

# SLUDGE VOLUME REDUCTION USING SLUDGE BLANKET MONITOR CERLIC CBX



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# SLUDGE VOLUME REDUCTION WITH SLUDGE BLANKET MONITOR CERLIC CBX

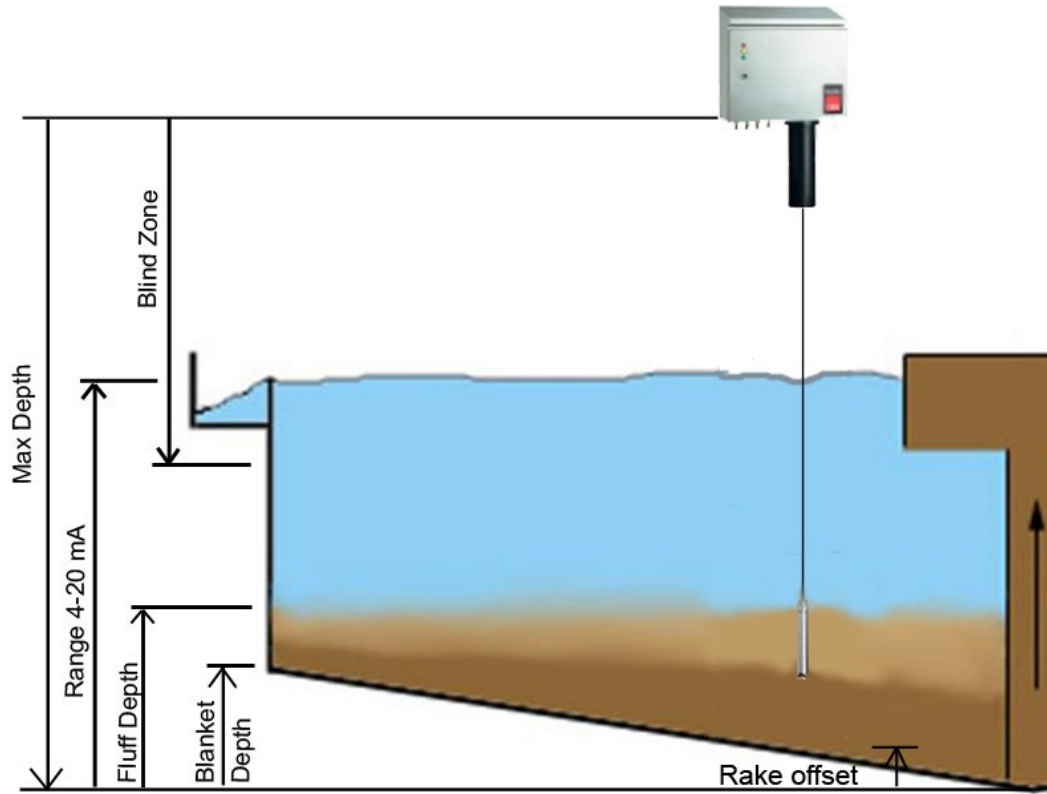
Cerlic Controls has made new innovating improvements of the way to measure sludge blanket and fluff sludge concentrations. This has led to new and better ways to control sludge pumping. By monitoring sludge concentration continuously through a basin the Cerlic CBX present two, by the operator pre-defined, levels of sludge interface and a profile of the concentration in the basin.

The pumping of liquids in waste water treatment plants use a considerable amount of the energy consumed in the plant. By optimizing the pumping of sludge in regards to its sludge concentration, the volumes in need of pumping will be noticeable reduced as the pumped volume will contain a higher amount of sludge concentration.

An increased, stable sludge concentration and a reduced sludge volume is of great interest when producing biogas using the byproduct, sludge, produced by the waste water treatment plant. Biogas is produced by heating activated sludge in a closed environment. Since less volume of activated sludge contains the same amount of activated sludge, less volume needs to be heated in the digester which saves large amount of energy. Higher and more even sludge concentration also leads to higher gas production and a better efficiency of the digester. The benefits in regards to higher sludge concentration and higher gas production have recently been exemplified by one of our customer, Mälarenergi AB. After the installation of the Cerlic CBX, the customer increased the sludge concentration of the sludge pumped from the thickener to the digester by 0,7% during the first year (2009). The flow from the thickener to the digester has up until now (2012) been reduced by 10 000 m<sup>3</sup>/year which reduced the heating energy of the sludge by 200 000 kWh/year. Mälarenergi, Kungsängsverket has also experienced an increased biogas production of which one factor is thicker sludge from the thickener and of course less energy used for sludge pumping.

The primary function of the CBX is to detect one or more levels where face shifts occur in the media by tracking a predefined suspended solids concentration. This is performed by moving the sensor up and down in the media and simultaneously measures the suspended solids. The output from the CBX gives one or more level signals. Those levels correspond to the predefined suspended solids concentration that has been tracked by the CBX at the change of interfaces like sludge and fluff. The CBX also provide a profile showing concentration verses depth on-line during sampling. The combination of giving multiple levels and show a profile makes the CBX unique on the market. The benefit with detecting more than one level is that you can monitor the surface water to avoid sludge wash out and at the same time monitor the sludge level and thereby control your sludge outtake. The profile will give you a picture or fingerprint of sedimentations properties at every sampling and an idea of changes in the sludge volume.

