



Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valve Types and the principles of selection

Written & presented by :-
Dave Anderson

IBC Onshore Pipeline Engineering Course
 On 01/06/16


 Created by
 Score Training
 And Multimedia Productions Limited
 STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Presentation contents :-

- Introduction
- Process flow adjustment / control
- Valve characteristics (and functions)
- Valve suitability / selection decision making
- Incorrect selection – possible consequences
- Conclusions

 Created by
 Score Training
 And Multimedia Productions Limited
 STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Primary Purpose :-

Pressure Retention / Containment is the ability to hold pressure inside the system or “envelope”.

Pressure RETAINING in valves is facilitated by the Body, Bonnet, Adaptors (i.e. the extremity parts).

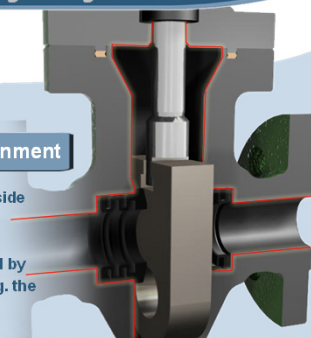
 Created by
 Score Training
 And Multimedia Productions Limited
 STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Primary Purpose

Pressure Retention / Containment

- The ability to hold pressure inside the system or 'envelope'
- Pressure retaining is facilitated by the body, bonnet, adaptors (e.g. the extremity parts)



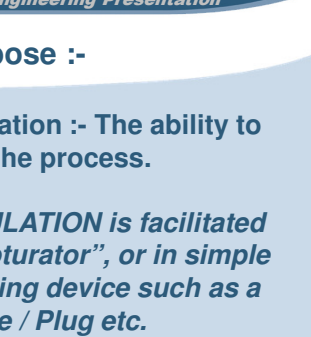
Created by Score Training
 And Multimedia Productions Limited
 © STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Secondary Purpose :-

Pressure Manipulation :- The ability to affect the flow in the process.

Pressure MANIPULATION is facilitated by an internal "obturator", or in simple terms, a seat sealing device such as a Ball / Disc / Wedge / Plug etc.



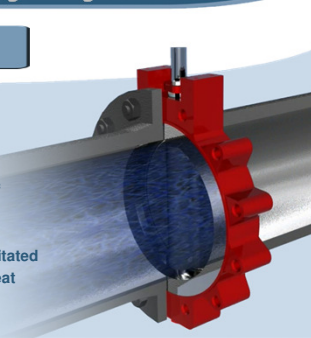
Created by Score Training
 And Multimedia Productions Limited
 © STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation


Secondary Purpose

Pressure Manipulation

- The ability to affect the flow of the process
- Pressure manipulation is facilitated by an internal 'obturator' or seat sealing device such as a ball/disc/wedge/plug, etc.




Created by Score Training
 And Multimedia Productions Limited
 © STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Pressure Manipulation


- Flow Isolation
- Flow Control/Regulation
- Flow Reduction
- Flow Intervention
- Pressure Relief
- Over-Pressure Protection
- Back Pressure Protection



Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Flow Isolation






Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation


Flow Control / Regulation






Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005

 Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

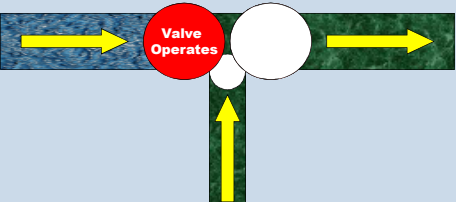
Flow Reduction

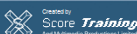



 Created by Score Training
And Multimedia Productions Limited
STAMP Copyright protected 2005

 Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

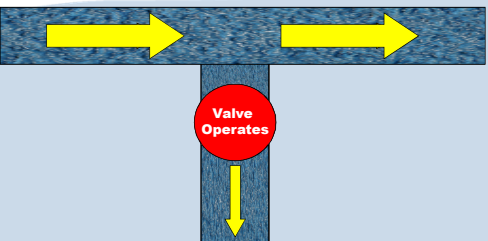
Flow Intervention, sampling and injection




 Created by Score Training
And Multimedia Productions Limited
STAMP Copyright protected 2005

 Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Pressure Relief



 Created by Score Training
And Multimedia Productions Limited
STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Over Pressure Protection

