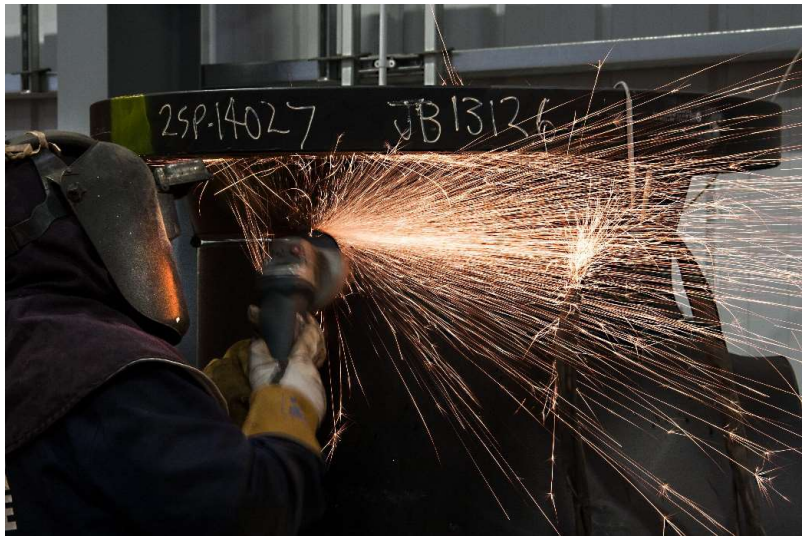
Strainer and Filtration Technology

Presented to **Tokyo Sangyo Co., Ltd**

06.11.2017

SIGNUM TECHNOLOGY



A brief history

The company was established in 1957 as Filtration & Valves Ltd. The business was privately owned up until March 2017, when it was taken over by Signum Technology Ltd. It then became part of a group companies incorporating Klaw Products Ltd. Klaw LNG Ltd and Gall Thomson Enviromental Ltd.

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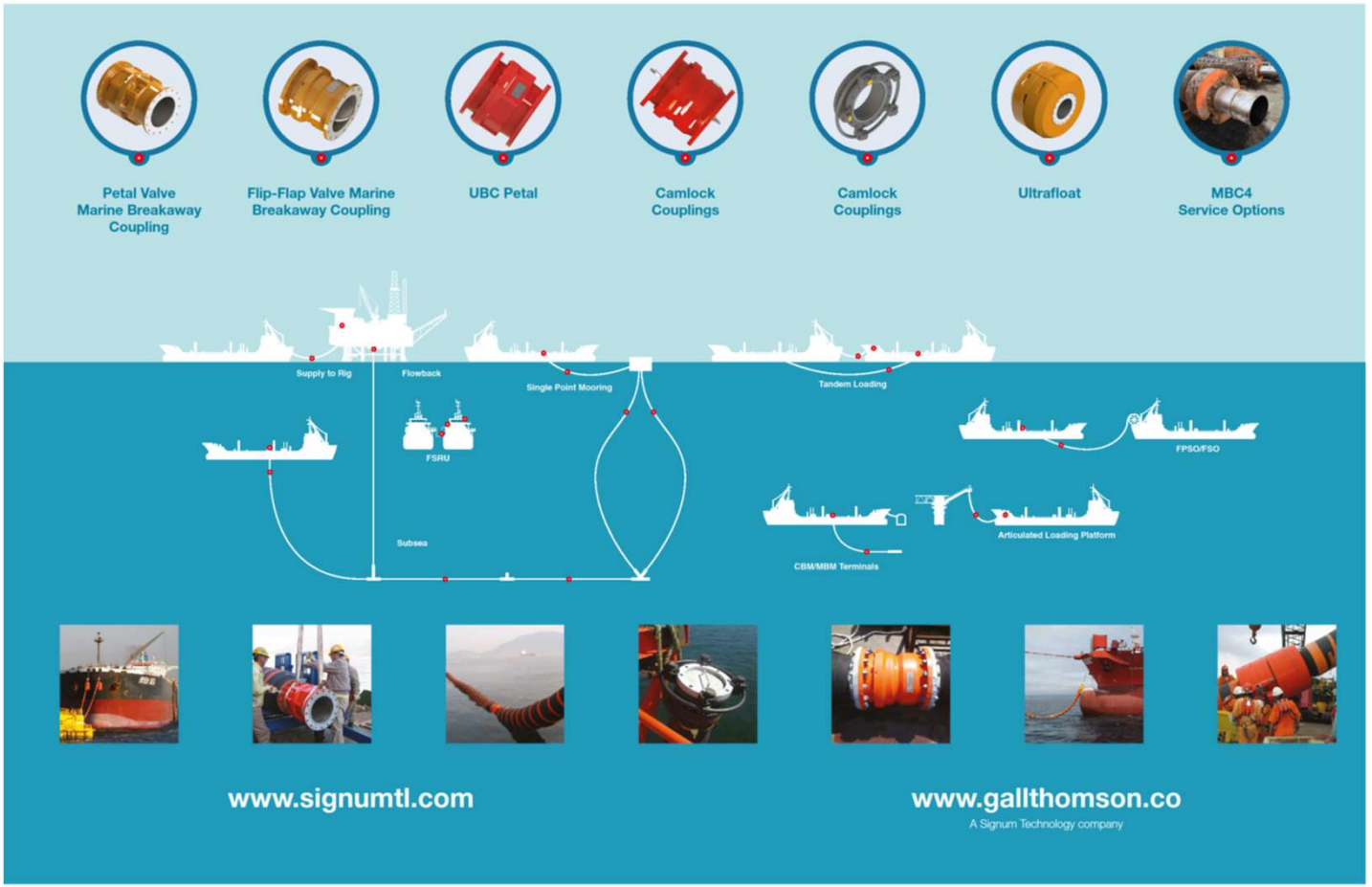
KLAW