# ILLUSTRATION AND PHOTOGRAPHS



Installed Cerlic CBX in thickener at  
Mälarenergi, Kungsängsverket,  
Västerås, Sweden



Outdoor installation at waste water  
treatment plant in Sweden



# LABORATORY ANALYSES

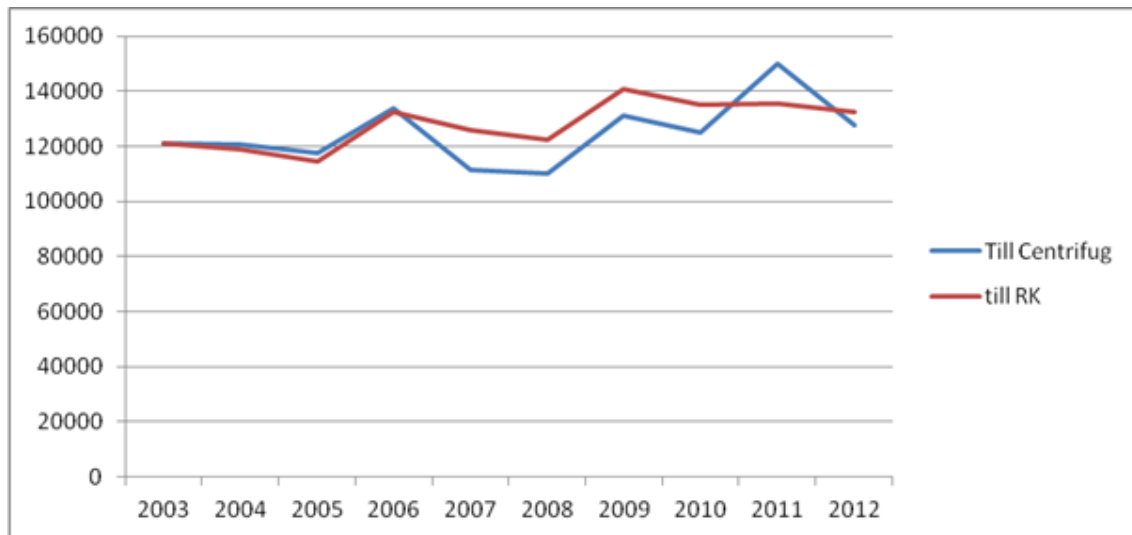
Laboratory analysis of Sludge concentration into (TS in) and out from (TS out) the thickener at Mälarenergi, Kungsängsverket, Västerås, Sweden.

The Cerlic CBX sludge blanket monitor was installed May 2009.

Date	TS out	TS in	Date	TS out	TS in
2009-01-07	3,72%	2,18%	2009-05-05	4,13%	1,01%
2009-01-13	3,97%	2,57%	2009-05-12	4,29%	2,45%
2009-01-20	3,76%	0,69%	2009-05-19	4,73%	2,61%
2009-01-27	4,12%	2,51%	2009-05-26	4,17%	2,35%
2009-02-03	3,74%	2,78%	2009-06-02	3,79%	2,12%
2009-02-10	3,43%	1,67%	2009-06-09	4,19%	0,88%
2009-02-24	3,60%	1,60%	2009-06-23	4,96%	1,18%
2009-03-03	3,27%	2,32%	2009-06-30	4,06%	1,70%
2009-03-10	3,86%	2,83%	2009-07-07	3,68%	1,96%
2009-03-17	4,11%	0,98%	2009-07-14	3,60%	1,50%
2009-03-24	3,55%	2,81%	2009-07-21	4,58%	2,02%
2009-03-31	2,99%	2,01%	2009-07-28	4,47%	1,98%
2009-04-08	3,86%	1,75%	2009-08-04	4,32%	1,30%
2009-04-21	2,99%	2,50%	2009-08-11	4,42%	1,25%
2009-04-28	3,60%	2,08%	2009-08-18	4,10%	2,20%
	<b>3,64%</b>	<b>2,09%</b>	2009-08-25	4,02%	2,06%
			2009-09-01	4,14%	2,66%
			2009-09-08	4,30%	2,78%
			2009-09-15	4,02%	1,10%
			2009-09-22	4,01%	0,84%
			2009-09-29	4,22%	4,83%
			2009-10-06	3,76%	1,82%
			2009-10-20	4,22%	1,19%
			2009-10-27	4,11%	1,73%
			2009-11-03	4,14%	2,39%
			2009-11-10	3,81%	1,64%
			2009-11-17	4,16%	1,21%
			2009-11-24	4,09%	1,93%
			2009-12-01	4,55%	3,00%
			2009-12-08	3,86%	2,24%
			2009-12-15	4,02%	1,54%
				<b>4,16%</b>	<b>1,92%</b>

# LABORATORY ANALYSES

Laboratory analysis of the flow of sludge from the Thickener to the Digester (red line) year 2009-2012 at Mälarenergi, Kungsängsverket, Västerås, Sweden



Translation of text in diagram:

Till Centrifug = To Centrifuge.

