COMPANY OVERVIEW

COMPANY WEBSITE

www.pmgroup-global.com

PM Group is an international project delivery company operating across Europe, the USA, and Asia. We have a 44-year track record in project management, process design, facility design, and construction management for leading multinational companies. We are world leaders in the Pharmaceutical, Food, mission-critical, Medtech, Advanced Manufacturing, and Energy sectors. Our reputation is built on great people with a flexible "can do" attitude who consistently deliver successful projects safely for our clients. We pride ourselves on our technical expertise and work closely with our clients to develop innovative solutions for complex projects. We have over 2,500 highly-skilled employees worldwide. While headquartered in Ireland, we have offices based in 17 countries worldwide.

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OVERVIEW OF THE LEAN INITIATIVE

This case study examines PM Group's focus on developing and deploying more effective and efficient Graphical Representation of Schedule on multiple Client projects in Europe, ranging in scale from €50M to €400M.

BACKGROUND TO THE LEAN INITIATIVE

Large-scale complex projects require large complex schedules, and these schedules often run to hundreds of pages. We have found that traditional Gantt charts do not communicate well the key schedule objectives and drivers to the full range of users. To address this, PM Group developed graphical-based means to convey more clearly and succinctly the requirements of schedules focused upon the specific information requirements of the end users across all stages of construction projects, from construction pre-planning and constructability, through construction, and into turnover and commissioning phases.

LEAN INITIATIVE UNDERTAKEN – LEAN THINKING, TOOLS, TECHNIQUES

Over many years of experience in the delivery of high-tech complex projects, PM Group has identified the following issues with the day-to-day use of traditional Gantt charts as a communication and coordination tool for large diverse project teams and end users:

- Difficult to relate Gantt Chart to specific areas/plant zones.
- Difficult to clearly convey the sequential flow of work in area.
- Difficult to convey weekly milestones per area.
- The overlap and coordination required between different contractors in a specific area not readily or clearly discernible.
- Hard to communicate current schedule status of all activities in a specific area.

Figure 1. Typical Traditional Gantt Chart.

On large, complex, technological-based projects, the user groups of schedule information are diverse and range from designers, project managers, and construction supervisors, to equipment vendors and commissioning teams. This is a large and diverse audience with multiple skillsets and not all are competent, capable, or even willing to try to disseminate and extract the information they require from large Gantt charts.

This barrier to information flow often results in the following negative project team performance characteristics:

- Large schedules are often too complex with several thousand activities and can be difficult to follow for some team members and as a result can often be ignored.
- This further reduces schedule ownership by project teams and schedule adherence on site.
- The project scheduler becomes isolated from the team.
- Schedule is not used as a coordination aid for planning work.
- This leads to more potential for coordination and congestion issues between trades/disciplines.
- Large schedules are hard to update on a regular basis and are therefore often out of date by the time they are issued.

To overcome the information dissemination and communication limitations of the traditional schedule Gantt chart described above, PM Group developed and utilises graphical measures to provide a more succinct means of extracting and communicating key schedule drivers.

These measures involve supplementing the traditional Gantt Chart by graphical presentation with actual facility layouts in the background. This provides both graphical representation of schedule dates with actual plant layout in the background, resulting in:

- Clearer and easier to understand schedule information for cross-discipline field supervisors, contractors, area owners, and safety professionals.
- Better communication tool for multi-contractor coordination meetings/whiteboard, planning and look-ahead meetings.
- Better communication tool for progress reporting to clients, and in particular non-technical personnel.
- Easier to update on weekly basis with minimal supervisor input.

The following are a series of project demonstrations from

recent construction projects where PM Group has effectively utilised graphical means as a supplemental measure to more effectively communicate schedule information.