VEE BEE FILTRATION

KLAW LNG

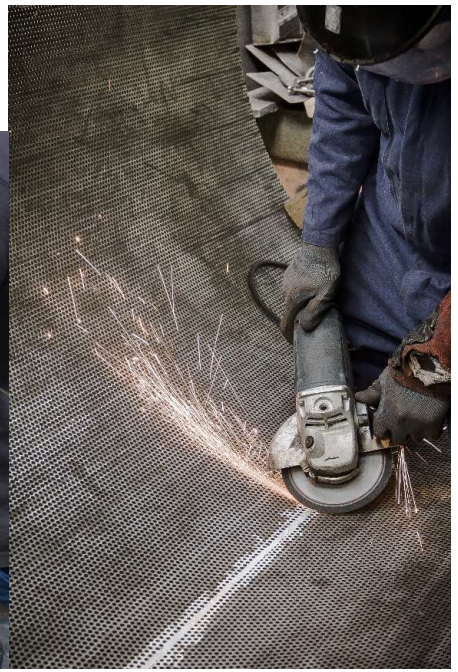
VEE BEE FILTRATION

Gall Thomson



Your pipeline filtration specialist

For 60 years, Vee Bee has been supplying a worldwide customer base with 'Specialized Filtration Equipment' for industrial and commercial applications. Vee Bee offers solutions to pipeline filtration requirements as well as being able to analyse and retro-fit existing systems. Whether the need is for a simple low pressure low flow application or a high pressure high flow application, we design and manufacture strainers and filters specifically to suit client requirements.



We can meet a host of filtration retention levels, specifications and special requirements and are able to offer a wide variety of meshes, materials and ratings ranging from standard carbon steels to Inconels and other exotic materials and in pressure ratings from Class150lb to API 6A 20,000 psi.

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Vee Bee strainers – Y types

Cast Y Strainers
Low clean DP values
Suitable for fine filtration
Element accessibility issues

Fabricated Y Strainers
Limited screen area – higher dp
Coarse filtration only
Element accessibility issues

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Vee Bee strainers – Mono-In-Line (MIL), Simplex or Basket strainers

Cast MIL Strainers
Higher clean dp values
Suitable for fine filtration
Good element accessibility

Fabricated MIL Strainers
High screen area
Not always suitable for fine filtration
Good element accessibility

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Vee Bee strainers – Dual-In-Line (DIL) or Duplex strainers

Cast DIL Strainers
Higher clean dp values
Suitable for fine filtration
Good element accessibility
Continuous Operation

Fabricated DIL Strainers
High screen area
Not always suitable for fine filtration
Good element accessibility
Continuous Operation

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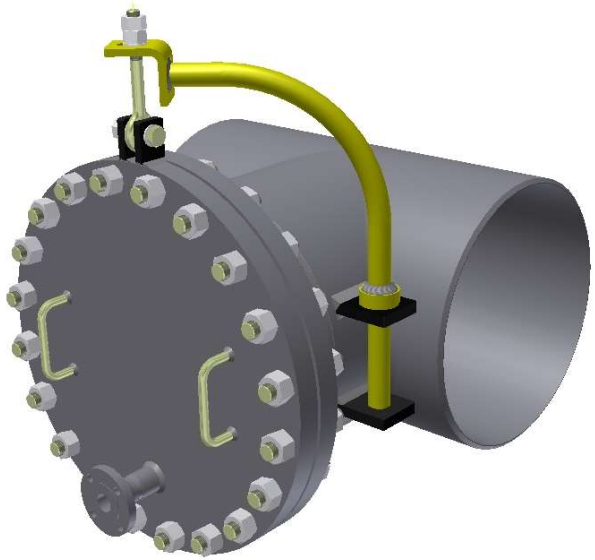
Vee Bee strainers – Tee strainers



Type A
Low clean dp values
Coarser filtration only
element accessibility dependant on piping

Type B or C
Higher clean dp values
Suitable for fine filtration
Good element accessibility
Piping issues for installation

