

أرامكو السعودية
Saudi Aramco



Projects Design and Construction Management

December 3, 2007

OUTLINE

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PROJECT EXECUTION PLANNING

- **Contracting Strategy**
- **Preliminary Design / Detailed Design (Scope)**
- **Material Procurement**
- **Construction**
- **Integrated Project Team - Roles & Responsibilities**

PROJECT EXECUTION PLANNING (cont.)

- Project Controls –
Schedule / Cost
- Quality Planning
- Safety Planning for
Plant and Construction
- Permitting



PRELIMINARY ENGINEERING

- **Preliminary Engineering Deliverables:**
 - **Scope of Work**
 - **Specifications & Data Sheets**
 - **Preliminary Design Drawings**
- **Environmental Impact Assessment**
- **Full Project Execution Plan**
 - **Issued for approval by 30% preliminary engineering completion**

PRELIMINARY ENGINEERING (cont.)

- **Project Proposal Review and Approval**
 - **Review Packages (30%, 60%, 90%)**
- **Proponent Reviews**
- **Others Department Reviews**
 - **Facilities Planning**
 - **Environmental Protection**
 - **Inspection**
 - **Loss Prevention**
 - **Consulting Services**
 - **Power Distribution**

VALUE IMPROVEMENT PRACTICES

- Value Engineering and a group of other value management techniques called Best Practices
- Most of the Best Practices applied by Saudi Aramco follow processes identified in Construction Industry Institute (CII) publications

VALUE IMPROVEMENT PRACTICES (cont.)

- **Project Execution Planning Workshop**
 - an alignment practice
- **Project Definition Rating Index**
 - a measure of scope definition completeness
- **Constructability**
 - use of construction knowledge during planning and design
- **Schedule Optimization**
 - combination of schedule reduction and compression techniques

VALUE IMPROVEMENT PRACTICES (cont.)

- **Scope Control plus Change Management**
 - a formal system for managing scope changes
- **Planning for Start-up**
 - tools and techniques to facilitate start-up planning
- **Lessons Learned**
 - Implementing, collecting, managing and using what has previously been learned

VALUE IMPROVEMENT PRACTICES (cont.)

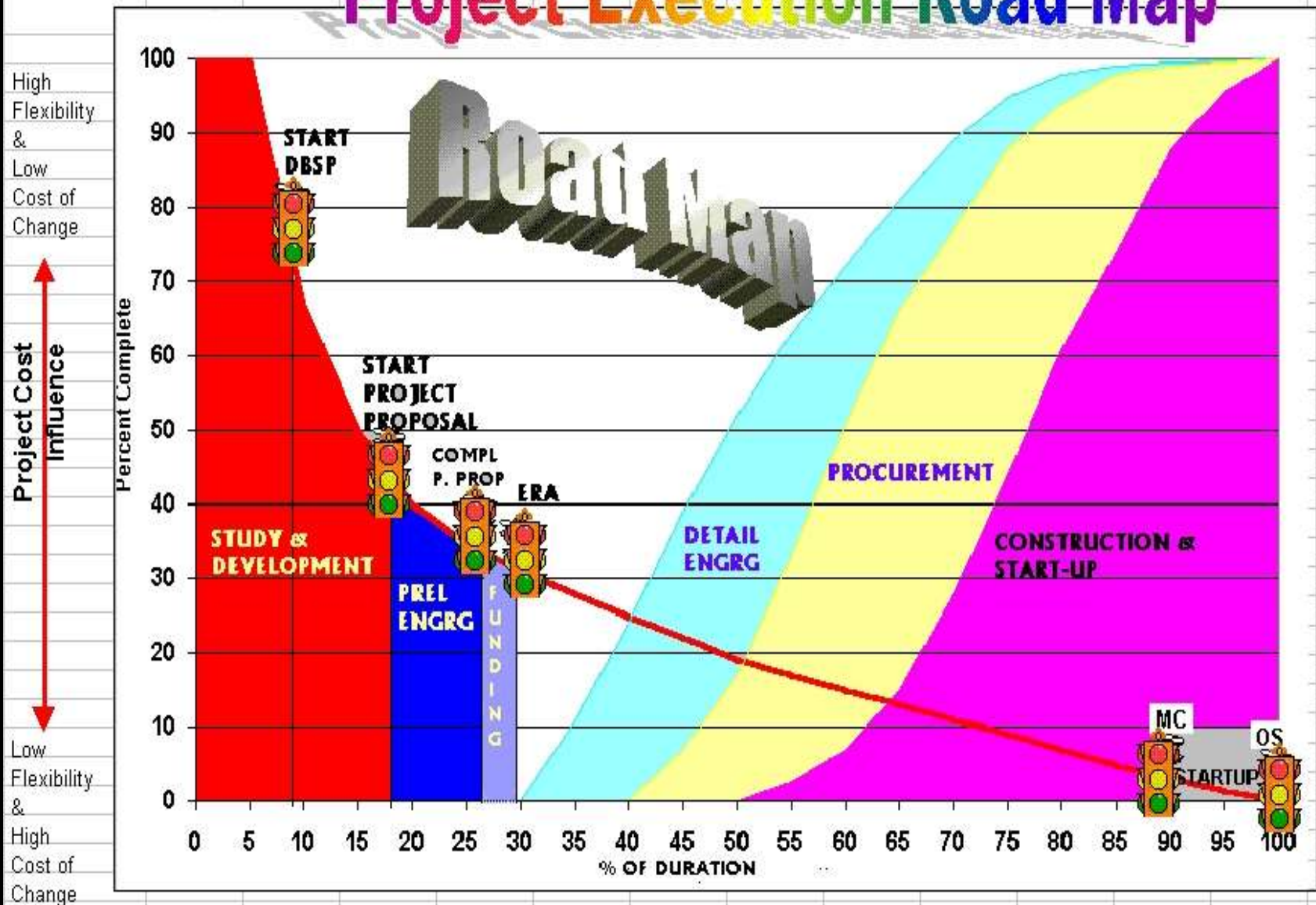
- Value Engineering
 - a function oriented multidisciplinary team approach
 - optimize project execution
 - eliminate unnecessary costs
 - without sacrificing total project performance, quality, and reliability.