Project Demonstration 1- Civils Works
On a large Bio-Pharma design and construction project, graphical representation of the civils schedule was effectively used as a key communication tool from pre-planning and constructability reviews through to site whiteboard meetings. It was used as an effective tool to on-board the CM team and Contractor supervisors and to visually communicate the planned sequence of install to both construction teams and designers. Figure 2 indicates graphically the civils installation sequence up to ground floor slab; and Figure 3 represents the superstructure build involving multiple contractors with overlapped schedules. These graphical representations of the civils schedule were found to be highly effective communication tools and extensively used at pre-planning/constructability stage, through tender stage, and into regular site planning, coordination, and whiteboard meetings. These were developed at an early stage during pre-planning and further developed as the project progressed into execution and site delivery.

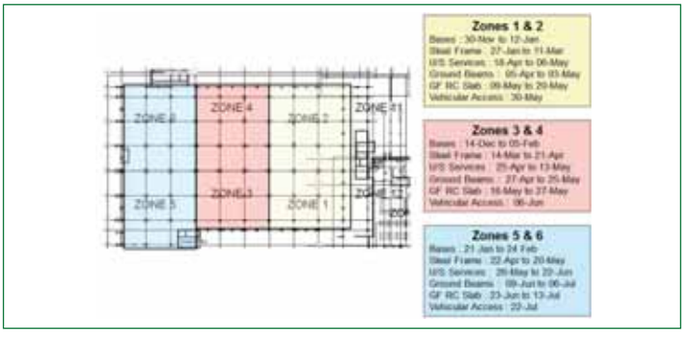

Figure 2. Graphical Representation of Civils Works Sequence.

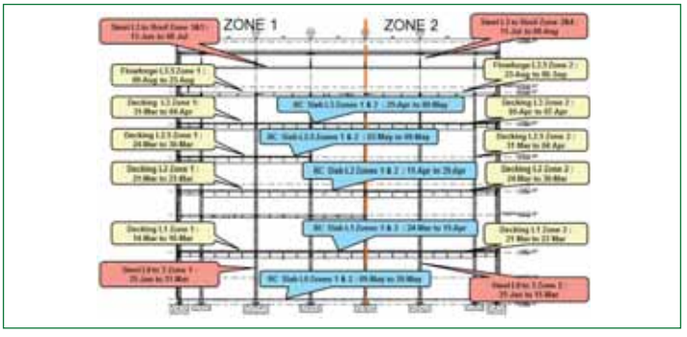

Figure 3. Graphical Representation of Steel Frame and RC Floor Sequence.

Project Demonstration 2 – Existing Roof Steel Reinforcement
This case study examines the scenario of two steelwork contractors working simultaneously on the same structure with an aggressively overlapped schedule. The scale of the project and the tight programme dictated the need for two separate steelwork contractors to deliver the fabrication and installation metrics required. As a result, particularly careful and detailed planning and coordination of the install was required to maximise productivity and safety in a tight, shared working space in an existing building. A significant and effective tool in achieving this was the use of graphical representation by schedule "storyboard" which provided:

- Clear schedule communication which was essential for planning, coordination, reporting, and mobilisation of follow-on trades.
- Direct correlation of schedule to actual site layout/specific area, for example, the schedule requirements were superimposed onto the steel portal frame grid.
- Visibility of the areas that other contractors were working in at the same time, which further enhanced coordination and safe working.

Figure 4 demonstrates how the works to the steel portal frame were represented graphically in a manner that is much clearer, communicative, and more user friendly than the traditional Gantt chart.

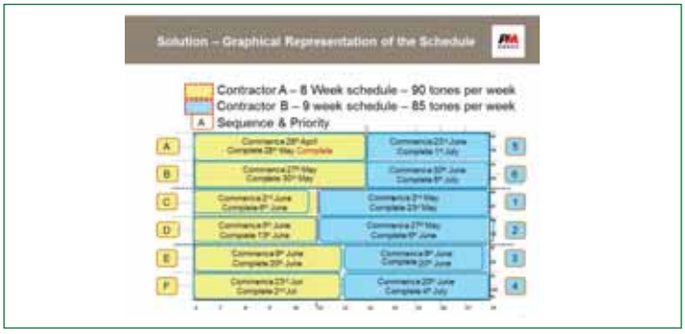

Figure 4. Graphical Representation of Roof Steel Installation Sequence.