(Comment: The sludge flow from the digester to the centrifuge)

Till RK (Rötkammare) = To the Digester

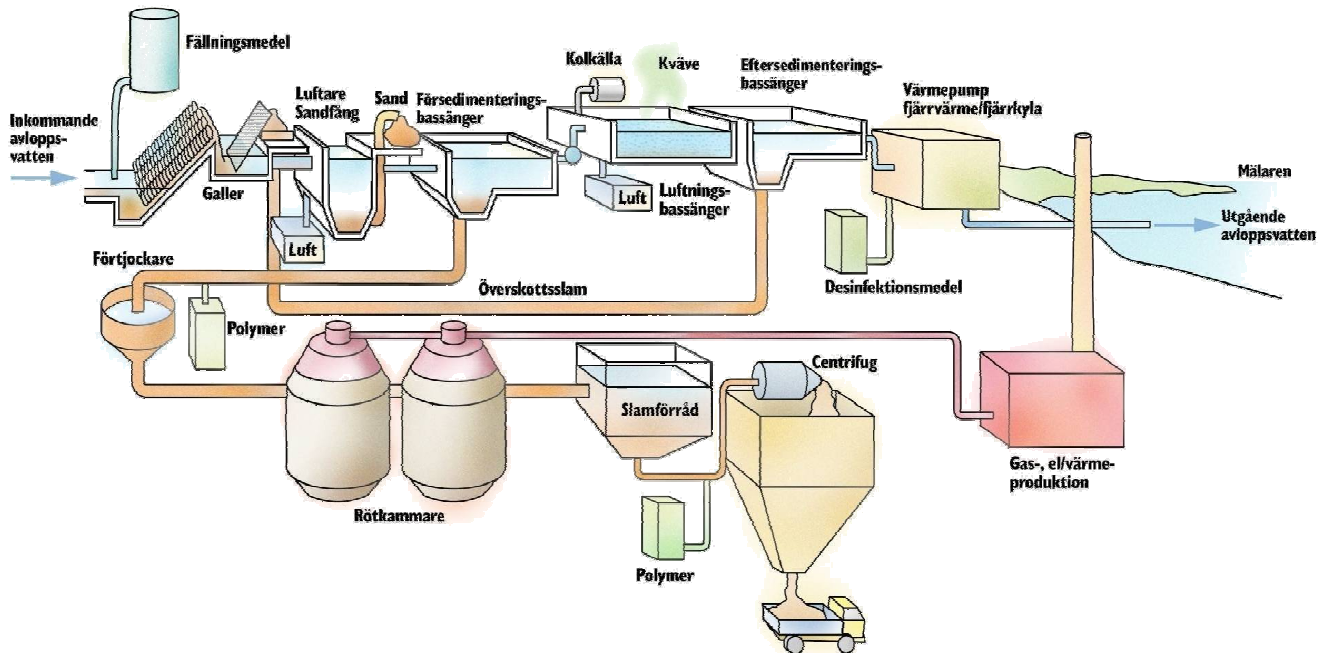
(Comment: The sludge flow from the thickener to the digester)

The flow has been reduced from 142 000 m<sup>3</sup>/year (2009) to 132000 m<sup>3</sup>/year (2012)

The data from year 2010 has been simulated as Mälarenergi experienced computer failure.

# PROCESS OVERVIEW

MÄLARENERGI, KUNGSÄNGSVERKET, VÄSTERÅS, SWEDEN  
125000 PERSON EQUIVALENTS = 25000MG/D = 8MGD



## Translation

*Swedish to English*

Inkommande avloppsvatten = Incoming waste water

Fällningsmedel = Precipitation chemicals

Galler = Bar screens

Luft = Air

Luftare Sandfång = Blower Grit chamber

Sand = Sand

Försedimenteringsbassänger = Primary clarifiers

Kolkälla = Carbon source

Luftningsbassänger = Activated Sludge Basins

Kväve = Nitrogen

Eftersedimenteringsbassänger = Secondary clarifiers

Värmepump, fjärrvärme/kyla = Heating Pump, District heating/cooling

Utgående avloppsvatten = Final Effluent

Desinfektionsmedel = Disinfection chemicals

Polymer = Polymers

Förtjockare = Thickener

Rötkammare = Digester

Slamförråd = Sludge storage

Centrifug= Centrifuge

Gas/El/Värmeproduktion = Gas/Electricity/Heating Production

Mälaren = lake Mälaren (recipient)



# PERMISSION FROM MÄLARENERGI AB

The laboratory data and diagram has been provided by Mr. Håkan Forsberg at Mälarenergi, Västerås, Sweden to Cerlic Controls AB, Kungens Kurva, Sweden. Cerlic has been given permission to use and present these data at W-E-X Global Awards for Innovation 2013.

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