FOR IMMEDIATE RELEASE – 23 October 2009

Conflicting requirements of API 610 mean the best pump for a job may not always be selected

Enquiries for pumps from the oil and gas industries normally refer to API 610, now ISO 13709, as the minimum technical standard. Often individual users and contractors/consultants add their own in-house project specifications and standards. Oliver Brigginshaw, Managing Director of Amarinth, a company specialising in the design, application and manufacture of pumps and associated equipment, looks at this combination of sometimes conflicting requirements of specifications and standards and explores why this can potentially lead to the best pump for the job not being selected.

API 610 has some apparently contradictory statements relating to the preferred and allowable operating range and the position of the customers rated flow on the pump curve. Preferred and allowable limits are defined as a percentage of the designed Best Efficiency Point (BEP). Many supplementary specifications laid down by companies require their rated flow to be to the left of BEP which further limits the selectable area of the curve. In any event, strict interpretation of API 610 would restrict rated flow to a narrow band just to the left of best efficiency flow.

– MORE –

One size does not fit all

There is an overriding feeling in the industry that abiding by the rules gives better reliability and availability. This may well be the case with high specific energy machines (that is motors over 300kW running at more than 3000 rpm) but is not always applicable to other smaller pumps. It should be borne in mind that the rules are of necessity based on historical experience and data, derived over long periods of time and often old design machines.

More recent designs, having evolved from the older designs and operating experience, incorporate concepts, philosophy and materials such as small rotor deflections obtained by low radial thrust hydraulic designs and stiffer shafts (L3/D4). Such design improvements mean that some of the historical rules may not be as applicable as they once were. Admittedly units with drives greater than 300kW certainly do need more attention to operating range and conditions if potentially higher maintenance, or worse wrecking of the pump, is to be avoided, as the higher levels of energy at the pump inlet and outlet will drive any destructive effects that much harder.

Preferred and allowable ranges

API 610 defines the operating ranges of the pump curves as a) preferable - 80% to 110% and b) allowable - 70% to 120%, of the designed BEP (Fig 1). These limits are also defined for acceptable levels of vibration and to limit suction specific speeds aimed at controlling recirculation susceptibility. However, this is not clearly defined in API 610 why the 70% to 120% limits are imposed. Most people think it is to make sure vibration limits are maintained and recirculation does not commence, but it is not clear why API 610 has this arbitrary rule, which must vary from pump to pump.

This standard often unduly restricts small lower energy units of the OH1 and OH2 type as they can operate well within the vibration limits but still be well outside the allowable 70% of BEP. Most pump manufacturers will define a minimum flow for the unit which can be as low as 15% – 20% of BEP (see Fig 1). Many pumps can operate very satisfactorily close to minimum flow whilst still achieving the API 610 vibration limits.

Conflicting requirements

Such restrictions can lead to application selection difficulties for the manufacturer, for example achieving a low enough NPSH. If the pump has to be within the 70% - 110% preferable range a smaller pump is often needed, but the NPSH available at the customer's duty can often be less than the smaller pump requires (see Fig 2). If the manufacturer is satisfied that the larger pump can operate close to its minimum flow without problems the larger pump would be a preferable choice as the NPSH required by the large pump operating well to the left of the BEP could be less than the NPSH required by the smaller pump operating in the "preferred operating range".

In addition, there are sometimes additional benefits to the customer of having a number of the same size of pump rather than a number of different sized pumps. These include interchangeability of parts which helps with service and refurbishments, lower stock holding of critical spare parts (e.g. one shaft will support three pumps rather than three different shafts for three different pumps). Again, staying with the preferable limits defined by API 610 often results in more different sized pumps being selected to ensure compliance, rather than more of the same pump.

Most OH1 and OH2 pumps up to 300kW would not exceed the 12,800 suction specific speed limit sensibly introduced by many users. Improved hydraulic and mechanical deigns often meet the deflection, vibration and noise criteria over a wider flow ranges than the API limits permit. Evidence is accumulating for these units to indicate the life of a pump is not impaired by operating outside of the preferable limits - that less than 70% away from the designed best efficiency.

Most of these units are fairly low specific speed and the value of the operating efficiency does not drop off quickly, so operating energy costs are not significantly increased. Many of these machines do not run continuously and so overall availability is probably more critical to the operator.

A more flexible standard?

API 610 does recognise the limitations imposed on small pumps in the small print but unfortunately many specifications do not allow the flexibility that is needed to permit more appropriate selection in the lower energy part of the market. Perhaps at the next revision, API 610 could emphasise that for lower energy pumps meeting all the design and test criteria, a wider operating range than the current preferable operating limits would be acceptable so long as the pump is deemed fit for purpose and guaranteed as such by the manufacturer?