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Vee Bee strainers – Conical strainers

Conical Strainers
Temporary or permanent
Dp values dependant on design
Suitable for fine filtration
Accessibility issues

Product design and development

- Driven by client requirements
  - Lower differential pressures (DP)
  - Higher bucking/burst Pressure
  - Reverse flow
  - Other considerations

Differential pressure

- Historically based on spurious data
- In-house water flow test rig
- Expanded testing to using certified laboratories
- Manual calculations
- Implementation of CFD
- Rechecking by tests to confirm data
- Vee Bee estimated clean pressure drops based on a +/- tolerance of 15%.
- Redesigned elements to reduce clean DP
- Running simulations based on clients actual pipework

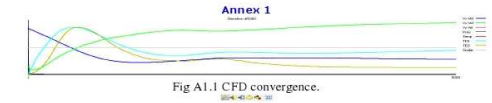


Fig A1.1 CFD convergence.

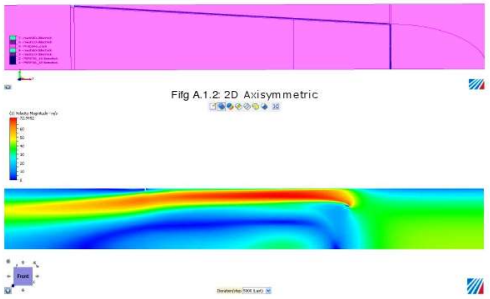

Fifg A.1.2: 2D Axisymmetric

Fig. A1.3. CFD:Velocity profile

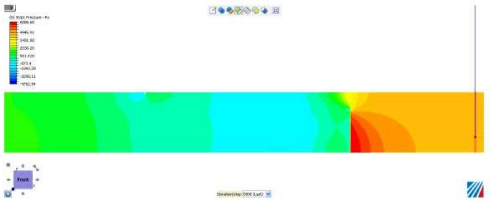
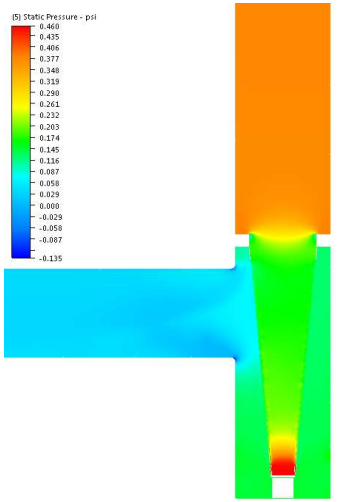
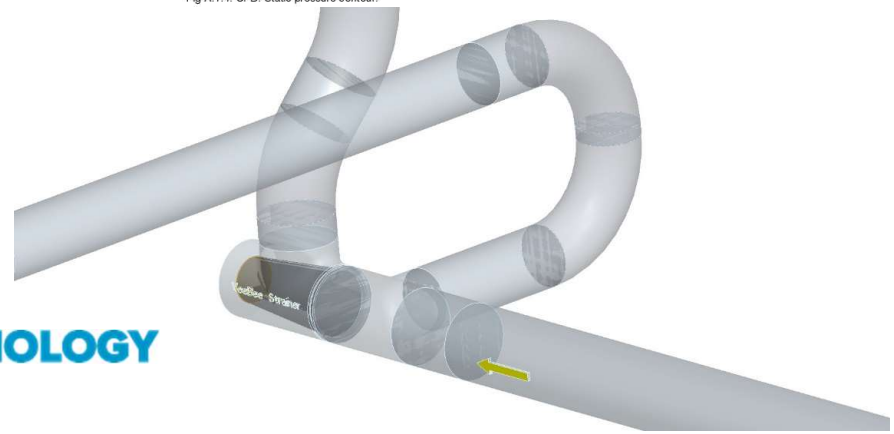


Fig A.1.4. CFD: Static pressure contour.





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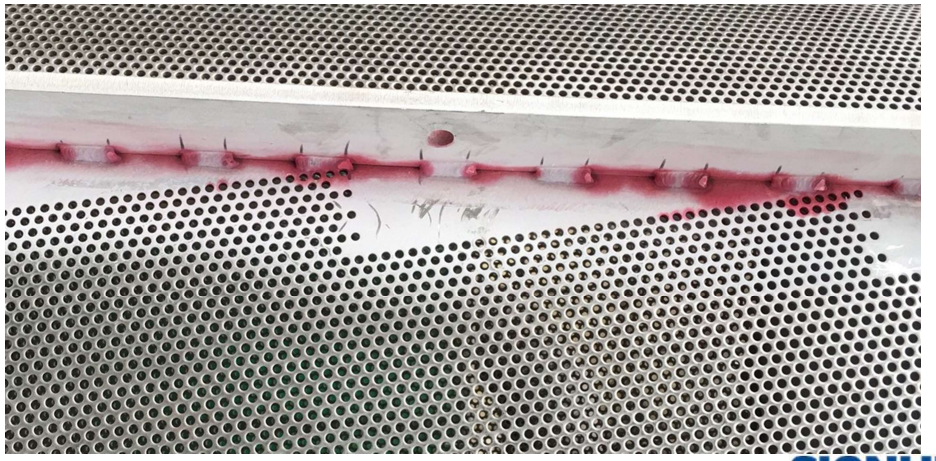
Buckling / burst pressure

