SPIROTECH BV

PRESENTATION ON
ENERGY EFFICIENT
WET SYSTEMS
CORRECT DESIGN
PRE-COMMISSIONING FLUSHING
PRE-COMMISSIONING CHECKS
COMMISSIONING
SYSTEM LIFE MAINTENANCE
ENERGY SAVINGS

Presentation by Bryan Barlow - Technical Consultant
AFFILIATED TO...
WHAT IS AN INSTALLATION?

- DESIGN
- INSTALLATION
- HAND-OVER [PC]
- MAINTENANCE
- PRE-COMMISSION
- COMMISSION
PRE-COMMISSIONING FLUSHING
CORROSION IN A SYSTEM

\[
2\text{Fe} + \text{O}_2 + 2\text{H}_2\text{O} \rightarrow 2\text{Fe} (\text{OH})_2
\]

\[
6\text{Fe(OH)}_2 + \text{O}_2 \rightarrow 2\text{Fe}_3\text{O}_4 + 6\text{H}_2\text{O}
\]

Oxygen (O\(_2\)) + Steel(Fe) = Magnetite (Fe\(_3\)O\(_4\))

\[
4\text{Fe}_3\text{O}_4 + \text{O}_2 \rightarrow 6\text{Fe}_2\text{O}_3
\]

Oxygen (O\(_2\)) + Magnetite (Fe\(_3\)O\(_4\)) = Haematite (6Fe\(_2\)O\(_3\))

“black sludge”

“red rust”
THE SOLUTION - DIRT SEPARATION

For the complete removal of dirt particles from a system

ALL DIRT IS COLLECTED & STORED OUT OF THE WATER FLOW PATH

THEREFORE NO INCREASED PRESSURE DROPS!!
THE SPIROTUBE

The advantages of the unique construction which is the crucial difference for efficient deaeration:

• Microbubbles of air can rise in the fluid because of the static [Laminar no flow zone]

• Minimal pressure drop across the unit
The Laminar No Flow Zone provides the correct environment for dirt particles to sink.

Draining the collected particles
HOW BIG IS A DIRT PARTICLE?

- **SpiroTrap Dirt Separator range**
- **Visible to the naked eye**
- **Standard filter range**

- **Haematite**
- **Sand**
- **Magnetite**

Size ranges:
- 0.01 µm to 100 µm
- 100 µm to 1,000 µm
- 1,000 µm to 10,000 µm
WHAT DOES SPIROTRAP DIRT SEPARATION REMOVE?

• Down to 5µ [or even less]

• A Strainer removes down to 1,600µ

• 320 x the diameter

• This equates to at least 32,768,000 times mass!
CENTRILAB REPORT 10th. SEPT 1993

620g/cubic M of particulates 5 - 10µ (>90%)

Installation of an SV3-200F Spirovent Dirt Separator

CENTRILAB REPORT 19th. OCTOBER 1993

<1g/cubic M of particulates >
0.45µ in circulating system water!
NORMAL COMMISSIONING PERIOD

- 80% to 95% removal in say 2 days
- 90% to 98% removal in 2 weeks???

- At “HAND-OVER” – Full bore blow down for around 10/15 seconds and 90/98%+ of dirt is removed with no further dirt creation if correct Degasification is applied

- 4 x 10/15 second blow downs a year maintenance, with system in operation!
PROBLEMS IN OPERATIONAL WET SYSTEMS
• Initial Venting
• Circulating Dirt
• Commissioning
• Corrosion
• Noise
• Strainers
• Pumps

• Cold areas
• Underfloor Heating
• Radiant Panels
• Pressurisation Units
• Water treatment
• Delays
• Maintenance
THE COMMON DENOMINATOR

AERATION OF SYSTEM WATER
4 - LEVELS OF AIR REMOVAL

AAV

AIR SEPARATORS

DEAERATION [Passive]

DEGASIFICATION [Active]
DEAERATION [Passive]

‘In-Line’ Deaeration has functioned well over the 43 years since invented, but currently modern introductions have had an affect:

- Lower maximum temperatures
- Seasonal climatic controls \(=\) lower loads \(=\) lower \(\Delta T\)
TEMPERATURE DIFFERENTIAL [FULL BORE IN-LINE] DEAERATOR – FULLY AUTOMATIC

Removal of air by automatic venting valve

The Laminar No Flow Zone provides the correct environment for maximum microbubbles to rise

Spirotube bundle

Turbulent area
DEGASIFICATION [Active]

- Is the process of removal of all air within the system water by physics

- Consider ‘Henry’s Law of Absorption of Air in Liquids’....
HENRY’S LAW

William Henry (1775 – 1836)

British physicist and chemist

Formulated his first law in 1803:

“The amount of gas, dissolved in water, is in direct proportion to the pressure of the water”

Or in other words

................................
AIR COMES OUT OF SOLUTION BY...