ISO 5199 already recommends that the manufacturer should advise the allowable operating range based on their analysis and experience of the pump. ANSI/HI 9.6.3 and other ANSI standards discuss the factors that should be considered when considering operating range.

Breaking down perceptions

Responsible manufacturers with modern designs will always ensure that API 610 pumps exceed the vibration, deflection and bearing life requirements of the standard and find that on smaller machines all of these limits can still be achieved considerably further away from the current 70% from BEP allowable limits. Amarinth has experienced pumps operating as far away as 0% of BEP (i.e. closed valve) on test that are still within API 610 vibration limits (though the pump would of course eventually overheat), but manufacturers remain hampered by "industry perception" into not offering units outside of the current 70% BEP allowable limits.

There are now some more enlightened user specifications being issued which are starting to recognise the situation and give wider scope, but more detailed definition as to what is permissible and what is not would be useful and provide more clarity to the industry.

At the end of the day the pump manufacturer's job is to make money making pumps and dissatisfied customers and warranty costs they certainly do not need. If users are to really get the best pump for the job, then bringing the wealth of experience of a respected pump manufacturer to bear and putting aside "perceptions" during the selection of API 610 pumps could deliver significant benefits.

– END –

Steve Buckley Tel: +44 (0)1394 462122 Phil Harland Tel: +44 (0)118 971 3790

OPTIONAL PANEL or BOX ITEMS

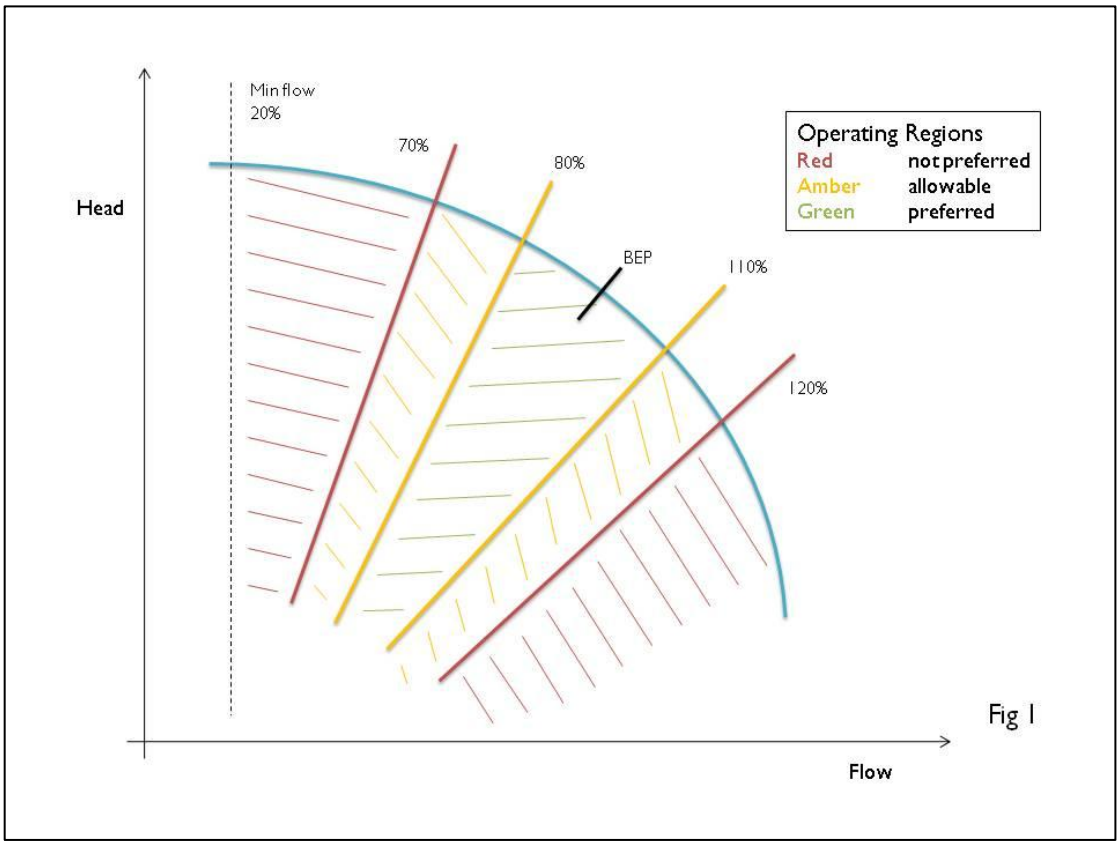


Fig 1

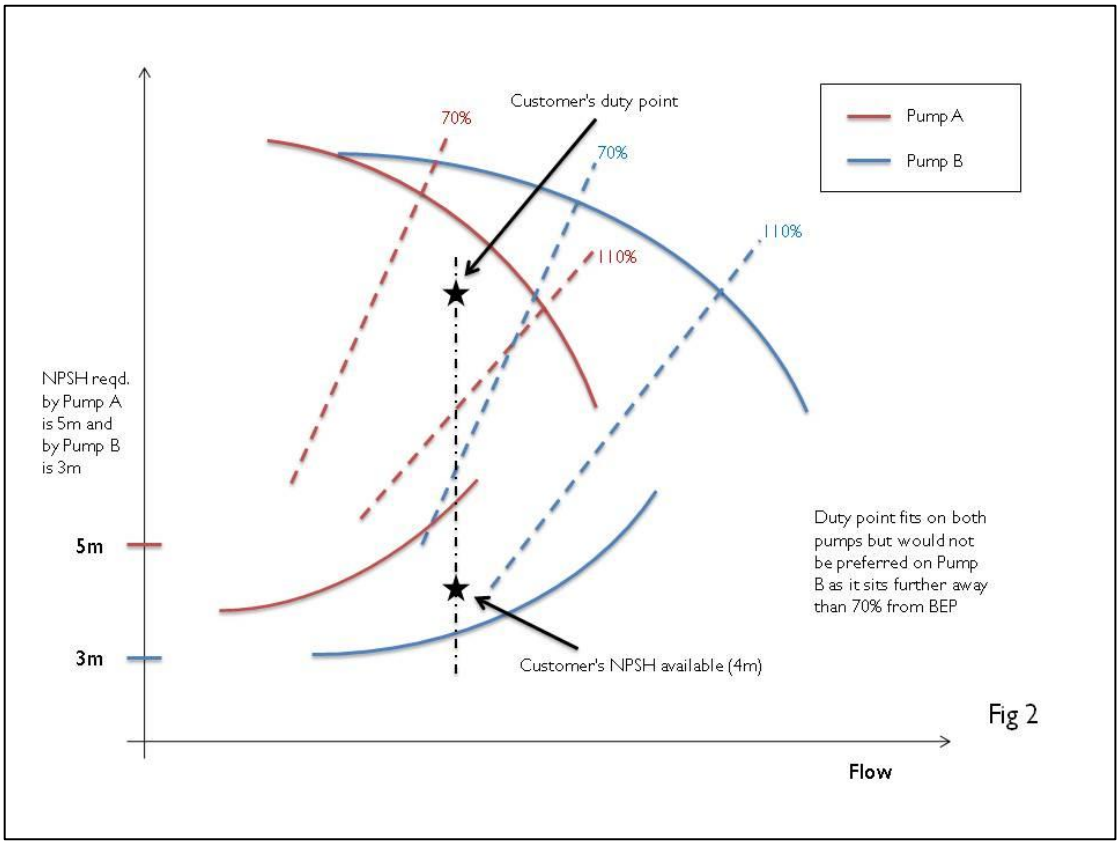
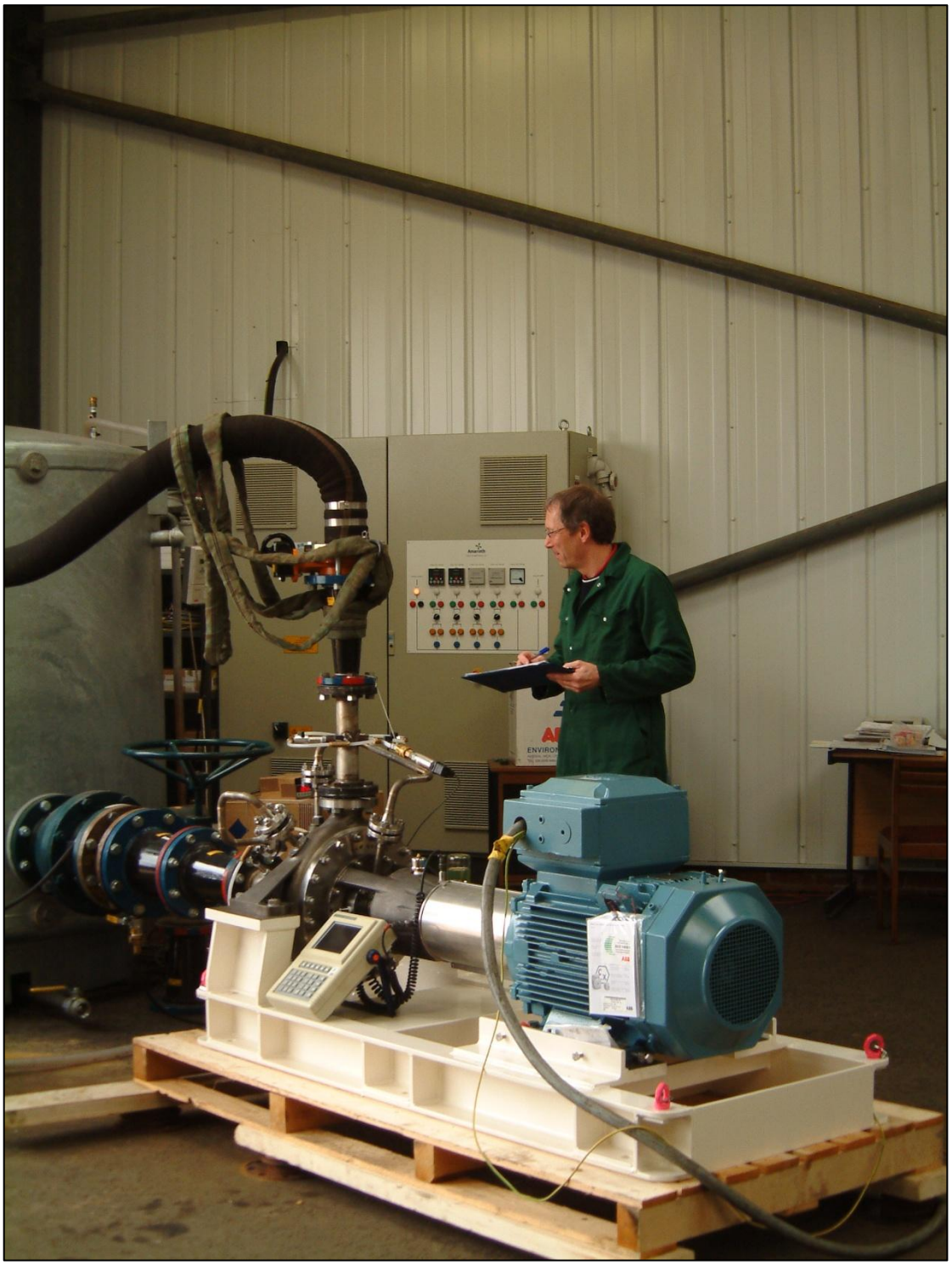