- Increased requirements for high burst pressures
- Full margin on all seams
- Full penetrant weld on all seams
- Welds subject to non-destructive testing
- Elements treated as a pressure vessel
- Laser cut panels in lieu of conventional punching



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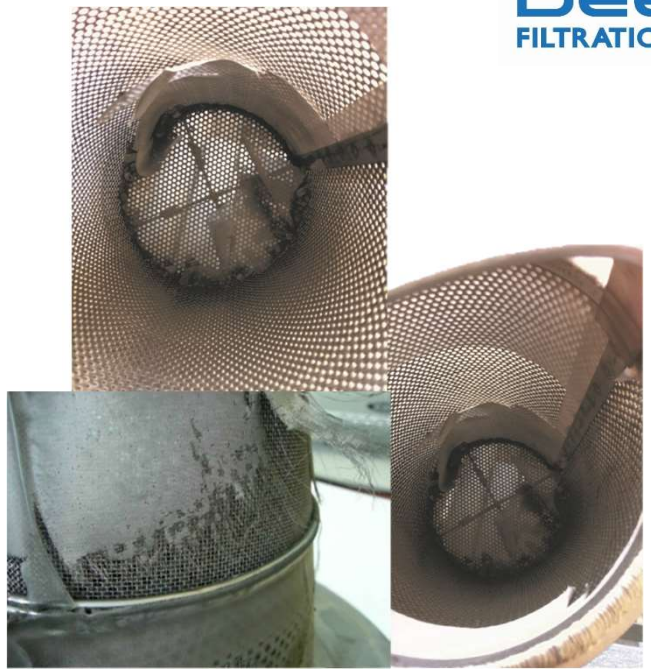
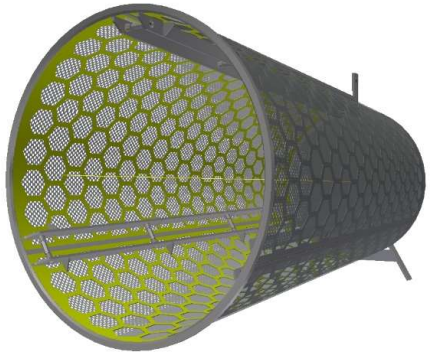
Reverse flow

- Weakest part of a filter element is the mesh
- Alternative solutions
- Use of bonded meshes for smaller units
- Laser or electron beam cut panels
- Backing cages for known values





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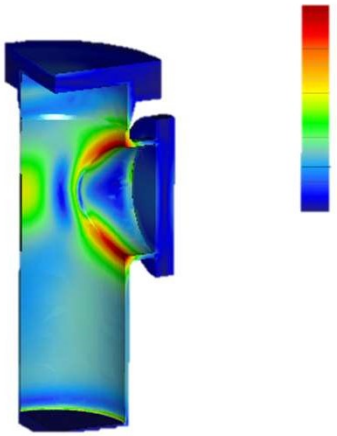
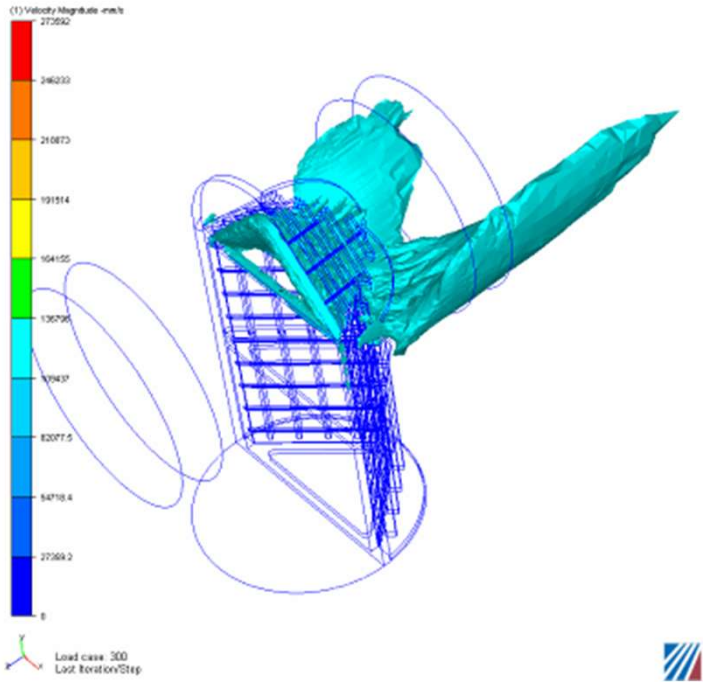
Other considerations

