Gulfstar One FPS

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Tulane Engineering Forum
April 15th, 2016
Outline

> Williams’ Gulfstar strategy
> The first Gulfstar: Gulfstar One (‘GS1’)
  – Overview
  – Specifications
  – Fabrication
  – Installation
  – Challenges and lessons learned
> Questions
Williams’ Gulfstar strategy

> Deepwater development alternative
  – Bundled approach - combine Williams funded and owned:
    • Pre-designed Gulfstar FPS™ as a tie-back host facility; with
    • Oil and gas export pipelines, to downstream pipeline(s)

> Maximize capital / risk allocation efficiency
  – Allow parties to focus capital investment on respective core business
    • Producers: Exploration, drilling, and production of oil and gas reserves
    • Williams: Infrastructure (Gulfstar FPS and export pipelines)

> Reduce cycle time, improve field development NPV
Gulfstar One

> MC-724, 4,300’ WD

> Anchor tenant:
  – Hess’ Tubular Bells (Chevron 43%)
  – First production: November 2014

> Tieback:
  – Noble’s Gunflint (MC-948)
  – Expansion project ongoing
  – First production in 2016

> 17-mile O&G export lines
Specifications

> Classic Spar Hull
  > 584’ length (524’ draft)
  > 85’ diameter

> Traditional 3-level deck
  > Single lift weight: 6,600 st.
  > Max operating: 8,600 st.

> Wet trees only

> Capacities:
  > 60,000 bopd / 132,000 Mcfd
  > Produced water: 50,000 bwpd
  > Injected water: 60,000 bwpd

> Base Export:
  > Gas: 1,850# (boosting to 3,200#)
  > Oil: up to 3,200#
Specifications (cont.)

> Flowlines & injection lines:
  - Porches: (3) Tubular Bells risers
  - Pre-installed pull tubes: (4) future risers

> Umbilicals:
  - (6) from pull-tubes
    • (1) initial, (5) future

> Export risers:
  - (2) x 12" (porches)

> In-Hull bulk storage:
  - Dry Oil: 10,440 bbl
  - Methanol: 1,160 bbl
  - Diesel: 1,160 bbl
  - (20) S/S vessels for PW and chemicals
    • 10 x 100 bbl
    • 10 x 200 bbl

> Designed to API-MET – CGoM
Mooring configuration

> Arrangement
  – Nine line, 3 x 3 array
  – One chain jack per line

> Line make-up:
  – 8.75” polyester
  – 5” R4, studless chain at hull
  – 6” R4, studless chain at piles

> Anchor piles
  – Suction (GS1) or driven
Fabrication

Hull: GMF – Ingleside, TX
- Signal Int. - skirt tank sections
- First traditional Spar built in U.S.

Topsides: GIF – Houma, LA
- Dolphin Services: Spool piping
- Allison Marine: TWD

Provided ~7,000 direct and indirect jobs in more than 20 states, ~90% domestic sourcing
Join Plates
Seam Weld
Square up Section
Fit Angles
Weld out Angles
Transport to Flipping Jigs
Flip panel
Back Gouge
Weld Second Side
Flip Panel

✓ Install in 1/4 jig
✓ Fit and weld circumferential girders
30' centerwell
Water Tight Flat is fabricated in quadrants then flipped for backwelding.
Water tight flat is fit around the centerwell
Access shafts are installed on the flat, ¼ sections are installed
Block ‘I’ Assembly
Block “G” Lift

- JSA
- Lift Off
- Rolling
- Swinging
- Lowering
- Touchdown
Block ‘F’ Lift
Challenges

> Skilled labor availability

> Interface
> SIMOPS during offshore campaign
> Fabrication (to follow)
  - Lessons learned incorporated into Gulfstar standard design
Challenges - Hull complexities

- Electrical and instrumentation cabling, block-to-block within hull
Chemical storage tanks
In-hull chemical storage

- **Benefits:**
  - Flexibility with chemicals
  - Improves CG and global motions

- **Challenges:**
  - Transfer pumps
  - Piping
  - E&I
  - HVAC
  - Firewater piping
  - Alloy (CuNi) welding (access, welders)
“Stop saying ‘that’s a good question’ and start answering them!”
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