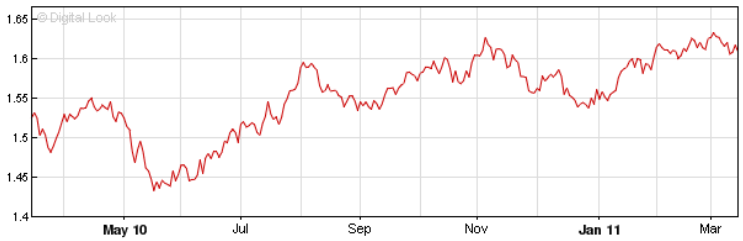
KIRK

PROCESS SOLUTIONS

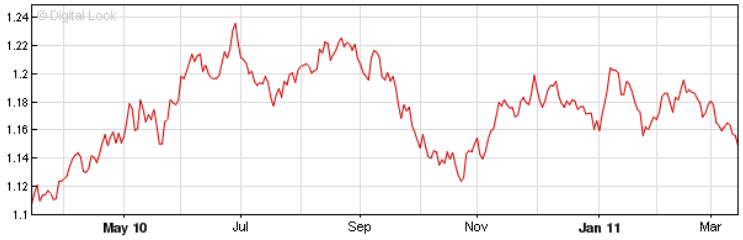
Welcome...

Welcome to the March 2011 *Highspeed™* e-newsletter from KIRK Process Solutions Limited. This edition brings you... market data tracking key exchange rates, commodity and share prices....industry news and project awards....the latest news from ourselves....and a special feature article!

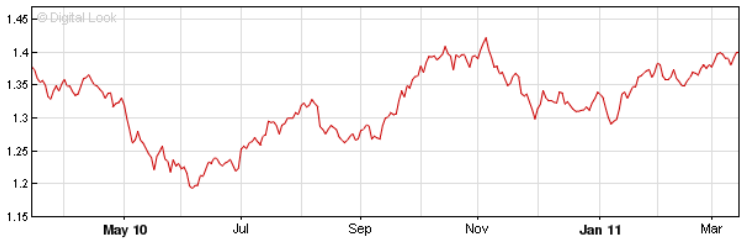
1 Pound Sterling = US Dollars



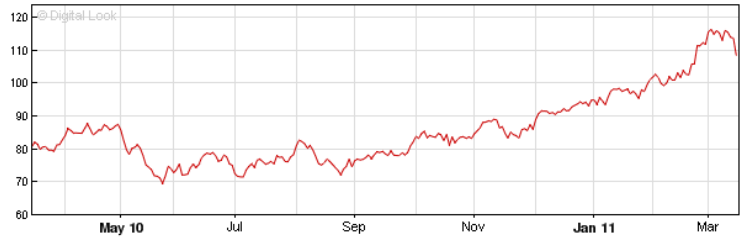
1 Pound Sterling = Euros



1 Euro = US Dollars



Brent Crude Oil: US Dollars/Bbl



Highspeed™ News...

March 2011
www.kirkprocess.com

What we do...

For those unfamiliar with our company, we are a process engineering business providing specialist vessel internals, software and design support to the oil, gas and petrochemical industries.

Market View...

The tumultuous events occurring in Japan, North Africa and the Middle East have created a climate of uncertainty that is having an impact on the oil price and stock markets around the world.

It is likely that a political reaction against new nuclear power plants will be felt in many regions causing (as a minimum) delays to their introduction, thus adding to the future demand for oil and gas. Whether this translates into new investments in oilfields or greener technologies remains to be seen.

Meanwhile the gradual weakening of the Dollar seems to be continuing, against the normal 'safe haven' trend. Fears of a new global recession caused by high commodity prices and geo-political instability are starting to surface.

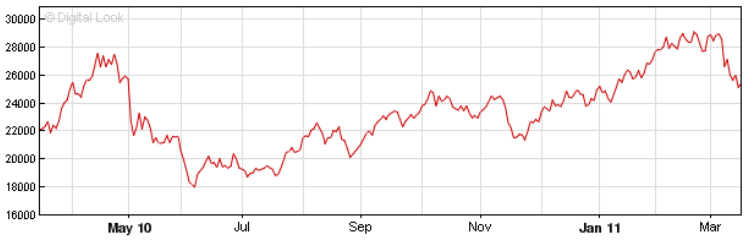
News from KIRK Process Solutions...