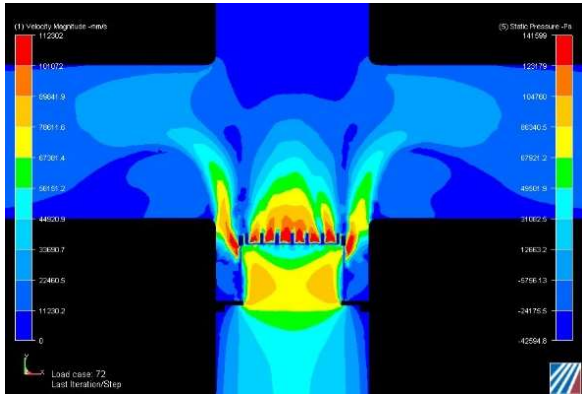
FEA: Stress Analysis



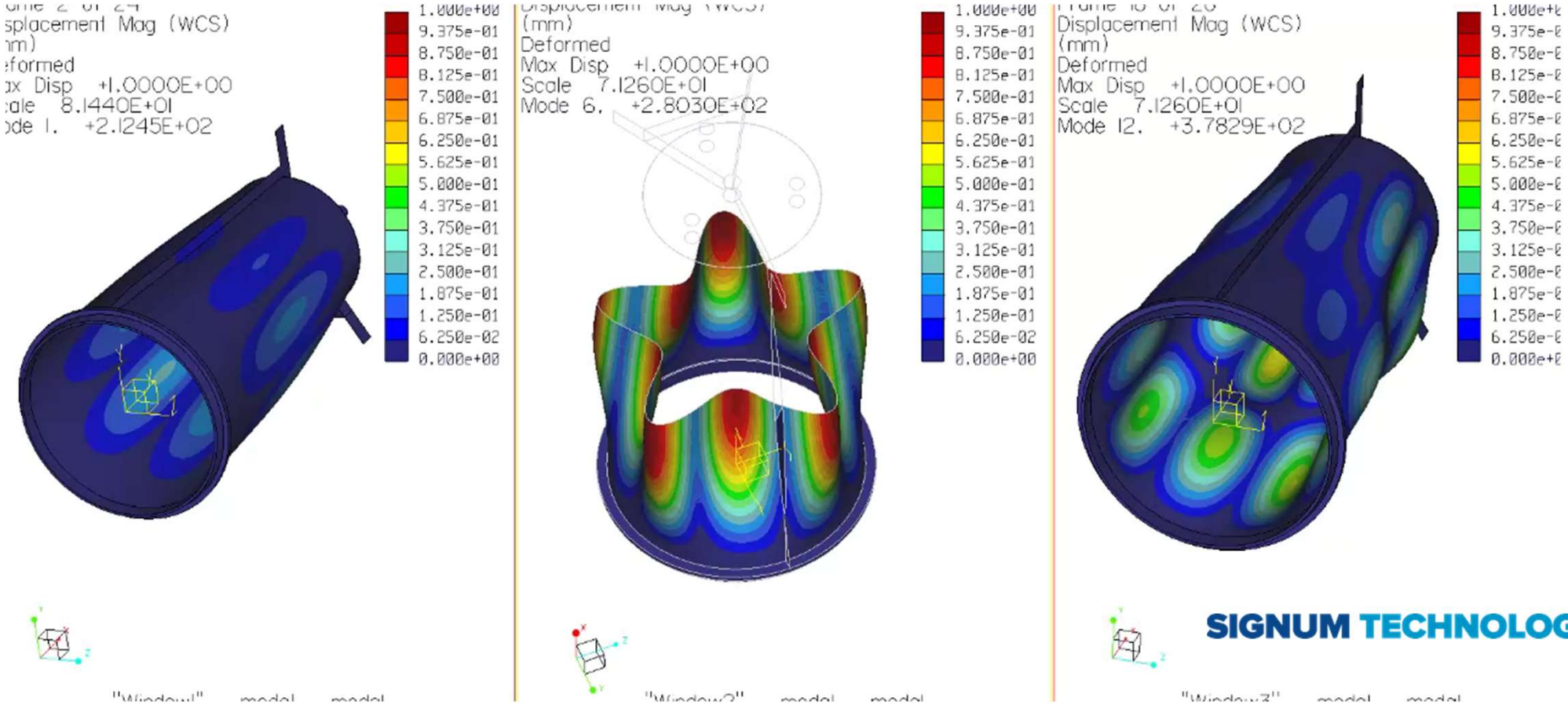
CFD: Velocity profiles



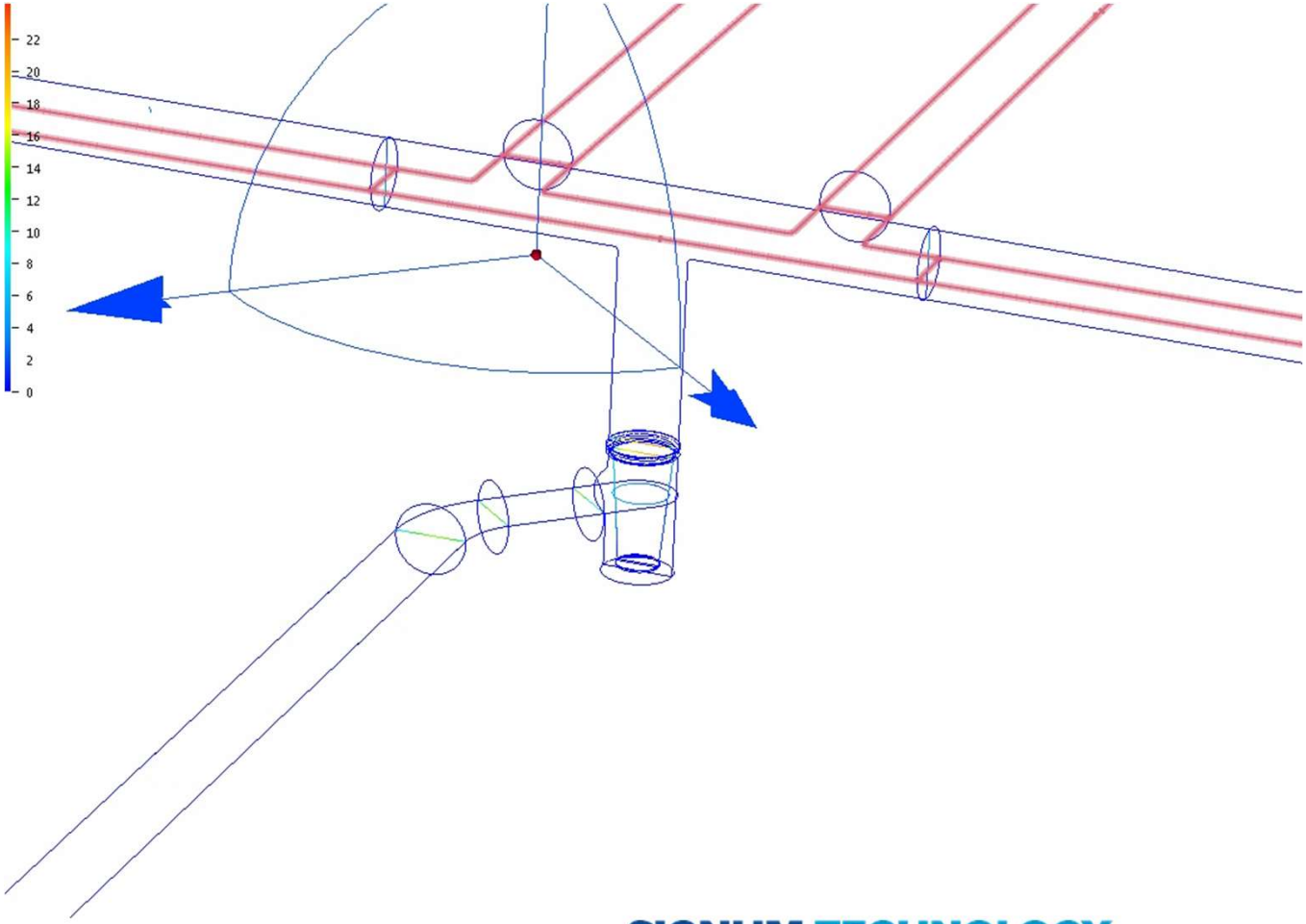
CFD: Pressure distributions



