

# A handbook for project practitioners in EPC businesses



*Project handling is a question of profound expertise. Our picture is provided by Inter-Cargo, an international transportation and logistics company specialized in out of gauge cargo, heavy lift cargo and project cargo charter*

**Excellence in project management is a key success factor in doing business across all industries. Globally recognized project management standards and guidelines, such as the Project Management Body of Knowledge (PMBok by PMI), ISO 21500 or the IPMA Competence Baseline have evolved during the last years to a universality that they can be applied to any project, no matter what size, no matter the nature of business. And exactly that universality is the challenge we face in the EPC business in the large-scale plant industry**

**writes FRANK-PETER RITSCHKE**



Frank-Peter Ritsche

Picture: Valinon

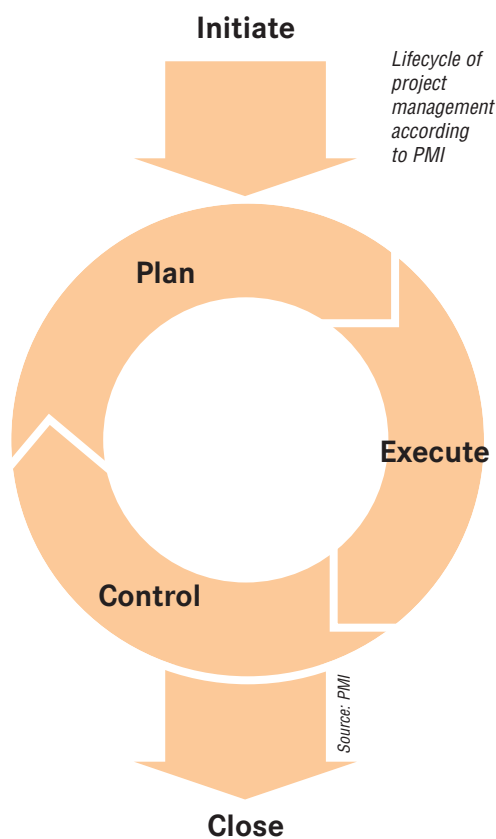
A couple of good project management guidelines have developed around the globe that summarize and standardize such basis project management principles. I consider the Project Management Body of Knowledge ("PMBoK") of the US-based Project Management Institute (1) (PMI) the most accurate and internationally recognized standard in the world. The certification scheme provided by PMI – the "Project Management Professional" (PMP) – has evolved to the leading certification program for project managers worldwide. In 2005 the PMI had registered 100 000 certified PMPs, within a few years the number has rocketed to an amazing 600 000 in 2013 – figures that explain themselves.

The PMI model (PMBoK, fifth edition, 2013) breaks down the project lifecycle into 47 processes organized in the five process groups of the project lifecycle: initiating, planning, executing, controlling, and closing. In addition these processes can be assigned to ten "knowledge areas": Integration, Scope, Time, Cost, Quality, Human Resources, Communication, Risk, Procurement, and Stakeholder.

The PMBoK knowledge areas can be correlated 1:1 with the ISO 21500 standard (Guidance on Project Management), a new standard by the International Standardization Organization that was edited just in 2012. With this correlation the PMI model is clearly the dominating project management model, and banned competing standards into the second line, such as the British Standard BS 6079 or the International Project Management Association (IPMA) with the IPMA Competence Baseline (ICB).

The creation of ISO 21500 started in 2006, when the British Standardization Institute (BSI) submitted a proposal to ISO for the development of a Project Management Statement based on the BSI Project Management Standard – BS 6079. Following ISO's standard procedures, once the pro-

posal was received, it was sent to the 157 member national organizations that make ISO's review board. In February 2007, the ISO Technical Management Committee met to review the feedback from the member countries and voted to create a Projects Committee PC236 to develop a Project Management Standard. The Chair position of PC236 was given to BSI and the Secretariat given to the American National Standards Institute (ANSI). Membership of the PC236



was made up of 20 participating countries and 3 observing countries plus IPMA with observer status. PC236 had formalized three working groups:

- WG1 – Terminology (using the PMBoK Guide Glossary as a basis)
- WG2 – Processes (using input from PMBoK, BSI 6079, and IPMA)