Created by
Score **Training**
And Multimedia Productions Limited

STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

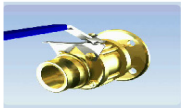

Back Pressure Protection

Created by
Score **Training**
And Multimedia Productions Limited

STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Two Main Types






VALVE TYPE	VALVE TYPE
Quarter Turn Sometimes referred to as 'Rotating'	Linear Sometimes referred to as 'Reciprocating'
	

Created by
Score **Training**
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation


Valves – Generic Types

Quarter Turn		Linear		
				
Quarter Turn Ball Valve	Quarter Turn Butterfly Valve	Rising Stem Wedge Gate Valve	Rising Wedge Gate Valve	Rising Stem Globe Valve

Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Ball Valve

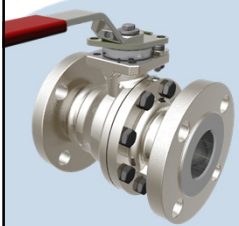


OPERATION
Quarter turn / rotating
SEAT/SEAL INTERFACE
Two smooth finish seats pressed on polished ball
ENERGISATION
Mechanical forces in assembly and/or pressure assisted by process flow
FLOW MANIPULATION
PRIMARY FUNCTION Isolation
SECONDARY FUNCTION Reduction


Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals



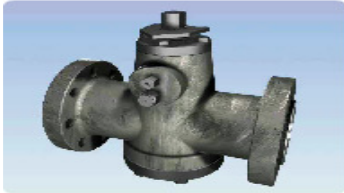

Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Plug Valve




OPERATION
Quarter turn / rotating


SEAT/SEAL INTERFACE
Two smooth finish seats pressed onto polished plug

ENERGISATION
Mechanical forces in the assembly

FLOW MANIPULATION
PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Reduction




STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Butterfly Valve




OPERATION
Quarter turn / rotating


SEAT/SEAL INTERFACE
Single smooth finish seat and polished disc brought into account

ENERGISATION
Mechanical force by operator (sometimes pressure assisted by process flow)

FLOW MANIPULATION
PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Reduction




STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning


Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals






STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Double Block & Bleed Valve



OPERATION

Dependent on configuration
Quarter turn and/or linear

SEAT/SEAL INTERFACE


Dependent on configuration
See Ball/Gate/Globe/Needle


ENERGISATION

Dependent on configuration
See Ball/Gate/Globe/Needle

FLOW MANIPULATION

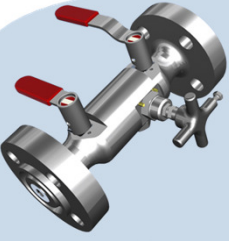
PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Intervention
TERTIARY FUNCTION
Sampling

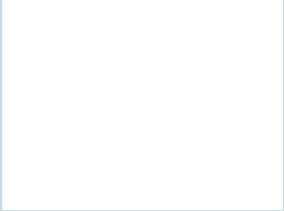

STAMP Copyright protected 2005





Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals



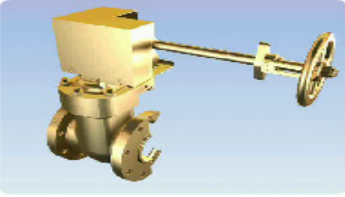



STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Gate Valve



OPERATION

Linear / reciprocating

SEAT/SEAL INTERFACE


Polished disc in contact
with two smooth seats

ENERGISATION

Mechanical 'wedging', force
applied via operator and
stem screw thread

FLOW MANIPULATION

PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Reduction


STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details *Energisation of Seats / Seals*





Created by Score Training And Multimedia Productions Limited
© STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details *Energisation of Seats / Seals*






Created by Score Training And Multimedia Productions Limited
© STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Globe Valve




OPERATION
Linear / reciprocating

SEAT/SEAL INTERFACE
Polished 'plug' in contact with single smooth seat

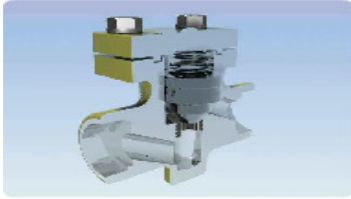
ENERGISATION
Mechanical force applied to plug by operator via stem screw thread to bring into contact with single seat

FLOW MANIPULATION
PRIMARY FUNCTION
Regulation
SECONDARY FUNCTION
Isolation
TERTIARY FUNCTION
Reduction


Created by Score Training And Multimedia Productions Limited
© STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Check Valve



OPERATION
Linear / reciprocating

SEAT/SEAL INTERFACE
Polished ball, needle point, plug, disc or split disc pressed onto smooth single seat

