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Sludge dewatering with the HUBER Screw Press Q-PRESS®

South West Water had been looking at alternative sludge dewatering technologies with lower TOTEX to potentially replace existing veteran centrifuge assets and tasked their preferred contractor Kier Utilities to offer solutions for the Plymouth Central and Maer Lane WwTW's.



HUBER Screw Press Q-PRESS® Trial unit

South West Water's requirements were to find a more reliable and less labour intensive option to de-watering than a centrifuge with lowest Whole Life Costs, low operator attendance, simple odour control availability and simple operation.

HUBER worked closely with Kier Utilities, undertaking trials to demonstrate the HUBER Screw Press Q-PRESS® to South West Water operations who wanted to touch and feel the machine and satisfy themselves that the machine was simple, robust and easy to operate. The trial data not only satisfied South West Water that this, first of its kind in their region was what they needed but provided hard data to confirm Whole Life Costs in terms of power and chemical consumption as well as enabling accurate sizing.

South West Water now have an alternative to centrifuges with a demonstrable WLC benefit together with operators who have bought into the equipment and are supportive of the change.

- 40 % polymer saving
- 80 % power savings (typical)
- 50 % saving on annual operating costs

HUBER Technology have been working on establishing the Q-PRESS® as the go to technology for sludge dewatering.

Sludge dewatering works extremely well on primary sludge and on larger sites sludge dewatering helps achieve a dryer cake, typically 18%- 30% for transportation and storage.

When clients are looking at sludge dewatering, three technologies are generally considered:

- **Screw Presses like the HUBER Q-PRESS®:**
Provide efficient , fully automatic, mechanical dewatering of sludge, low polymer usage
- **Belt Presses:**
Although a well-established technology they are perceived to have high maintenance costs due to lots of moving parts, the belts are vulnerable to wear and blockage, spills are likely unless enclosed and they have a high wash water demand
- **Centrifuge:**
Although again an established technology they tend to have high TOTEX although single units are capable of large throughputs which equals lower CAPEX, they have high power costs associated with them, high operator attendance is required, high wearing parts due to high rotation speeds and a single wash is required at the end of a shift which can overload the unit and spill out of the discharge end

The HUBER Q-PRESS® has been an established product for the HUBER group and now has 1633 installations worldwide and 21 of those are UK installations.

South West Water had identified sludge presses as an option to replace the centrifuge at Plymouth Central and compared HUBER's Screw Press Q-PRESS® with another screw press technology, both technologies undertaking trials at Plymouth Central.

Plymouth Central serves a P.E of around 320,000 and, being on a coastal port receives higher proportions of saline and fat than other in-land works typically do. Maer Lane serves a small population on the outskirts of Exmouth.

On site previously was a 2002-centrifuge unit with 45 kW main drive and 7.5 kW back drive, which operated from around 6:30 AM to 9 PM as required, running at around 30 m³/h.

HUBER's Screw Press Q-PRESS® was demonstrated to have:

- Lowest NPV and WLC
- Lowest whole scheme capital cost
- Lowest operating cost
- Best technical support

HUBER SCrew Press Q-PRESS® sludge dewaterers are designed to provide efficient, fully automatic, mechanical dewatering of sludge once the diluted polymer dose into the feed sludge has been adjusted correctly to provide a suitable floc. The enclosed design serves to reduce the odours, noise and the potential requirement for operator attendance due to spills that can be associated with other dewatering technologies on some sites. The low operating speed of the screw presses reduces wear and energy demand.

For the trial to take place a HUBER Q-PRESS® 280 was tested on indigenous co-settled chemically assisted lamella-settled DensaDeg Primary and humus-like BAFF secondary sludge's from the Plymouth Central site as well as imported similar sludge's from the site at Maer Lane WwTW.

The feed sludge during the trial varied from 4.6 to 5.15% DS with an average active polymer usage of 4.7-4.8 kg/tDS with an average cake dryness of 33% and minimum of 28.6%. As a comparison, the existing centrifuge was using around 8-10 kg/t_{DS} of polymer based on a throughput of 25-30 m³/day to produce cake at around 23%. A sample of the trial results from a single day are shown in the table besides (click to enlarge).

Following the successful trial HUBER were asked to tender for the supply of the permanent units for both of the sites at Maer Lane and Plymouth Central.