HIGHSPEED CYCLONE DELIVERIES

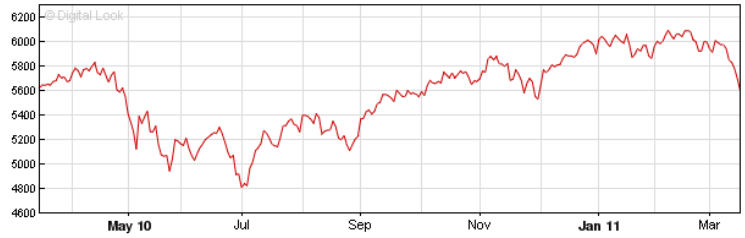
Over 100 stainless steel and GFP cyclones were manufactured in the last month and shipped to customers and end users in the UK, China and Russia.

Stainless steel cyclones....

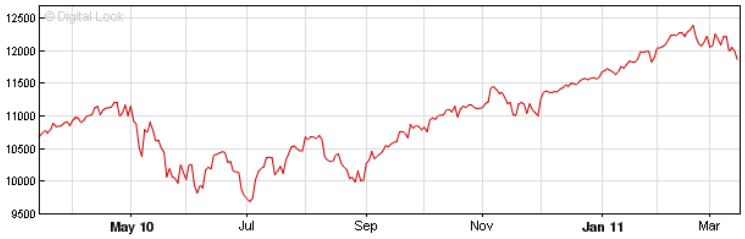
Nickel Price: US Dollars/tonne



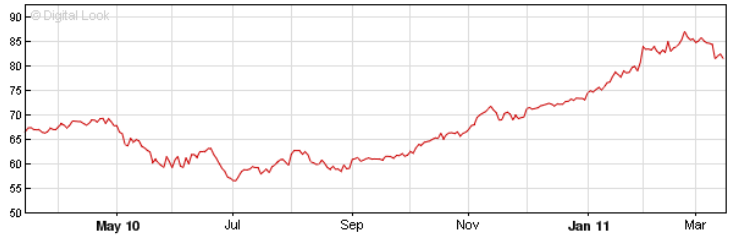
London FTSE-100 Stock Market Chart



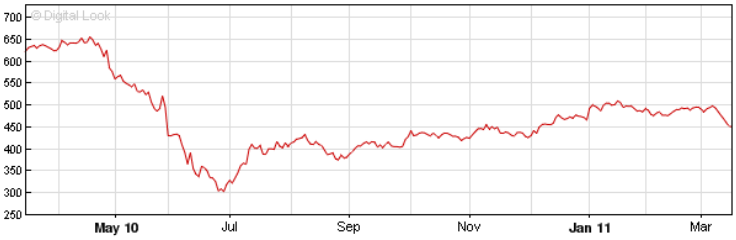
NY Dow Jones Stock Market Chart



Exxon-Mobil Corp. Share Price



BP Share Price



COMPETITIVE RANGE OF KWM™ WIRE MESH DEMISTERS LAUNCHED

Many applications for our Highspeed Cyclones will benefit from a wire mesh pre-coalescer pad to cater for very small droplets and turndown conditions. To meet this demand KIRK Process Solutions has launched a range of competitively priced wire mesh demisters in different mesh densities and wire sizes and materials – see our website for more details.

SEPARATOR DESIGNS

KPS has been continuing to support several clients in India and the USA with the detailed process and internals design of a range of oil/gas/water separators, including performance prediction and the detailed design of suitable inlet cyclones, coalescer plate packs and mist eliminators. This service is also available for design verification purposes to check existing sizes, as well as for retrofitting applications.

SEP-CALC SOFTWARE

KPS has received more enquiries and orders for its specialist design software from customers in the USA and Italy. 2011 Updates are currently being worked on and will be launched throughout the year. Further details are available on our website.

WEBSITE

This is currently being upgraded by our service provider so please be patient as we can't load up new pages just yet!