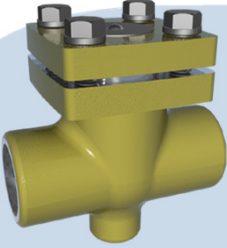
ENERGISATION
Seal is energised and pressure assisted by reverse flow in the process

FLOW MANIPULATION
PRIMARY FUNCTION
Back pressure prevention
SECONDARY FUNCTION
Isolation

Copyright © Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals



Copyright © Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005

VITAL
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals



Copyright © Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation


Functional Details *Energisation of Seats / Seals*





Created by
Score Training
And Multimedia Productions Limited


STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Globe Control Valve




OPERATION
Linear / reciprocating

SEAT/SEAL INTERFACE
Polished needle point plug comes into contact with single smooth seat


ENERGISATION
Mechanical force applied by operator through stem

FLOW MANIPULATION
PRIMARY FUNCTION
Regulation
SECONDARY FUNCTION
Isolation
TERTIARY FUNCTION
Reduction



Created by
Score Training
And Multimedia Productions Limited


STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation


Functional Details *Energisation of Seats / Seals*





Created by
Score Training
And Multimedia Productions Limited


STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Pressure Relief Valve

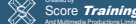


OPERATION
Linear / reciprocating

SEAT/SEAL INTERFACE
Polished disc comes into contact with single smooth seat


ENERGISATION
Mechanical force applied through stem by a spring

FLOW MANIPULATION
PRIMARY FUNCTION
Over-pressure protection
SECONDARY FUNCTION
Pressure dump



Copyrighted by Score Training And Multimedia Productions Limited


STAMP Copyright protected 2005

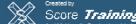


Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Functional Details Energisation of Seats / Seals





Copyrighted by Score Training And Multimedia Productions Limited

STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Needle Valve



OPERATION
Linear / reciprocating

SEAT/SEAL INTERFACE
Polished needle point plug in contact with single smooth seat


ENERGISATION
Mechanical force applied by operator through screwed stem

FLOW MANIPULATION
PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Reduction



Copyrighted by Score Training And Multimedia Productions Limited


STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Choke Valve




OPERATION
Linear / reciprocating


SEAT/SEAL INTERFACE
Polished internal cylinder slides in polished bore

ENERGISATION
Cylinder position controlled by operator via screwed threaded stem

FLOW MANIPULATION
PRIMARY FUNCTION
Reduction
SECONDARY FUNCTION
Regulation
TERTIARY FUNCTION
Isolation




STAMP Copyright protected 2005



Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation

Diaphragm Valve




OPERATION
Linear / reciprocating


SEAT/SEAL INTERFACE
Soft diaphragm pressed against polished seat area on body

ENERGISATION
Mechanical force applied by operator via the screwed stem

FLOW MANIPULATION
PRIMARY FUNCTION
Isolation
SECONDARY FUNCTION
Regulation




STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning

Onshore Pipeline Engineering Presentation




Isolation :-
Ball, Butterfly, Plug, Gate, Globe, Diaphragm.



STAMP Copyright protected 2005


Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation



Control / Regulation :-
 Globe, Diaphragm, Butterfly, Choke

Created by
 Score **Training**
 And Multimedia Productions Limited
 STAMP Copyright protected 2005


Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation



Reduction :-
 Choke, Reduced bore

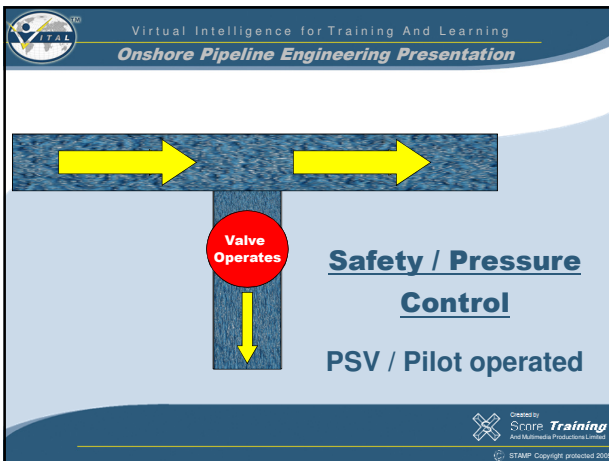
Created by
 Score **Training**
 And Multimedia Productions Limited
 STAMP Copyright protected 2005