The sludge feed at both sites was specified as 4.5% DS with a feed rate at Maer Lane of 10.22m³/hr and at Plymouth Central a feed rate of 35.55 m³/hr.

Following a successful tender submission HUBER were awarded both projects and the HUBER Q-PRESS® 800.2 was selected for both sites with a single unit required at Maer Lane and three units required at Plymouth Central with installation and commissioning taking place in 2019.

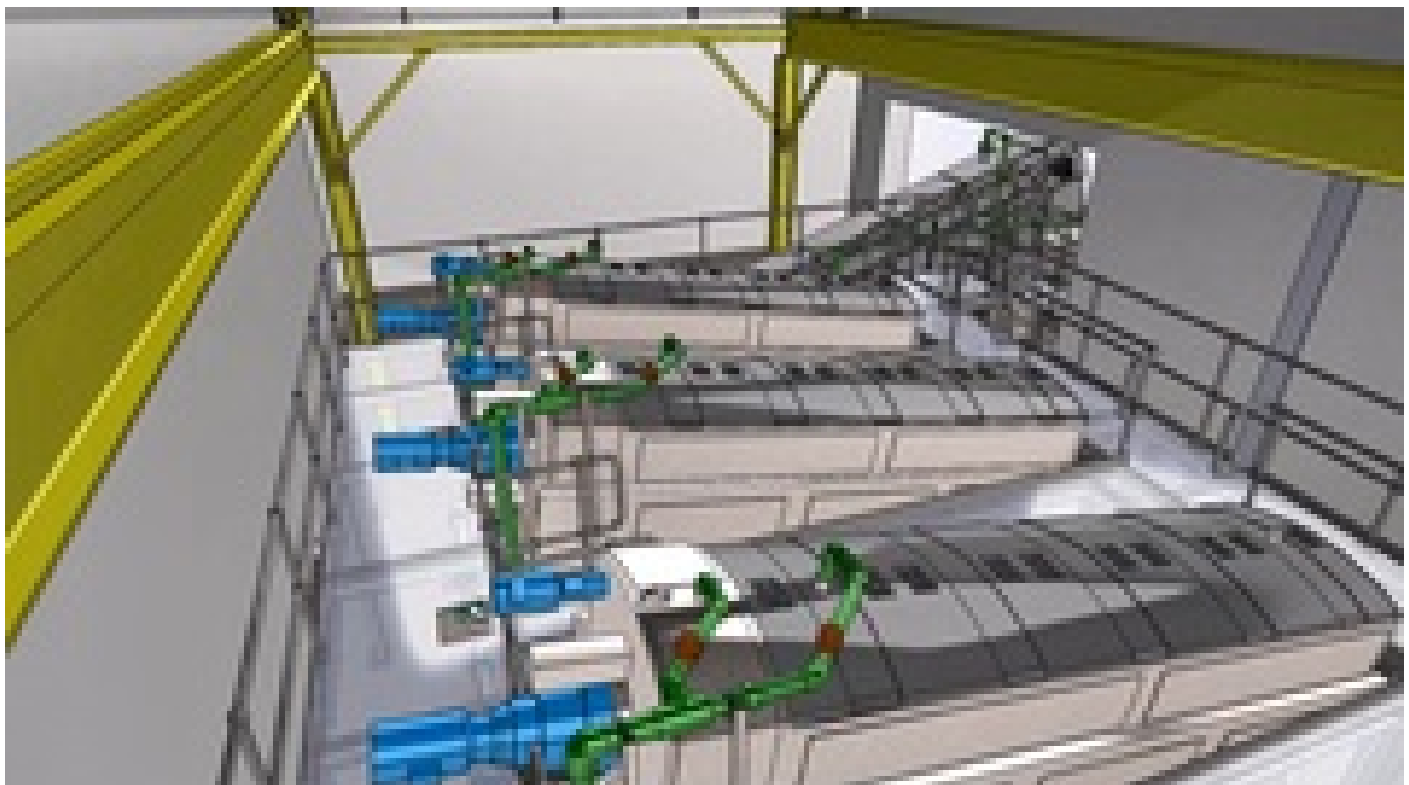
Whole Life Cost Comparison

South West Water's requirements were lowest WLC, low operator attendance, simple odour control availability and simple operation. Kier Utilities were keen to do a whole life cost comparison and using trial data and tender price as a thorough whole life cost evaluation, the following table summarises the comparison between the HUBER Q-PRESS®, new centrifuge technology and an alternative dewatering press technology, which was tested prior to HUBER.