Project Demonstration 3 – Cleanroom Construction and M&E Fit-out
On a fast-track Pharma project involving multiple contractors and schedule interdependencies, graphical representation of schedule was effectively used to simply communicate and plan the complex sequence of cleanroom completions, equipment move-in, and Mechanical, Electrical and Instrumentation completions.

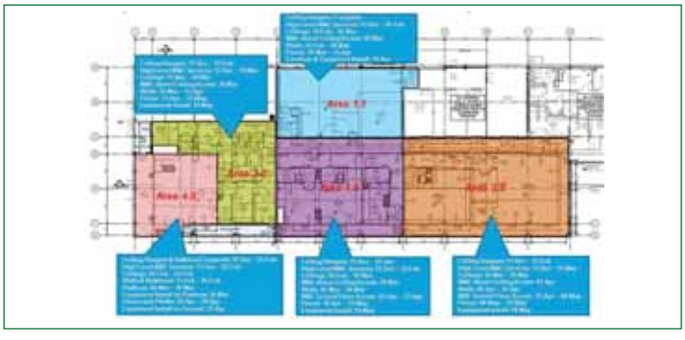

Figure 5. Graphical Representation of Cleanroom Coordination with MEP Trades.

Project Demonstration 4 – Turnover Planning
The turnover process on a large-scale BioPharma construction project was enhanced by the use of graphical schedule tools (Figure 6) to clearly communicate key system turnover dates and to identify simply the precursors. This information was presented at the daily turnover meeting as a simplified communication tool for system owners, supervisors, and turnover personnel to manage the sequential completion of systems within clearly defined timeframes.

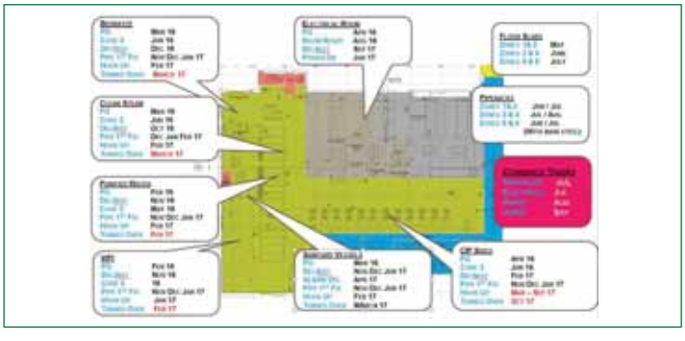

Figure 6. Turnover Planning.

LEAN INITIATIVE IMPROVEMENTS & IMPACT

Current schedule tools, namely traditional Gantt charts, for large complex projects are not communication-friendly for construction management teams, contractors, and clients. However, the improved schedule graphical communication tools described in this case study have been proven to provide enhanced performance on design and construction project in following areas:

- Enable culture change with supervisors taking ownership and accountability of schedule.
- Improved work planning for CM Team and Contractors.
- Improved Supervisor/Contractor schedule understanding and adherence.
- More frequent updates aids better decision making by management.
- Improved coordination amongst contractors leading to safer working.
- Enhanced reporting material to clients and internally.

Graphical presentation of schedule information improves coordination, communication, and understanding of schedule:

- Schedule slides in graphical format are used at weekly coordination and planning meetings.
- Construction supervisors and contractors use the slides relevant to their areas on site to plan work.
- The highly visual representation of schedule encourages more interaction between supervisors, area owners, and schedulers on site.
- Schedule slides used as reporting tool for progress reports to clients.
- Graphical schedule slides can be linked directly to Primavera P6 using smart links.

The greatly improved communication and co-ordination achieved by the use of graphical schedule information resulted in the following benefits:

- Better ability to plan.✓
- Improvements in H&S performance.✓
- Reductions in claims and costs.✓
- Improved quality and reduced snags.✓
- Improved schedule compliance.✓
- Improved client and supply chain satisfaction.✓