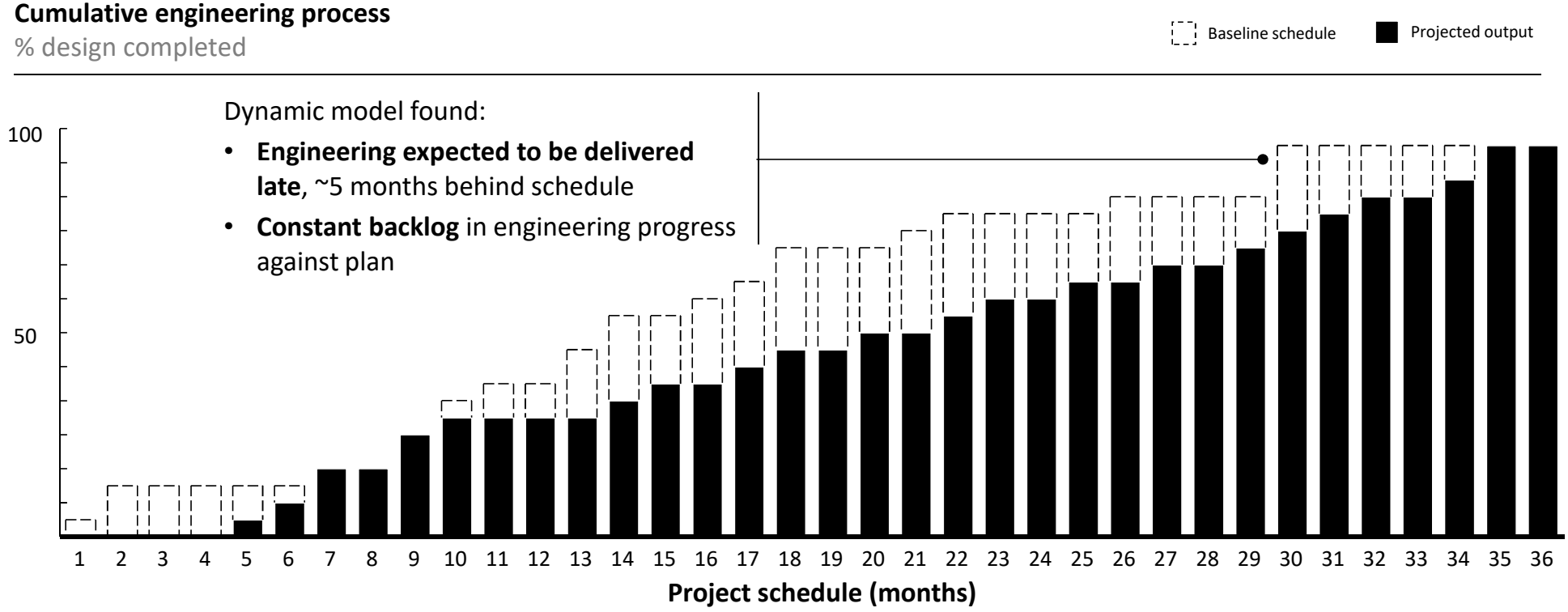
Dynamic model (Discrete Event Simulation) predicted a five month schedule overrun

Cumulative engineering process

% design completed



With baseline model established, scenarios tested to explore benefit of interventions to meeting project schedule

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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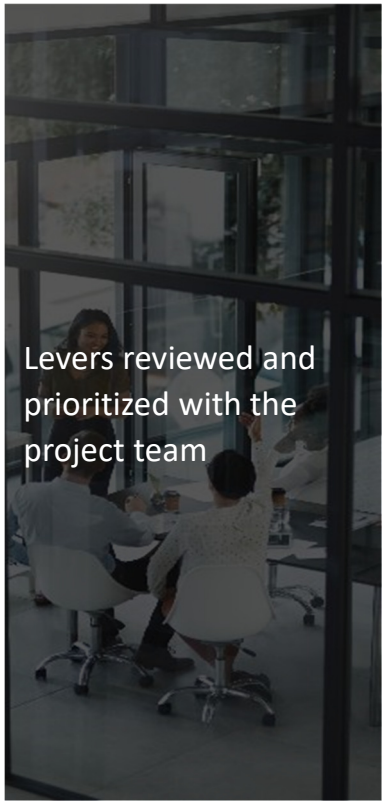
Levers to optimize cycle time and throughput

How can cycle time and throughput be optimized?

