Hot News

from the heat transfer society

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The President's Night

On October 23 at the Kensington Park Thistle Hotel, the ***hts*** President, Keith Mangnall of Hick Hargreaves, was ably assisted by Richard Birtwisle in explaining to us some of the new problems of producing vacuum systems which satisfy current environmental requirements. The solutions to these problems have led to exciting developments in heat exchangers.

There are few vacuum duties which do not have to handle noxious gases. Apparently the pollution inspectorate is not sympathetic to the traditional *North-of-England* approach summerised by "If you can't put it in the atmosphere, stick it in the local river".

Liquid ring pumps, or "wet systems", used to be operated once through with all the heat and dirt being absorbed in the liquid seal and then discharged to the environment. An obvious solution to this is to recirculate the seal liquid though a secondary heat exchanger except that this will foul very quickly as a consequence of being at the lowest part of the circuit, not to mention having to handle up to 90% solids! Hick Hargreaves therefore came up with falling-film heat exchanger which handles the high solids with little fouling. This required very special design of the liquid distribution system.

The alternative to the wet system is a dry-running pump which requires multistage compression with interstage gas cooling. These gas coolers, while seemingly conventional, have to be designed with almost impossibly small pressure losses.

Pre-condensers are common in vacuum systems but we were told of new direct-contact designs which have the additional advantage of pre-scrubbing sticky solids or vapours which may polimerise or solidify.

Can anyone help?

The ***hts*** Committee is looking for a room in which to hold committee meetings. To save the Society's money, we have been meeting in pubs. Unfortunately, the old fashioned quiet pub is disappearing to be replaced by lively theme bars where you can't hear yourself speak, never mind anyone else.

So, does your organisation have offices in central London and would be prepared to let us use a room for free for about 6 weekday evenings a year? We are house trained! If you can help, please contact Simon Earland on Tel 01245 349 160, Fax 01245 349 161.

New Members

We are pleased to announce that the following have been accepted as *hts* Members in 1996

Andrew Woodrow - John Brown E&C Ltd
Mansoor Al-Jamri - BOC Process Plants
E A Plummer - Parsons
Penny Beaumont-Martin - Parsons
Michael Bovey - Orbit Valves Ltd
David Hunter - Orbit Valves Ltd
Lewis Ashby - Wellman Graham Ltd

This Issue

Pressure Vessel Standard

A seminar organised by the IMechE and co-sponsored by the ***hts*** was held on 25 September to describe the requirements of the draft CEN standard for Unfired Pressure Vessels.

Speakers from BSI and industry explained various aspects of the draft and gave comparisons with existing standards. Of interest to heat exchanger designers were the presentations by Richard Fawcett on flange design, and Rod McFarlane on tubesheets.

The CEN standard will include two alternative methods for flange design. The first will be the familiar *Taylor Forge* method with modifications as in BS 5500, and the second a new method developed in the former East Germany. The latter method covers the effects of mechanical loads, thermal expansion and flange rotation, as well as pressure.

There will also be two methods for tube-sheet design. One is an elastic analysis similar to that in BS 5500 and CODAP, while the other is based on limit analysis and comes from a TGL standard used in the former Eastern Bloc countries. The second method is likely to give benefits in reduced tube-sheet thickness in, say, fixed tube sheets exchangers without bellows

National Heat Transfer Conference

The 5th UK National Conference on Heat Transfer will be held 17-18 September 1997 at Imperial College, London. The call for papers will be circulated shortly with a request for abstracts by the deadline of 31 January, 1997.

Topics covered in the conference will include fouling, forced & natural convection, Boiling, condensation, advanced heat transfer technology and combustion & radiation. As joint sponsors of the conference, the ***hts*** is keen to encourage papers with a direct industrial application.

In order to help financially hard-pressed research students, the ***hts*** will be sponsoring three students to attend the conference.

For more information, contact the IChemE, on Tel 01788 578 214, Fax 01788 577 182.

HEXAG

HEXAG is open to all UK companies and has DTI support to encourage the exchange of information in heat exchangers with a view to developing colaborative ventures. The last meeting was held on 31 October at the new Brown & Root offices in Leatherhead. Topics discussed included heat exchangers with chemical reaction, welded plate and air-cooled exchangers, use of CFD, educational software, the EU programmes on heat transfer, fluid properties and the effect of high pressure tube failure.

For further information, contact David Reay on Tel 0191 251 2985, Fax 0191 252 2229.

Mike Ackrill Award

The Mike Ackrill Award is given every year by the ***hts*** to honour a significant recent contribution to engineering heat transfer in the UK. The detailed criteria for the award have varied from year to year. It has, for example, been awarded to the best industrial paper at the UK National Conference in those years when the conference is held,

The ***hts*** Committee has decided from now on to award the prize to the best presentation given at an ***hts*** Forum. The criteria are that the presentation

- Contains information of significant value to a sector of the heat-transfer industry especially if of topical interest
- Contains information which may be counted towards Continuing Professional Development (CPD) rather than simply being an advert for the companies products or services
- Is clearly and logically presented

So, let's have some great presentations. The competition is deemed to have started with the first Forum of the year held in May.

CPD

Both the IChemE and IMechE have indicated that *hts* forums may be counted as part of your continuing professional development (CPD).

See the back page for future Forum events.

Forum Evenings

Is Overdesign Safe?