Natural frequency



Pipeline CFD based on clients pipe layouts



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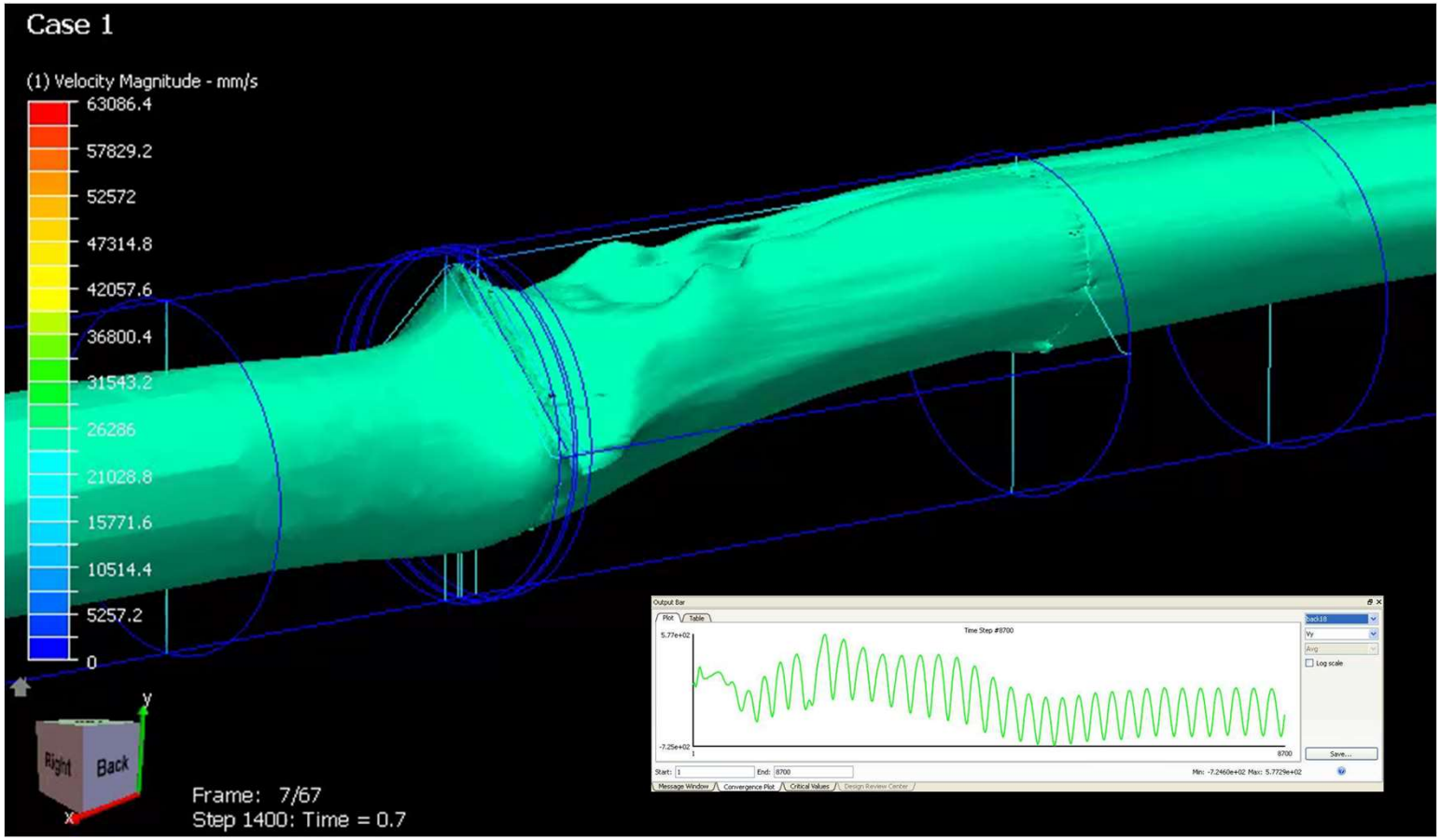
Fluid vibration

CFD, Vortex shedding assessment studies