- Optimize WIP
  - Determine optimum WIP across process
  - Re-balance WIP as process and workload evolves
- Fine tune process
  - Kill steps
  - Swap steps
  - Combine steps
  - Simplify steps
- Adjust resources
  - Re-balance resources
  - Targeted increases
- Lean bottlenecks
  - Time in motion observation of critical steps
  - Tactical productivity booster initiatives
- Improve mindset`s & behaviors
  - Role modelling
  - Establish formal mechanism (targets + incentives)
  - Training/capability building



SOURCE: McKinsey Capital Projects and Infrastructure Practice

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Targeted interventions could deliver project within current schedule

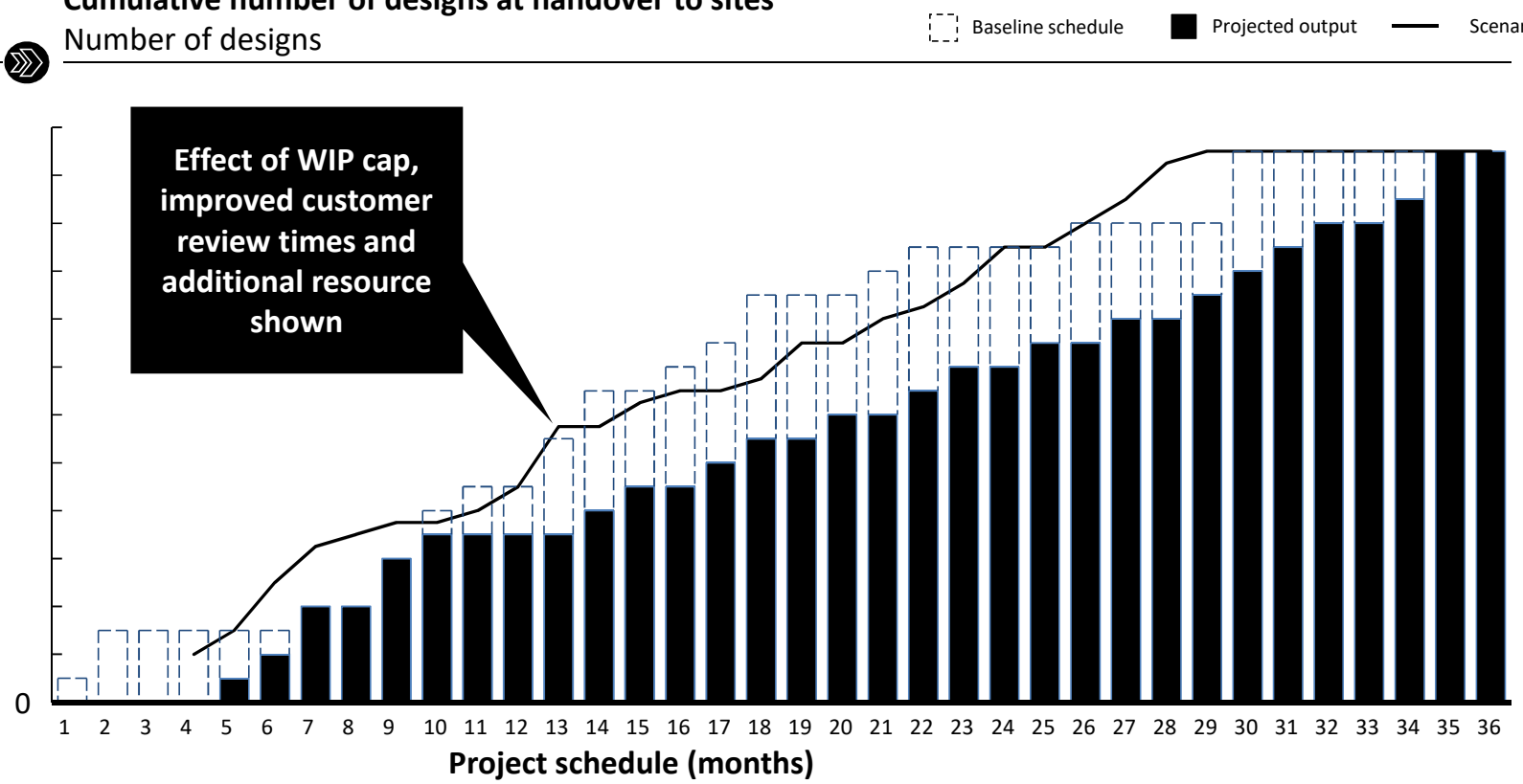
Scenarios applied

Production System modelled with:

- **WIP capped at xx** designs in process
- Customer team **review times reduced by 50%**
- One **additional resource added in bottleneck teams**

Cumulative number of designs at handover to sites

Number of designs



SOURCE: McKinsey Capital Projects and Infrastructure Practice

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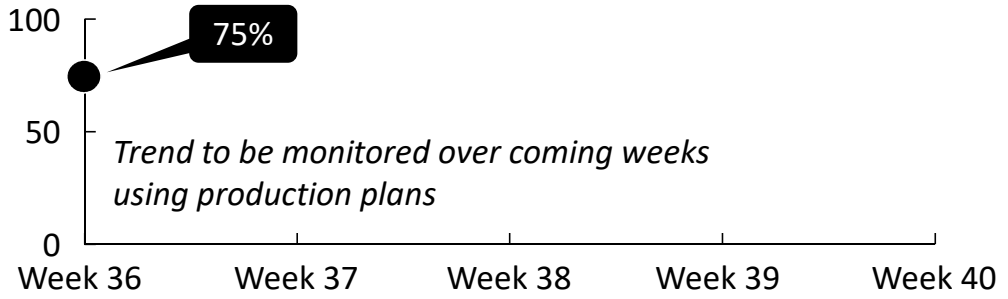
PPC set up to drive daily work and capture the data required to refine the model

PPC kicked off

- Standard process used to define **production schedule & production plan**
- Structured review of production plan tasks completed to assess **commitment reliability and plan adherence**
- **Root cause** of incomplete tasks captured, with preventative actions defined

Outputs from production control week 1

Commitment reliability (% planned tasks complete)



Root causes categories for incomplete tasks

Categories of incomplete tasks , Number of incomplete tasks

Category	Count	Detail
Tools & equipment		Incomplete training for IT system
Under estimated workload		First of type design activities
Priority change		Management re-direction on priority

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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PPM brought tangible benefits to project while setting teams up for future performance improvement

Interventions made

- **Mapped three engineering processes** through 10+ workshops with all relevant stakeholders
- **Dynamic simulation model** created one solution to identify critical path and potential **bottlenecks**
- Identification of 10+ initiatives to **optimize process** incl. capping of WIP and introduction of production control
- Established **weekly production control meeting** to discuss progress and potential blockers, and capture data for model
- **Trained** two clients in production control tool and **coached** teams on task prioritization and internal communication

Impact realized

- **Visibility:**
  - **Workflow** of activities to follow identified
  - **Projected finish date** estimated
  - **Impact of interventions** on delivery schedule assessed
- **Schedule de-risking:**
  - **5 months** compression potential on critical engineering
- **Capability building:**
  - **2 production control facilitators** in training
  - ~**20 people** introduced to project production management

SOURCE: McKinsey Capital Projects and Infrastructure Practice

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