In a most provocative presentation in January, Graham Polley of UMIST and Cal Gavin challenged us with questions like, is overdesign safe, is it necessary and is there a better way? He attacked our preconceptions by showing how, in a network, overdesigning the wrong exchanger will steal MTD from a more critical exchanger and thereby reduce the overall performance of the network.

So, what's the answer? We know that there are uncertainties in our designs so we will have to make some allowance somewhere. Graham therefore gave us a methodology for examining the response of the network to changes in coefficient within an individual exchangers. This enables us to add area only to critical exchangers and to explore various strategies for allowing for uncertainty.

This report was held over from the last *Hot* News

More New Twists in Heat Transfer

During a hot and sultry evening in May 1992, the ***hts*** learnt about new developments in shell-and-tube exchangers which may have then seemed fanciful. One of these was the *twisted-tube exchanger* which is now establishing itself as a well tried alternative the conventional shell and tube in suitable applications.

At the May Forum, Alan Guy and Byron Black of Brown Fintube, along with David Butterworth, told us about the construction and application of these exchangers. One point to remember is that twisted-tube exchangers do not contain twisted tubes! They just look like they have been twisted whereas they have been formed into an oval cross section with a superimposed helix. The tubes support themselves and hence do not need baffles. The combined tube-side enhancement and ability to achieve pure counter flow makes them well suited to cases where high thermal effectiveness is needed.

Selected examples were given of the 400 plus exchangers in operation.

Window gazing

At the June meeting, the select few, whose devotion to the cause of heat transfer exceeded the attraction of the European Cup match between England and Holland, heard Laurie Haseler of HTFS describe the particular benefits of Windows-based programs for heat exchangers. Going beyond the standard advantages of a familiar environment, and extensive help facilities, he showed how the ability to produce an exchanger drawing, or a graph of properties data can help the user be sure that the input he or she has provided is correct and self consistent, without the need for poring over extensive lists of numbers.

Using the new Windows version of the HTFS MUSE program for plate-fin exchangers as an example, he showed how results can be viewed in the form of either graphs or tables which can be expanded to show as much detail as required, without losing the broad picture.

Maybe the easier it becomes to design or check heat exchangers, the more time we shall all have to watch the football.

It's a NOx Out!

At the September Forum, Peter Jackson and Roy Godwin of Callidus Technologies explained the principles of NOx reduction and how these are used in their *Low Emissions* (LE) burners to meet the tight limits in new and anticipated legislation.

We have NOx to thank for those throat-tickling smogs which arise mainly from car exhausts rather than industrial burners. The NOx emissions come from three sources referred to as *thermal, fuel* and *prompt*. NOx reduction strategies concentrate on the first of these using techniques like air staging or fuel staging.

Callidus use the jet action of the fuel gas to recycle gases from the combustion chamber thus helping control the flame temperature and therefore avoid the high-temperature reactions which generate NOx. This can be combined with fuel staging to give NOx concentrations down to 10 ppm.

Waste **Heat**

by L M Teedy

What is a Heat Exchanger?

I thought I knew until I saw a recent paper. The authors started with the definition -

"A device used to transfer thermal energy between two or more fluids at different temperatures"

I'll buy that but sadly the authors didn't. They went on at some length on why this was a useless definition and then proposed their new one -

"A device which provides for the change of mutual thermal energy (exergy) levels between two or more fluids in thermal contact without external heat and work interaction"

How have we survived so long without this definition?

I recommend that the ***hts*** Committee embrace this new definition by renaming the ***hts*** the "Society for mutual exergy level interaction", or ***smeli*** for short. I further suggest the ***hts*** set up a working party to oversee this important change. This will be known as "Subcommittee to implement new keyname", i.e.***stink***.

European hot air

I attended the 2nd European Heat Transfer Conference in May or, to be more precise, the *European Thermal Sciences Conference*. I should have realised from that name what I was in for. Most the papers were written by people who could actually understand the new definition of a heat exchanger but would not recognise a real one if it fell on them. Or as Ken Bell (of the Bell-method fame) once said of delegates to an international conference "Most people here couldn't tell the difference between a heat exchanger and a giraffe."

The good points of the conference was that it was in Rome and that there were two refreshingly practical keynote lectures from ***hts*** members. These contrasted sharply with the academic lectures from our continental colleges. Vishwas Wadekar talked about improving heat transfer with more compact exchangers and Reg Bott showed how to reduce fouling, particularly biofouling.

Perhaps the ***hts*** should be doing something to improve the industrial relevance of the European Conference in the same way we have been able to for the UK Conference and the last International Conference.

The brighter New Engineering Council

Some of you may have noticed that the engineering council has re-invented itself with a new image. This includes a new logo whose significance escapes me unless it is a ball and chain meant to signify the shackling of the British engineer.

The views of L M Teedy are not necessarily those of the *hts*.

Future **Events**

- *London Forum, 21 November, 1996, "Are current process condenser design methods satisfactory?", David Webb, UMIST*
- *London Forum, 14 January, 1997, topic to be confirmed*
- *London Forum, 13 February, 1997, "Is CFD more than just an expensive way of producing pretty pictures?", Prof. Joe Quarini, University of Bristol*
- *Annual General Meeting, 6 March, 1997*
- *Annual Dinner, 21 March, 1997*

The next *Hot* News will be printed in April. Contributions are needed by mid March, which should be sent to

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