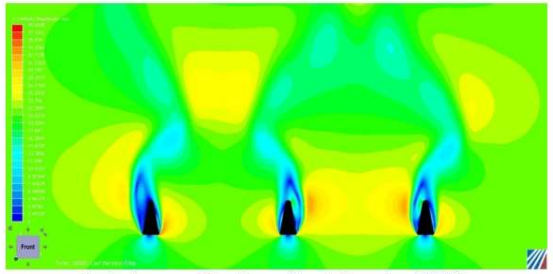


Fig 1. Average Velocity profile at time step 0.018 s

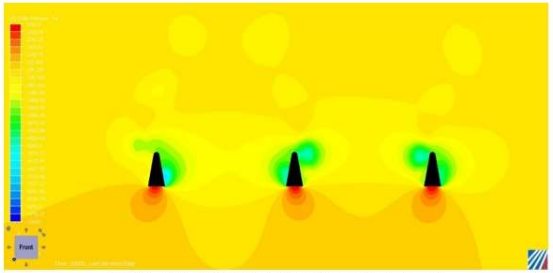
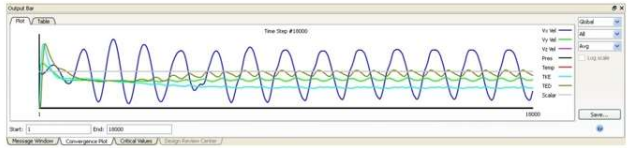