KIRK
PROCESS SOLUTIONS

DESIGN GUIDE

UNDERSTANDING MIST ELIMINATORS

PREDICTING DROPLET CAPTURE THROUGH A WIRE MESH DEMISTER PAD

1) BASIC SIZING

Most readers will be familiar with the basic Souders-Brown sizing equation for a wire mesh demister:

$$V = (k)\sqrt{\frac{\rho_L - \rho_V}{\rho_V}}$$

Where:
- V = Vapour velocity
- k = K-Factor
- ρl = Liquid density
- ρv = Vapour density

The GPA Engineering Data Book recommends the following ***k*** values for vertical drums with horizontal mesh pads (at the denoted operating pressures):

- At a gauge pressure of 0 bar: 0.107 m/s
- At a gauge pressure of 7 bar: 0.107 m/s
- At a gauge pressure of 21 bar: 0.101 m/s
- At a gauge pressure of 42 bar: 0.092 m/s
- At a gauge pressure of 63 bar: 0.083 m/s
- At a gauge pressure of 105 bar: 0.065 m/s

GPA Notes:

1. ***k*** = 0.107 at a gauge pressure of 7 bar. Subtract 0.003 for every 7 bar above a gauge pressure of 7 bar*.
2. For glycol or amine solutions, multiply above ***k*** values by 0.6 - 0.8 **
3. Typically use one-half of the above ***k*** values for approximate sizing of vertical separators without mesh pads
4. For compressor suction scrubbers and expander inlet separators, multiply ***k*** by 0.7 - 0.8

*One origin of these recommendations being the recognition that at elevated pressures there is usually a reduction in the surface tension of the associated hydrocarbon liquid causing (a) smaller droplets to be formed and (b) re-entrainment to occur at lower energy levels.

**Due to higher viscosity of liquid reducing the rate of draining, thus causing earlier flooding.

For vertical pads with horizontal gas flow, the accepted sizing rule is to multiply the k factor by approximately 1.4 to take into account the increased gas handling capability since the liquid is not draining counter-current to the gas flow.

2) PRESSURE DROP

The pressure drop relationship is also reasonably well documented, although designers must rely on some simplifications as it is unlikely they will know the liquid loading with any degree of accuracy:

$\Delta P = C * (\rho l - \rho v) * k^2 * t$

where: t = Pad thickness, m
ΔP = Pressure drop, kPa

For values of **C** refer to the table below:

Mesh Pad Style	**Dry**	**Light Loading**	**Moderate Loading**
High Efficiency Pad e.g. KWM-A2 Wire Dia 0.15mm Pad Density 145 kg/m^3	0.13	0.20	0.25
General Purpose Pad e.g. KWM-B2 Wire Dia 0.27mm Pad Density 170 kg/m^3	0.10	0.15	0.20
Dirty Service Pad e.g. KWM-C2 Wire Dia 0.27mm Pad Density 80 kg/m^3	0.07	0.10	0.15

[To convert from kPa to mbar multiply by 10; or to mm H_2O, multiply by 100]

To assist with knowing the likely liquid loading the designer can either calculate the actual maximum droplet size likely to be hitting the mist extractor using drag force coefficients (made straightforward by using proprietary software such as our **KO-Calc** program), or more simply determine the underlying equivalent notional k-factor for the vessel diameter (the lower it is, the lighter the potential liquid loading).

3) DROPLET REMOVAL EFFICIENCY

However, to predict and estimate the actual droplet removal performance at the exit from the mist eliminator pad requires a little more design effort and a 3 step calculation (ideally with a computer to assist!

Step 1: Determine the Inertial Separation Factor, SF
Step 2: Convert the Inertial Separation Factor into an Impact Efficiency, E
Step 3: Calculate the carryover for a range of droplet diameters, Dd

1) Inertial Separation Factor, $SF = \{(\rho l - \rho v) * Dd^2 * V / (0.018 * \mu v * Dw)\}$

Where: Dd = Droplet diameter, m

Dw = Wire diameter, m
μv = Vapour viscosity, cP

Example, look at 10 micron droplets of oil with density 850 kg/m3 in a gas stream of density 15 kg/m3 and viscosity 0.012 cP at the design velocity of 0.75 m/s (k = 0.1). Use a mesh pad with wire diameter of 0.28mm.

SF = $\{(850 - 15) * (10 * 10^{-6})^2 * 0.75 / (0.018 * 0.012 * 0.00028)\}$ = 1.035

2) Impact Efficiency, E ≈ $\{ SF^{\wedge 1.2} / (SF^{\wedge 1.2} + 1) \}$ = { 1.042 / 2.042 } = 0.51

Note: This relationship is an approximation only for these calculations.