## ■ WG3 – Informative Guidance.

All these standards and guidelines have evolved during the last years to a universality that they can be applied to any project, no matter what size, no matter the nature of business. *And exactly that universality is the challenge we face in the EPC business.*

## Large manufacturing plants: most complex projects

The construction projects of large manufacturing plants are among the most complex projects. Construction companies which cover the engineering, procurement, construction and commissioning (EPC) of these plants are facing challenges that significantly differ from the characteristics of projects in other industries. I have been working in EPC projects since more than 20 years, in project management and engineering offices, in manufacturing facilities and on construction sites, in projects from some hundred thousand Euros up to several billion Euros. I always was missing a guideline that translates the common project management standards into the complex and specific world of the EPC business, and I was not the only one. Many of my fellow colleagues were struggling with the universality of the "big" project management guidelines. This is the reason why I finally started writing the "Project Management Handbook for EPC". The first edition has just been published in August 2014.(2)

The know-how compiled in this book has been gained during more than 20 years of professional life. The processes, methods and tools are originating from the "real life" of project management in companies that I have been working for; however none of them are proprietary to one of these companies. I had the opportunity to exchange my own experiences with colleagues across the world, from the same or from different industries, during professional audits, during benchmarking sessions, during training courses,

# SMART PLANNING & EXECUTION

during international conferences. I have overseen hundreds of contracts with various clients and with various contractors that provided insight in their project management and EPC processes. This insight refined the material that I collected during all these years. It is not proprietary know-how of single companies, but the collectively recognized common work practices across the EPC business that I will share with the EPC community with this book.

But what makes project management in the EPC business so very special? To answer this question let's have a closer look at the headlines of the "PM Handbook for EPC".

## Module 1: The Project Plan

The book gives clear instruction about the content of a project plan for a (large) EPC project. Each following PM module will come back to the project plan and will suggest corresponding procedures to be issued in a project manual. And in large projects there are several hierarchies of procedures: internal procedures, external procedures, procedures with the client, with main contractors or consortium partners, with sub-contractors and suppliers.

## Module 2: The Project Organization

There are internal project organizations depicting the operational and support functions in a project team; there are external project organizations depicting the relationship between client, authorities, architect engineer, partially consortium leader and consortium partners, some main contractors. There are job descriptions of the major project management functions. What is the purpose of a steering committee? The special case of a project joint venture or consortium is discussed – what is the role of a consortium leader?

## Module 3: Project Structures

The work-breakdown structure (WBS) defines work-packages and their hierarchical structure. The responsibility-assignment-matrix correlates the WBS with the organization structure. There's a plant breakdown structure (a so-called plant coding system), a material breakdown structure and so on. And all must be defined from the start! Later changes are costly, if not impossible.

## Module 4: Communication Management

Communication is a wide area to look at. Meetings, correspondence, action tracking, crisis management. How to consider lessons learned? Something just for the project start and the project closure, or isn't it better to manage lessons learned in a continuous process? These topics are discussed in this chapter.

## Module 5: Contract Management

I wonder how short all these guidelines and standards are with regard to contract management. PMI covers contract management as part of procurement, but from the perspective of the project director of an EPC contractor the management of the client contract is probably the area that deserves most of the attention. It starts with contracting: the bid phase, which is by the way the phase where most of the project planning is done. The project director is the integration manager of technical, commercial and legal aspects in the contract – a jack-of-all-trades! Dealing with assumptions, clarifications, exclusions, preventive and active claim management, the management of scope or cost or schedule changes – the daily challenges in EPC projects.

## Module 6: Time and Resources Management

Scheduling has a lot to deal with the tool we use, most often Primavera. The schedule hierarchy from the overall schedule down to the detailed schedules, the schedules we generate using filters and sorting functions, the baseline schedule, reference schedules from the previous reporting periods – all that shall be produced from one consistent database.

## Module 7: Cost Management

Cost planning and cost control is well defined in the PMI space, but I did not find any single word about cash-flow? Isn't it equally important to plan and control the cash-in, as we plan and control the cash-out? Financing, taxes, bonds and guarantees, insurances – more about money in this module.

## Module 8: Risk Management

Risk management is well standardized. But do you really know your current risk exposure in terms of money, and does it fit to the risk reserves you have at hand? And how does your project risk management correspond with your enterprise risk management? We all hope that statistics will work – this is the business model of insurances –, but how to deal with a very big risk with a very small probability?