Decreasing Pressure

[Vacuum Degassing]

Degasification is not temperature dependent
HENRY’S GRAPH

ΔP

<table>
<thead>
<tr>
<th>Pressure (bar)</th>
<th>Temperature (° C)</th>
<th>Concentration of air (l / m³)</th>
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<td>10</td>
<td>158</td>
</tr>
<tr>
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<tr>
<td>2</td>
<td>10</td>
<td>68</td>
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<tr>
<td>-0.95</td>
<td>10</td>
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HOW & WHERE TO INSTALL

Install on the RETURN main

Minimum pressure at unit [solenoid valve] – 1bar.g
VACUUM DEGASSER

Pump
SpiroTop AAV with Automatic sensing
Vacuum Chamber
Control Panel
Pressure Gauge
Inlet Pipe
Outlet Pipe
DEGASIFICATION

• Ultimate degassing close to full vacuum [0bara]
• Virtually all gasses are removed [99%+]
• Absorbed Pump Power reduced by up to 30%
• Up to 98.82%+ reduction in oxygen corrosion
PRESSURISATION OF SYSTEM WATER
PAST PROBLEMS

• System Volume unknown = Undersized Expansion Vessel

• Undersized Expansion Pipe [System to Vessel]

• Make-Up Water reducing chemical strength [This is an Emergency/Warning as to what WILL happen]

• Fixed Diaphragm Vessel ‘Gas side’ pressure not maintained annually = Undersized vessel – If it is checked, is the vessel drained down?

• Some Lower Priced Pressurisation Pumps can have short life expectancy = Frequent & prolonged use or even not in use!
SPC [Fixed Diaphragm Vessel] System – 90° C Maximum

**SPC CONTROL UNIT**

- Control Panel
- Deaeration Vessel
- Pump
- Pressure Sensor
- Cold Water Make-Up Solenoid Valve
- Water Meter
- 22mm Cold Water Make-Up
- Deaeration Solenoid Valve
- 22mm Expansion Pipe
- System Return
- To BMS

**Expansion Vessel**
- EVF with butyl fixed diaphragm

**SpiroTrap Dirt Separator**
DUTY/STANDBY PUMP?

• Assuming the Expansion Volume is correctly catered for

• The Fixed Diaphragm [SPC] System does not require the Pump to be in service – Degasification operates the pump daily
SPMC [Spill] System – 90° C Maximum

S4A/S6A VACUUM DEGASSER

35 litre Buffer Vessel
Safety Valve set at 0.5 bar

Primary Vessel
Butyl Bladder
Overflow Pipe B
Refill Pipe B
22mm Connections to Degasser & Buffer Vessel

SPMC CONTROL UNIT

BMS Volt Free Connection
Control Panel
Cold Water Make-Up
Expansion Pipe A
System Return

Electronic Water Meter
Pressure Reducing Valve
Magnetic Valve
Pressure Maintaining Valve
System Pressure Sensor
Pump

SpiroTrap Dirt Separator
ALL PROBLEMS SOLVED

Initial cleaning and flushing protected
Venting and Re-Commissioning simplified refilling
Circulating Dirt and Corrosion removed
Heat Exchangers not blocking up
Noise none existent
Valves Strainers and Pumps not fouling
Cold areas within Building [including Underfloor Heating]
Pressurisation Units
Water treatment – Correct control reduces chemical usage
Delays none existent
Maintenance costs reduced by planned maintenance
INCREASED EFFICIENCY & REDUCED MAINTENANCE

Overall affect of Spirotech on a system’s lifespan
THE FINAL FRONTIER [SOLUTION?]
WHAT IS IN IT FOR YOU?

- Cost is recovered during Pre-Commissioning & Commissioning
- Best possible design
- Any risks removed
- Peace of mind
- Optimum condition & control of system water – For life
- Customer satisfaction
- Future repetitive business
- No wasteful meetings, etc., eroding your margins (£’s wasted)
- Future maintenance costs reduced
- Power & Fuel savings
- Etc., etc.
ON BEHALF OF SPIROTECH UK Ltd

- Thank you for attending our CIBSE accredited CPD on providing Total Control of System Water Pressure & Quality Control and trust you found it beneficial

- Please do not hesitate to contact us regarding any future queries or Projects, we are here to work with you, not just to sell

- Could you please spare a couple of minutes to complete our Questionnaire to comply with CIBSE requirements and which is our yardstick to continually improve our service to you, the customer

- For further details please visit us at www.spirotech.co.uk