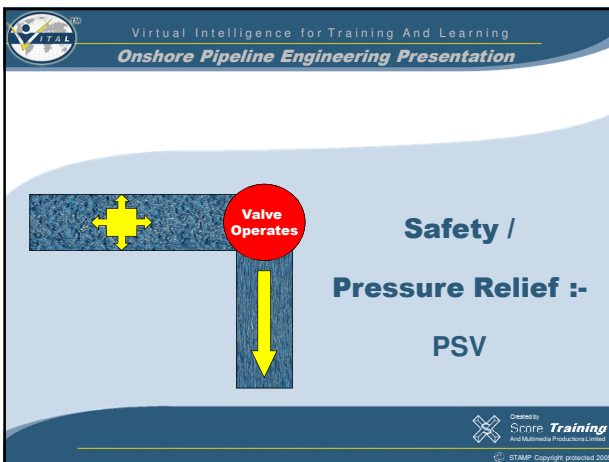
Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

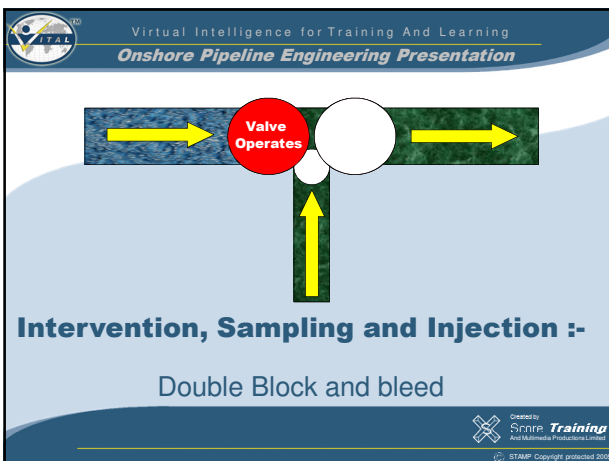


Non-Return
 Check (Swing, Piston or Ball type)

Created by
 Score **Training**
 And Multimedia Productions Limited
 STAMP Copyright protected 2005







Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valves :- Summary of Type selection by function

Isolation :-
Ball, Butterfly, Plug, Gate, Globe, Diaphragm

Regulation / Control :-
Globe, Diaphragm, Choke, Butterfly

Reduction :-
Choke, Reduced Bore

Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valves :- Summary of Type selection by function

Non-Return :-
Check (Swing, Piston, Ball type)

Safety, Pressure Relief and Pressure Control :-
PSV, Pilot Operated

Intervention, Sampling and injection :-
Double Block and Bleed


Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valves :- Suitability / Selection

- Valve Type (Operating Function)
- Maximum working pressure (Rating)
- Bore size
- Bore Configuration
- Process medium


Created by Score Training And Multimedia Productions Limited
 STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valves :- Suitability / Selection


- Process temperature range
- Materials of construction (Hazard analysis)
- Dimensions (Design Codes)
- Maintenance requirements
- Life Expectancy


Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation


Valves :- Incorrect Selection (Possible consequences)



Emissions


Premature failure


Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005




Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Valves :- Incorrect Selection (Possible consequences)




Corrosion

Premature failure


Created by Score Training And Multimedia Productions Limited
STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

**Valves :- Incorrect Selection
(Possible consequences)**



Erosion


Premature failure

Created by
Score Training
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

**Valves :- Incorrect Selection
(Possible consequences)**



Pitting


Premature failure

Created by
Score Training
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

**Valves :- Incorrect Selection
(Possible consequences)**



Flaking


Premature failure

Created by
Score Training
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

**Valves :- Incorrect Selection
(Possible consequences)**



Pick-up


Premature failure

Created by
Score **Training**
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

**Valves :- Incorrect Selection
(Possible consequences)**



Cracking

Premature failure

Created by
Score **Training**
And Multimedia Productions Limited

STAMP Copyright protected 2005

Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation


Valve Selection :- Conclusions

1. Understand and quantify your process
2. Understand how you want to manipulate the process flow
3. Specify / select the correct valve
4. Monitor performance over time
5. Introduce improvements where appropriate (Failure Mode Analysis)

6. Never be afraid to start again !

Created by
Score **Training**
And Multimedia Productions Limited


STAMP Copyright protected 2005

 Virtual Intelligence for Training And Learning
Onshore Pipeline Engineering Presentation

Require Further Information ???

Dave Anderson, Score Group Plc
Telephone +44 (0) 1779 482331
dave.anderson@score-group.com

www.score-group.com
www.score-training.com
www.midasvalvediagnostics.com

 Created by
Score Training
And Midas Production Limited
STAMP Copyright protected 2005