3) Calculate the capture efficiency for this droplet

Efficiency % = $\{ 100 - (100 / e^{0.21*S*T*E})\}$

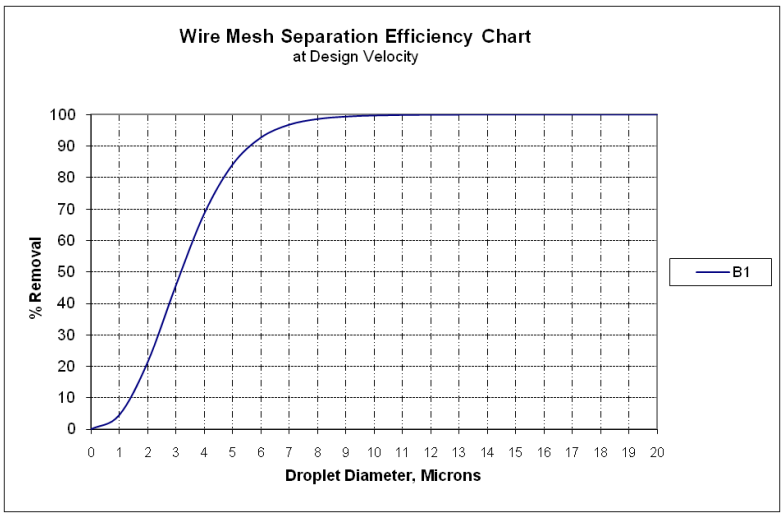
Where: S = Surface area of pad, m^2/m^3
T = Thickness (depth) of pad, m

For a KWM-B1 style demister pad the surface area is 355 m^2/m^3 and we shall select 150mm thickness:

Efficiency at 10 microns is = {100 - (100 / e ^0.21*355*0.15*0.51)} = 99.67%

This is the theoretical maximum efficiency, so it may be wise in practice to allow a de-rating factor on the pad thickness, for example.

The calculation may be repeated at other droplet sizes to build up the likely efficiency curve thus:



INDUSTRY NEWS & HEADLINES

Courtesy of www.yourprojectnews.com and www.the-eic.com

Upstream Oil & Gas Projects (Iraq)

Badra Oil Field

Gazprom Neft has awarded a FEED contract to Technip. The project preparation is expected to be completed by June. The field, which was discovered in 1979, holds some 150 million barrels of oil reserves and has a projected output of 170,000 barrels per day. The tender award decision has also been taken for the road and well site construction, as well as for the construction of a permanent camp. Iraqi ALMCO was selected as the contractor in both cases. In January 2011, the mobilisation of manpower and equipment was completed, and geological engineering surveys and future roads laying-out were launched. In accordance with the latest instructions of the Ministry of Oil of the Republic of Iraq, the ITT submissions for well drilling and integrated project management in terms of well construction were delivered to the state Iraqi North Oil Company (NOC) and the Ministry of Oil for approval and declaration of winners. The commencement of works is scheduled for April - May. The Badra oil field is situated in Wasit governorate, 160 kilometres southeast of Baghdad city, and extends across the border with Iran.

South Rumaila Oil Field

WorleyParsons has officially confirmed that it has been awarded a contract by BP Iraq NV and its partners PetroChina and the State Oil Marketing Organisation (SOMO) of Iraq, to provide conceptual design, FEED, minimum work obligations and integrated project management team services to boost production from the $15 billion Rumaila oil field. The contract will be executed from WorleyParsons' offices in London, UAE and Iraq, with an initial revenue in excess of $100 million. In November 2009, BP and its partners entered into a 20 year technical service contract with the South Oil Company of Iraq under which the BP led consortium is required to nearly triple output from the field to 2.85 million barrels of oil per day over the next six years. On completion of this work, Rumaila will become the world's second largest producing oil field, contributing approximately 10% of Middle East production, 7% of OPEC production and 3% of global production.

Garraf (Gharaf) Oil Field

Weatherford International is the frontrunner for the estimated $300m deal to build the early production facilities at the Gharaf oil field. The developers of the field received bids in late 2010 from four groups for the EPC contract. Weatherford has already won the engineering design deal for the production facilities and an 80 kilometre pipeline at the field, but other companies remain in the running for the EPC contract. The 1 billion barrel Gharraf field, located in the Thi Qar governate in southern Iraq, was awarded to Petronas and Japex as part of Iraq's second oil field licensing round in December 2009. The companies plan to increase production to 50,000b/d by 2012 and 230,000b/d by 2023.

