When Mega Goes GIGA

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Today’s Objectives:
• Introduce the Sadara Project
• Discuss a Few of the Unique Challenges…

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Latitude 26.94, Longitude 49.48
Sadara - Company Overview

- Joint Venture: Dow Chemical & Saudi Aramco
- Twenty-Six World Scale Production Units
- Extensive OSBL, Infrastructure & Off-Plot
- Location: Jubail, Eastern Provence, Saudi Arabia
- Initial Memorandum of Understanding – May2007
- Company Incorporation – Oct2011
Sadara - Project Overview

- Largest Petrochemical Project Ever Designed & Built at One Time
- 27 Project Teams
- 25 Engineering Offices Worldwide
- 100+ Construction Contractors
- Peak Site Staffing: 60,000 Workers
- 0.033 Total Recordable Incident Rate
- Nominal $20B Investment
Location

Jubail
Location

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Jubail
1.3 Miles

1.9 Miles

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4 Dimensional Organization

Program Officers

Contractors & Suppliers
Timeline

- **2007**: JV LOI
- **2008**: Feasibility Studies
- **2009**: Initial Gate Review
- **2010**: Authorization
- **2011**: FEED
- **2012**: Design
- **2013**: Construction
- **2014**: Startup
- **2015**: 1st Product

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Sadara Configuration

**Products**
- Isocyanates
- Polyols
- Propylene Glycol
- Ethylene Oxide
- Propylene Oxide
- Solution PE
- Elastomers
- Glycol Ethers
- Amines

**Intermediates**
- Raffinate
- Pygas
- Pyoil

**PlasChem Park**

**Market Segments**
- Specialty Films
- Household Products
- Polyurethane Foams
- Adhesives/Sealants
- Paints & Coatings
- Laminates
- Oil & Gas Chemicals
- Detergents
- Water Treatment
- Cables
- Construction Material
- Additives
- Furniture/Insulation
- Automotive Fluids
- Auto Components

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Olefins

Four Project Teams

$3B
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Chemicals I Chlorine

$1B

Three Project Teams
Chemicals III
EO/PO & D
$2B
Four Project Teams
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Leveraged Assets
Three Project Teams

$1B

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Unique Challenges…

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Topics

- The Core Challenge
- Nonlinearities
- New Capabilities Required
- Contracting Potpourri
- Back to Fundamentals
The Core Challenge

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The Core Challenge: GIGA is a “Supply” Problem

Rate of Decision Making

- Equipment Suppliers
- Bulk Material Suppliers
- Consumables Suppliers
- Financing Arrangements
- Cash Flow

- Owner Personnel
- PMC Personnel
- Design Engineering
- Skilled Labor
- Technical Experts

Concentrate the Buy – But Don’t Hurt Yourself

- Program Leveraged Pricing Agreements Can Deliver Significant Savings
- GIGA Volumes Can Bring Very Low Prices
- GIGA Volumes Can Overwhelm Suppliers
- GIGA Must Limit the Volume Committed to Any One Supplier
- GIGA Must Maintain a Higher Expediting/Inspection Presence
Strategic Sourcing

- What Volumes Will You Buy that the Market Will Struggle to Supply?
  - Rotating Equipment?
  - Analyzers?
  - Special Metallurgy?
  - Switchgear?
  - Etc…

- Pinch Points Require Special Mitigation Efforts
Nonlinearities

When Mega Goes GIGA
GIGA is Not an Extrapolation of Your Past Experiences

Effort & Expertise Required

What GIGA Delivers

What We Think

Project Size
Examples of GIGA Nonlinearities

- FEED Iterations – Massive Parallel Optimizations
- Interface Management – The Number & Complexity of Interface Points
- Change Management – The Domino Effect
- Risk Management – On Steroids
- Personnel Turnover
- Learning & Leveraging
- Black Swans Redefined – Typically Small Risks are Now Large

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New Capabilities Required

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New Capabilities Required by GIGA

- A Four-Dimensional Organization with Proactive Morphing
- Standardization Plus
- Office of Intervention
- Integrated Asset Delivery
- Strategic Float
- Staying Aligned – Organizational Effectiveness
- 1st Product Team
- Proactively Managing ‘Black Swans’
Small Things that Grow Up to be Big

- Attracting & Retaining Talent
- Career Management
- Financing Support
- Community Relations
- Construction Workforce Marshalling
Contracting Potpourri

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There is No Single Contracting Style that Fits GIGA

- OSBL/Infrastructure is Always Late Getting its Process Data, but Must Startup 1st
- Attracting Sufficient Bids Requires a Mix of Contracting Types
- Newer Technologies are Still On Their Learning Curves – Scope Changes Likely
- It’s Best Not to Let the Market Split Up Your Packages – Scale Them to the Market
- The Result: All Types of Contracts for which You Need to Be Prepared to Manage
Back to Fundamentals

When Mega Goes GIGA
GIGA is Intolerant of Forgetting to Do the Basics Well

- Full Staffing of Project Teams with Experienced Personnel
- Complete & Robust FEL Work & FEED Packages
- Full Implementation of Value-Improving Practices
- Benchmarking
- Gate Reviews
- Integrated, Backward Pass, Resource Loaded Scheduling
- Progress & Critical Path Monitoring & Reporting
- Robust Change Management
- Vigorous Risk Management
- Proactive Contract Management
GIGA is an Unforgettable Roller-Coaster Ride!
But Allows You to Achieve Things No One Else Has Achieved.