Fig 2

Steve Buckley Tel: +44 (0)1394 462122 Phil Harland Tel: +44 (0)118 971 3790



Amarinth testing API 610 OH2 A-Series pump

NOTES TO EDITORS:

Founded in 2002, Amarinth has harnessed the skills, creativity and passion of people who have worked in the pump industry for many years. Amarinth delivers world-leading expertise in the design, application and manufacture of centrifugal pumps and associated equipment to ISO, ANSI & API standards, primarily for the industrial, chemical & petrochemical markets. Their portfolio includes:

- **Pumps**: Horizontal and vertical API 610 pumps, chemical and industrial pumps, many of which are interchangeable with the Girdlestone pump ranges, eliminating the need for expensive modifications when replacements are required.
- **Pressure Vessels**: Protect System Plan 52 and 53A and 53B sealant systems with inbuilt condition monitoring for pumps and mixers that are suitable for Safe area up to Zone 1.
- **Spares & Service**: High quality, fast lead-time re-engineered spare parts to improve performance and extend pump life, including many which are directly interchangeable with the Girdlestone pump ranges.
- **Packages & Modules**: Condensate Recovery Units manufactured for Spirax Sarco incorporating the innovative Ci-Nergy intelligent variable speed control system, plus bespoke packages & skids built to order.
- **Business Systems**: state-of-the-art e-commerce technologies that deliver 24/7 support enabling customers to select pumps and place orders on-line and then track every stage of manufacture through to delivery, any time, anywhere in the world.

The company operates globally from its base in Rendlesham Suffolk, United Kingdom and has a customer base of world-leading companies, including BP, Shell, ExxonMobil, GlaxoSmithKline, Pfizer, Spirax Sarco, Diageo, AMEC, Fluor and Halliburton.

For further information, electronic copy or photos contact:

Comment:

Steve Buckley
Sales & Marketing Director
Amarinth Limited
Bentwaters Park
Rendlesham
Woodbridge IP12 2TW
United Kingdom

Tel: +44 (0)1394 462122
Mobile: +44 (0)7971 506 994
Steve.Buckley@Amarinth.com

Media Relations:

Phil Harland
B6 Solutions Limited
29 Swan Drive
The Wharf
Aldermaston
Reading RG7 4UZ
United Kingdom

Tel: +44 (0)118 971 3790
Mobile: +44 (0)7880 748380
Phil.Harland@B6solutions.com

Amarinth can also be reached on its website: www.amarinth.com.

Go to our "Downloads" page at www.amarinth.com to see all our press releases and find out more about us.