Fig 2. Static pressure at time step 0.018 s



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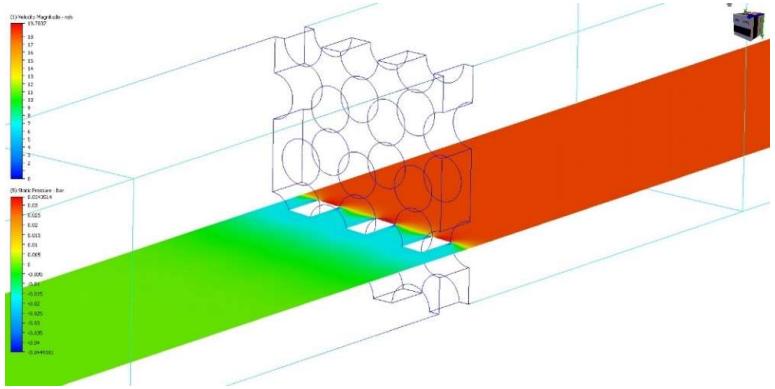
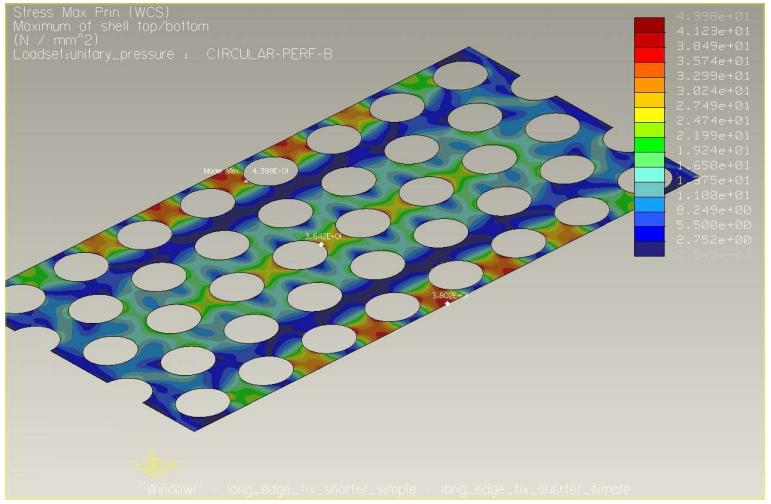
Research & Development

Product flow testing



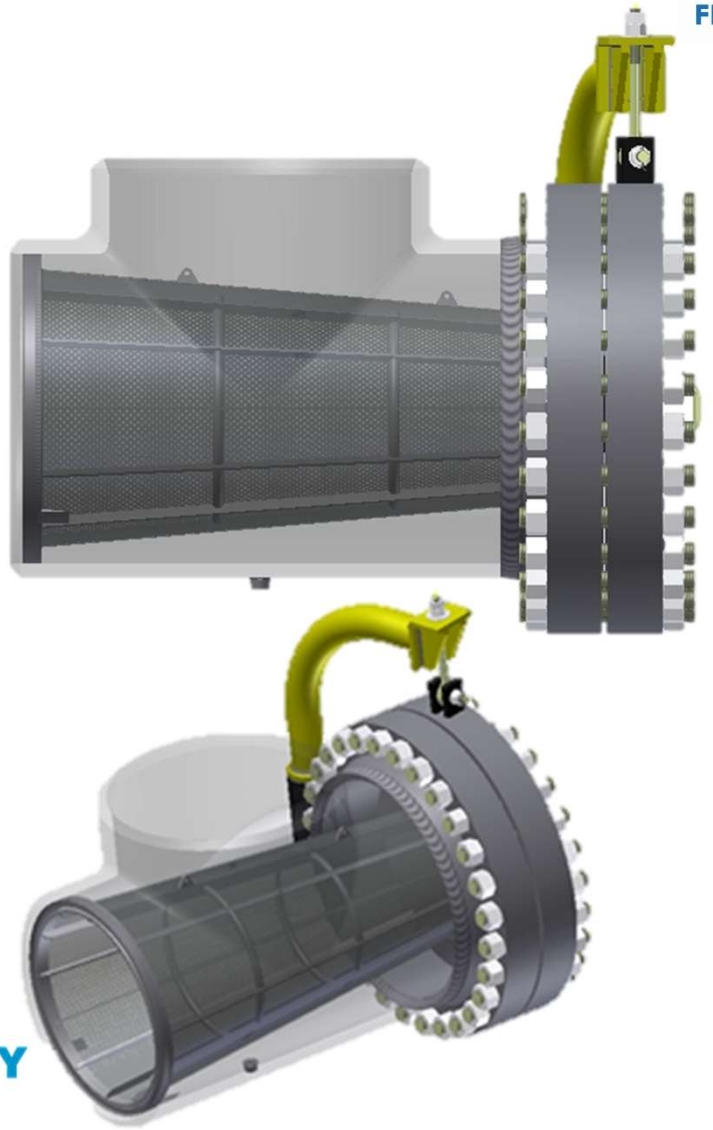
CFD: Filter media simulation



FEA: Stress concentration analysis on filter media

Vee Bee can offer:

- High burst pressure verified by FEA / Calculations
- Accurate pressure drops by use of Computer Fluid Dynamics ,bench marked by actual flow tests on both liquid and gas applications
- Optimised screen design to reduce clean DP
- Screen design for reverse flow applications
- Special designs for back pressure scenarios
- Specialist Simulations
  - Natural Frequency analysis
  - Vibration Analysis
  - Fatigue Analysis
  - Flow Induced vibration Analysis
  - Acoustic Analysis



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