Project Performance Optimizing Practices



BM	Benchmarking
VE	Value Engineering
PEPW	Project Execution Planning Workshop
PDR I	Project Definition Rating Index
SO	Schedule Optimization
LL-I	Implement Existing Lessons Learned
LL-C	Collect New Lessons Learned
PFSU	Planning For Start Up
Const	Constructability
SC&CM	Scope Control & Change Management

Project Execution Road Map



OTHER ASSESSMENTS

- **Project Quality Plan**
- **Preliminary Hazard Identification Plan**
- **Facility Communications Requirement**
- **Operations Training Requirements**

DETAILED DESIGN

- Final Project Execution Plan
- Engineering Deliverables
 - Scope of Work
 - Specifications & Data Sheets
 - Detailed Drawings
- Final Hazard Identification Plan



DETAILED DESIGN (cont.)

- **Special Design Considerations**
 - **Tie-Ins & Shutdowns**
 - **Protective Coatings**
 - **Non-Metallic Materials grating, ladders, handrail**
 - **Metallurgy**
 - **Instrumentation and Controls**
 - **Access-egress & equipment handling
(housed plant vs. outdoors plant design)**

DETAILED DESIGN (cont.)

OUTSIDE PLANT



HOUSED PLANT

MATERIAL PROCUREMENT

- Vendor Inspection Requirements
- Use of Recommended Vendor Lists
- Saudi Manufacturers
- Spare Parts Data Package



CONSTRUCTION CONTRACT

- Bid Package
 - Pro Forma Contract
 - Technical Scope
 - Scheduled Milestone
 - QA/QC Requirements
 - Safety Requirements



CONSTRUCTION CONTRACT (cont.)

- Bid Slate Development
- Job Explanation Meeting
- Bid Period / Questions
- Bid Review Program
 - Technical Review
 - Commercial Review

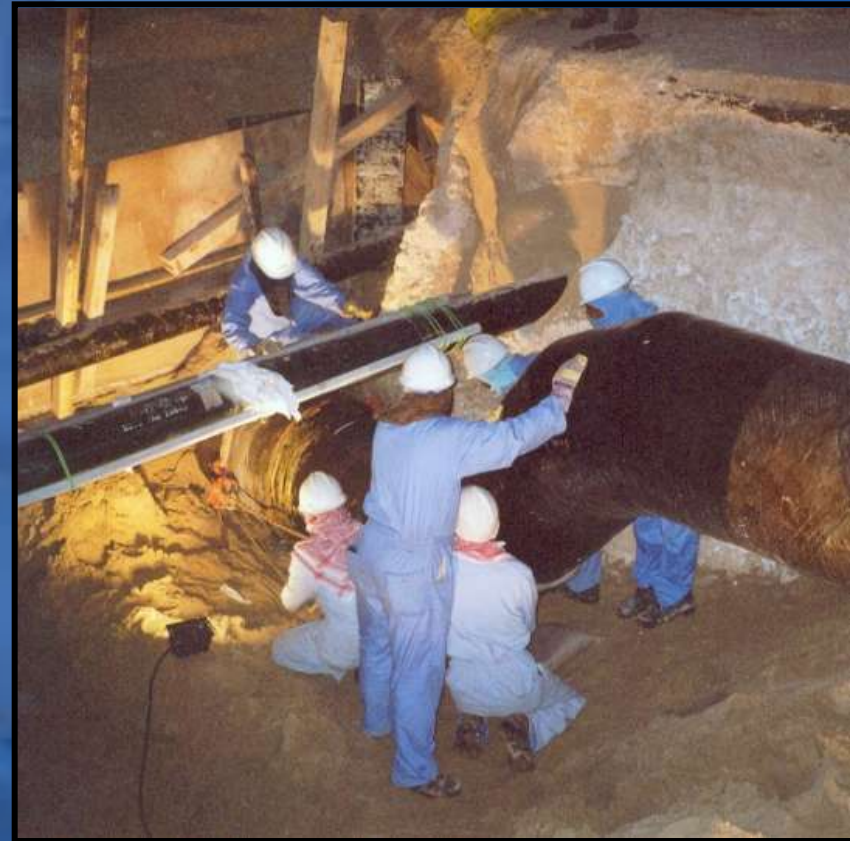


CONSTRUCTION ACTIVITIES

- Mobilization
- Construction & Procurement Schedules
- Work Permits & Safety Procedures
- Contract Administration
- Progress Monitoring
- Inspection – Construction & Procurement
- Control of Special Processes
- Coordination with Proponent
- Construction Technical Support

TESTING AND START-UP

- Mechanical Completion
- Pre-Commissioning
- Hydrostatic Testing
- Instrument Loop Testing
- Electrical Testing
- Final Tie-Ins & Shutdowns
- Commissioning
- Functional Testing



PROJECT COMPLETION

- **Operator Training**
- **Performance Acceptance**
- **Project Record Books**
- **As-Built Drawings**
- **Equipment Inspection Schedules**
- **Project Close Out Report**
- **Record Retention**





“WATER PROJECT”, 1948



THANK YOU