	HUBER Q-PRESS 800.2	New centrifuge	Other dewatering press technology
Average Polymer consumption	6 kg/tDS	10 kg/tDS	7 kg/tDS

Power consumption (kW)	11	140	12	G-PRESS 280		
Cake quality (DS content)	30%	23%	25%	Plymouth Central		
M&E Capital Cost – HUBER Baseline 100	100%	64%	116%	18-08-19		
Total Scheme Capital Cost – HUBER Baseline 100	100%	106%	08:55	111%	10:55	11:05
Annual Operating Cost Relative to current	-£298,208	£2150,666	1.61	-£223,539	1.61	1.61
NPV 20 yrs. HUBER based 100%	100%	90%	4.79	117%	4.77	4.72
Instantaneous solids loading		105 t/hr	0.077	0.077	0.076	
Dilute poly dosing rate		l/hr	250	264	275	
Average poly DS concentration		%	0.251	0.253	0.253	
Poly active concentration from curve		%	0.157	0.158	0.158	
Active polymer use		kg/105	0.09	0.44	0.73	
Poly type						
Degree of mixing (weight size and position)			Sm. Max. / NA	Sm. Max. / NA	Sm. Med. / NA	
Main drive rotation speed/frequency	%		95-99	95-99	95-99	
Cone Hold Pressure (CHP)	Bar		0.75	0.75	0.75	
Observed average approx. inlet pressure	mBar		-105	100-290	100-500	
Observed average main drive current	A		-0.97	0.97	0.9	
Duration between wash cycles	mins		10	10	10	
Cake dryness	% DS		32.60	33.90	32.30	
Filtrate Suspended Solids content	mg/l		414	349	580	
Filtrate % DS	%		0.0414	0.0349	0.058	
Instantaneous Solids Capture Rate (SCR)	%		99.26	99.37	98.95	

Table: trial results



Schematic drawing at Plymouth Central





Installation photos at Plymouth Central

So what is the potential for the HUBER Q-PRESS® in the UK in the next AMP?

Mike Willis, HUBER's Business Development Director commented, " *We see the WLC benefits of the HUBER Q-PRESS® driving efficiencies in the sludge dewatering market as the cost of moving sludge is identified by OFWAT as a key efficiency driver.*"

During the PR19 price, review OFWAT is expecting water companies to account for the sludge business separately from their wastewater business. The OFWAT consultation document has already highlighted the potential efficiencies through transporting sludge. This, together with the focus on regarding sludge as an asset rather than a cost is likely to result in more sludge being moved as well as focusing on the cost to transport. This needs to be done at lowest TOTEX.

- Reduced chemical, power and maintenance costs compared to centrifuge will drive ongoing OPEX savings year on year.
- Reduced odour emission rate of the Q-PRESS® compared to a centrifuge or belt press enables smaller, more efficient odour treatment plant, reduced risk of odour nuisance and improved working conditions for operators.

The Q-PRESS® is available in four sizes and processes over 500kg/DS/h, providing a sludge dewatering technology that is more reliable, less fussy to operate, cheaper to buy and cheaper to operate than conventional systems- an ideal solution to meet the OFWAT objectives.

The impact of the approach is considerable with a standard, modular design and approach- demonstrated by a single unit at Maer Lane and triple units at Plymouth. This has provided South West Water with a scale-able solution for their Sludge Dewatering sites.

Kier Utilities and HUBER can apply the learning to the wider industry to deliver TOTEX efficiency across the industry. HUBER are involved in trials for another water company to develop a kiosk-mounted solution based on a standard off-site built HUBER Screw Press Q-PRESS®.

At the beginning of March, the finalists were announced for this year's Water Industry Awards 2020. HUBER Technology working with Kier Utilities and South West Water are delighted to have been shortlisted again for the third year running and as finalists in the following categories:

- **Asset Optimisation Initiative of the Year** - TOTEX savings at Plymouth Central
- **Most Innovative Use of existing technology** - Reshaping sludge dewatering

Productos afín:

- [HUBER Prensa de tornillo Q-PRESS®](#)

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