## Module 9: QHSE Management

PMI and ISO 21500 talk about quality – in EPC we talk about "QHSE". Quality based on ISO 9001 or ASME or equivalent, health and safety based on OSHAS 18001 or SCC, environmental management based on ISO 14001 – a highly regulated field in our industry.

## Module 10: Progress Reporting

Progress reporting as part of project control

happens on any level of the project organization, but where the project director needs KPIs and S-Curves to keep control the work-package manager has to dig through detailed reports and data.

## Module 11: Document Management

I have seen no EPC project manual without an exhaustive document management procedure. The process for the review and approval of documents with client and eventually involved authorities could kill a project, if it does not work. And again there's a lot of IT involved in this: codification, classification, workflows, revision control, rendition management, just to mention a few.

## PM Module 12: Information Management

Project specific IT architecture? I work in a modern state-of-the-art company. We have an IT department with an IT policy and we have defined tools and software within our organization that has been configured to fit our business processes. We will not invent new project-specific IT solutions just because we win another big contract! True? Wrong! In a global project involving several global organizations exchanging data across companies' boundaries it is mandatory to define the way how your IT system will interact with our project partners' systems. And this always is different from project to project.

## Engineering

There are engineering processes and procedures in EPC projects that are common across Energy, Oil & Gas or the Chemical industries. There's civil work, there's mechanical systems engineering, plant layout, electrical, instrumentation, and control engineering. There's a technical configuration management with design reviews and design freezes, design configuration baselines and change management, there's FEED (front-end engineering and design), basic design, detailed design. The "PM Handbook for EPC" is not an engineering handbook, but it describes the role of the project manager in the engineering process.

## Procurement

Procurement of material for an EPC project has its own procedures: The material take-off that in EPC generally is generated from engineering tools, the solicitation into purchase orders and delivery lots, the selection of suppliers, manufacturing, transportation, eventually export, finally the reception on site and warehousing.

## Construction and Commissioning

The site manager with his site organization somewhere at the remote end of the world



will have his own procedures. At the end of the day he is the one called to court whenever national laws applicable in the country of construction are violated. Not only the construction sequences must be scheduled, also site infrastructure and logistics, temporary facilities, scaffolding, horizontal and vertical transports must be planned and coordinated. A work order system, a lock-out procedure, field engineering, inspection and supervision, finally mechanical completion management and the testing and commissioning of the equipment and the plant systems – there are many very special fields in EPC project management space.

## Closing remarks

I have been learning project management from the “rough” side. Many years I have been on construction sites climbing across pipes and structures before entering the cosy chairs in engineering and project management offices. I celebrated my 50th birthday this year and suddenly found out that they call me a “senior” manager. I am representing the generation that grew up with a Commodore computer – does any of the younger kids know what I mean? When I started my first projects we were shifting

tons of paper. We built mega plants without any computers – surprisingly in time and in cost schedule! My son is communicating across continents with Skype, Facebook, or WhatsApp. I am still the old-fashioned one to pick-up the phone or walk and talk directly face-to-face, instead of sending SMS or e-mails.

But: The progress of IT has revolutionized the way we manage projects, especially large EPC projects. The tools we use in engineering, in commercial management or project management are no longer stand-alone-systems, special applications configured for a special business process. Integration is key, and the more the IT vendors come up with integrated solutions on the market the higher the efficiency of interface management in EPC projects.

The book that I have written is taking strong reference to the recognized standards of PMI and ISO. These standards have a maturity that make them extremely valuable for anybody working in this business. We use the same terminology, we have a common sense of understanding business processes, whether I talk with my partner in Europe, the US, the Middle East, India or China. But sometimes these standards appear “old-fashioned” and do not really recognize the

work practices in a modern state-of-the-art IT-supported real-life project management organization. I would wish that my book will close this gap. And I invite every reader to feed back his/her experiences, ideas, suggestions, remarks in order to make this book even better for the future.



## REFERENCES

- (1) [www.pmi.org](http://www.pmi.org)
- (2) Ritsche, F.-P., “Project Management Handbook for EPC”  
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[www.project-team.org](http://www.project-team.org)



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Alice Brandenburg (Media Consultant)  
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