Delayed Coking Technology & Innovation

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Les Antalffy

May 2001

Fluor Delayed Coking Technology and Innovation

- First coker ball valve switch valve installation (1984) Texaco Anacortes
- First single level switch deck now the model for the industry (1984) Texaco Anacortes
- First coke drum deheading system installation (1988) Champlin Corpus Christi
- First deheading system to throttle drum cave-ins developed for rail car discharge (1994) BP Toledo
- First automatic switching system - (1994) Exxon Baton Rouge

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Fluor Delayed Coking Technology and Innovation (continued)

- Automated chute systems
- First fully automated top head deheading system (1998) CITGO Lake Charles
- Automated drill stem guide CITGO Lake Charles
- First drum moveable platform system installation (1999) BP Toledo
- Our automated bottom head deheading system is scheduled for installation in September 2000

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Delayed Coker Technology

Video Presentation
Fluor Deheading Systems

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Recent Innovations in Coke Drum Deheading

- Original Fluor Deheading system
- Developed and patented automated closure
- Low headroom deheading system
- Ability to throttle drum cave-in flows
- Automated chute system with automated chute cover
- Automated Grayloc feel line closure system

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Recent Innovations in Coke Drum Deheading (continued)

- Automated top head system with drill collar
- Working towards a totally automated deheading system

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Low Headroom Deheading System

- Designed to handle drum cave-ins
- Used to throttle cave-in flow
- Can open or close head in 15 seconds or less
- Used to control discharge to railcars

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Fluor's First generation Deheading System

- Manual removal of drum flange bolts
- Hydraulic system lowers head hinged to drum
- Hydraulically operate deck chute

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Existing Fluor Deheading System Installations

CITGO	Corpus Christi, TX	2 drums
MOBIL	Chalmette, LA	2 drums
SASOL	Secunda, S. Africa	2 drums
LAGOVEN	Amuay, Venezuela	4 drums
BP (Unit #1)	Toledo, Ohio	2 drums (L.H.)
EXXON	Baton Rouge, LA	4 drums
CITGO (#1)	Lake Charles, LA	4 drums
BP (Unit #3)	Toledo, Ohio	2 drums
CITGO (#2)	Lake Charles, LA	4 drums
CITGO (#2)	Lake Charles, LA	1 drum *
CITGO (#1)	Lake Charles, LA	1 drum **
Cerro Negro	Jose, Venezuela	4 drums
Hamaca	Jose, Venezuela	4 drums***
	Total	36

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* Top Head boltless Closure
** Boltless Closure Installation 3rd Quarter 2001
*** Installation 2003

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Fluor's New Generation Automated Boltless Top Head Deheading System

- System conceived, designed and patented by Fluor
- Completely automated boltless closure
- Operating in conjunction with automated drill stem guide
- Operated from remote location

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Fluor Automated Boltless Bottom Head Deheading System

- Concept proven in top head prototype
- Automated boltless closure
- Combined with either conventional or low headroom hinge system
- Head is raised or lowered hydraulically
- Operation is from a remote location
- Design and engineering by Fluor
- Shop testing complete - Installation in 3rd quarter 2001

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Totally Automated Coke Drum Deheading System

- Objective to automate all deheading functions except gasket cleaning
- Automated top head boltless closure
- Automated drill stem guide and locking system
- Automated deck cover
- Automated feed line disengaging system
- Automated chute

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Totally Automated Coke Drum Deheading System (continued)

- Automated bottom head boltless closure
- Control options
  - Totally automated PLC control
  - Individual function press button control with PLC logic

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New Technology

Moveable platform to facilitate quick draining

- Can safely speed up drum draining time
- No coke chutes required
- Drum cave-ins safely handled without operational slowdown
- Can drain drum when there are blocked drum lines
- Potentially may eliminate drain line and valves
- No operator present around coke drum during deheading

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Fluor Coke Drum Deheading System Patents

- Hinged head (U.S.P. 5,098,524)
- Boltless closure (U.S.P. 5,048,876)
- Drum cover handling apparatus (U.S.P. 5,336,375)
- Low headroom hinged head (U.S.P. 5,785,843)
- Automated chute (U.S.P. 5,628,603)
- Automated stem guide (U.S.P. 5,846,034)
- Moveable platform (U.S.P 6,113,745)

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Fluor Coke Drum Deheading System Patents (continued)

- Application made for the following coke drum deheading improvements
  - 2 automated chute covers
  - Automated chute latching system
- Automated drill stem guide shield to prevent water jet injuries

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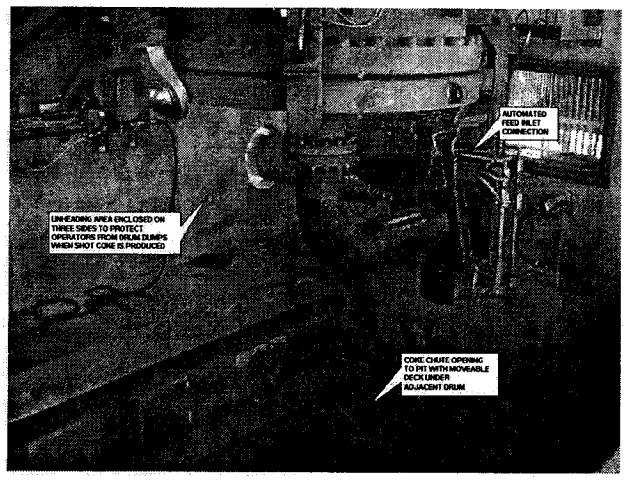
New Technology



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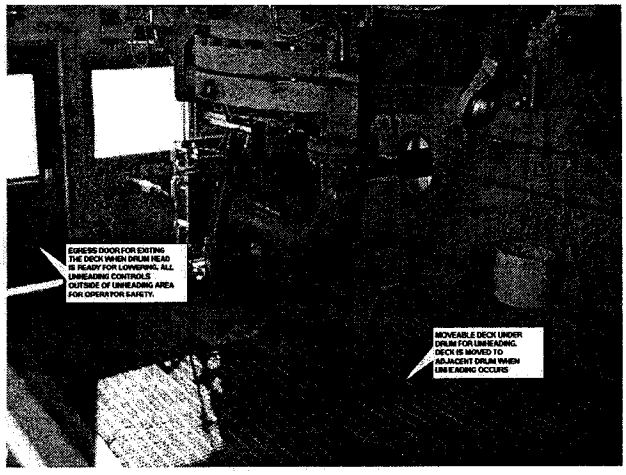
New Technology



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Summary

- Fluor's ultimate goal in Coke Drum deheading is to provide:
  - Safety
  - Reliability
  - Minimal Maintenance
  - Completely automated drum Deheading System

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