Shtokman Gas Field (Shtokmanovskoye, Russia) - Phase 1

An award could be made as early as June for construction and delivery of a ship-shape floating production unit (FPU) for the project. Reportedly, the partners have a concept that is fixed. However, they have not fully completed all of the alignment issues between Total and Statoil on one side and others within Gazprom. Even though the cost for the first phase of the project was originally estimated at $15 billion, Gazprom has recently expressed worries about cost overruns. With weakened demand for natural gas amid a gas glut hitting global markets, the economics of the project are becoming more difficult for shareholders. Separately, the Deputy Head of the Federal Agency for Subsoil Usage recently said that the launch of the field might be postponed until 2018, due to active development and use of shale gas in the US, prompting lower demand for natural gas.

Australia Pacific Liquefied Natural Gas (APLNG) - Gladstone CSG to LNG Project - Origin/Conoco

ConocoPhillips and Origin Energy may announce a final investment decision to proceed with the project as early as May. It is reported that the partners will make a call on the Queensland project in the May to July period. ConocoPhillips could raise debt to help fund the LNG development. The partners will sign up as many as three additional customers after Sinopec Group agreed to buy 4.3 million metric tonnes of LNG a year for two decades. The supply contract with Sinopec may be worth about $71 billion, according to independent analysts. The project entails development of the coal seam gas reserves and initial construction of two LNG liquefaction trains, which will use coal seam gas as feed stock. The first two LNG trains will have a capacity of 4.5mtpa each, with first LNG production by 2014. A third train will be added when resources and markets are firmed up to give a total capacity of 13.5mtpa. A potential fourth train to lift capacity to 18.5mtpa will be considered in the project's environmental impact statement. Laird Point on Curtis Island will be the site of the LNG plant.

Fluor wins Browse offshore FEED contract in Australia

Fluor Offshore Solutions has been awarded a front-end engineering and design (FEED) contract by Woodside for the Browse Liquefied Natural Gas (LNG) development. The Browse fields are located in the Browse Basin about 425 kilometres north of Broome off the western coast of Australia. Fluor will be responsible for FEED services for the offshore central gas processing facility including the steel jackets, a compression platform and a utilities accommodation platform. Fluor has teamed with McDermott International to design the steel jackets and float-over installation.

Petronas finds new oil and gas fields offshore Sarawak

Petronas has made major oil and gas discoveries through the drilling of NC3 and Spaoh-1 wells in Blocks SK316 and SK306 offshore Sarawak. In March 2010, successful drilling of the NC3 wildcat well and a subsequent appraisal well brought significant discovery for Petronas in Block SK316 with early estimation of 2.6 trillion standard cubic feet (tscf) of net gas in place. The Spaoh-1 well of 3,000m drilling depth, located in Block SK306, shows similar promise. It was drilled in December 2010 and found both oil and gas. The preliminary evaluation indicates around 100 million barrels (mmstb) of oil and 0.2tscf of gas in place, respectively. Currently, the well is being prepared for production testing.

Baird Gas Storage Project, (United Kingdom)

The 1.7 billion cubic metre Baird storage project in the East Irish Sea could be operational by 2016/17, if a positive investment decision can be made this year. Centrica would like more storage but only if the economics work. This year there is a shrinking gap between summer and winter wholesale prices which makes storing gas less attractive. The proposed Baird storage facility would have capacity of approximately 81Bcf of gas. Baird has been developed using a long-reach production well drilled from Perenco's Inde D platform. A new platform is to be constructed and is expected to weigh about 4,000 tonnes, while the jacket weight is currently unknown. The platform will host between 14 and 16 development wells, although is expected to be designed to handle up 18 wells. The project will also involve a 100km pipeline with a diameter of 38 inches. Baird is a depleted gas field. It has been producing gas since 1993, and feeds into the Bacton terminal.

Second Upgrade of Saudi Aramco Rabigh Integrated Refinery and Petrochemical Complex

The joint venture partners are prequalifying companies for the $5 billion phase II expansion. The tender for the EPC packages are set to be released in the next three months. The exact scope of the expansion has not yet been released, so it is still unclear as to how many packages will be tendered for the project. Due to the technical nature of the project, it is believed that consortiums will be formed between EPC contractors and engineering companies. The project, which is estimated to be as big as the first phase, involves the expansion of the existing ethane cracker and aromatics complex, and the construction of at least 15 downstream chemical production plants