



DDI-HeatExchangers Inc.

www.ddi-heatexchangers.com

DDI Since 1980

514-696-7961

erwin@ddi-heatexchangers.com

Novel RECTANGULAR Heat Exchanger Technology

As **Water-to-Sludge**, much less maintenance

As **Direct-Sludge-to-Sludge** Heat Recovery
ROI of only a few month

As HX in **WWTP, Molasses, Farms, Industrial**

As new projects for **Consulting Engineers**
with their current or new Customers

CITY Sewage Heat Recovery

ENERGY RECOVERY

by Heating in the Winter
and Cooling in the Summer

Application in

**ANY commercial & Industrial
BUILDING**

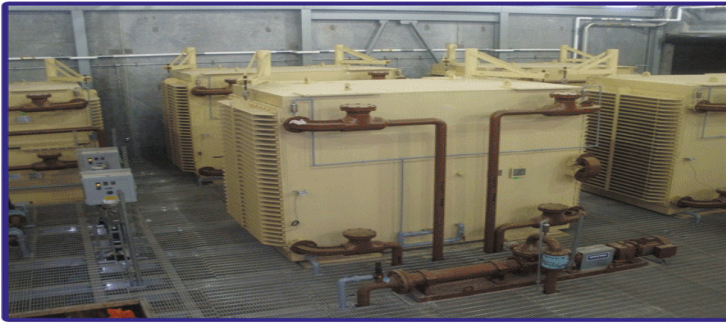
**Hospitals, Shopping Center, Ware Houses
etc.**

Building's Grey Water Heat Recovery

RECOVERING HEAT from the Hot liquids
leaving the apartments at 15-20 deg C.

to... PREHEAT the

Cold Water entering the Building
before the Boiler, at about 4-10 deg C.



DDI HEAT & HEAT RECOVERY **“RECTANGULAR, SQUARE, CUBE”™**

NON PLUG EXCHANGERS

A Reliable, Efficient, Economic and Environmental Solution to **SAVE** Heat & Energy in diverse applications.

APPLICATIONS

SOLID WASTE REDUCTION:

Anaerobic Digestion, Methane Recovery and Bio Solids Pelletizing.

PREHEATING OF DOMESTIC OR INDUSTRIAL RAW SLUDGES:

Extracting heat from: Recirculated hot water or digested sludges (i.e. heat recovery), centrate digested sludge temperature augmentation reduction prior to dewatering or supernatant containing solids or cooling of digested sludge. Heating to produce Class A biosolids (Thermophilic)

PROCESSING LIQUIFIED PRODUCTS CONTAINING SOLIDS:

In fermentation, mining, agriculture, breweries, distilleries, pulp & paper, metallurgical and oil industries.

KEY FEATURES AND ADVANTAGES

NON PLUG DESIGN: RECTANGULAR CHANNELS

Minimizes maintenance with large -Non Plug gaps (3" minimum). Large cross inlets to allow for passage of stringy, fibrous and viscous solids & debris.

EASY MAINTENANCE:

Access to all internal Passes/Layers via two opposite positioned fully gasketed doors. Flushing connections provided. Recommended maintenance only once every 5 years for most municipal applications.

COMPACT SIZE:

Small foot print with very large heat transfer surface.

LOW CAPITAL COST INVESTMENT:

Relatively short payback from recuperated energy, about 1 year on average.

IMPROVED HEAT TRANSFER EFFICIENCY:

Low fouling due to high turbulence in specially designed return bends and channels. Natural mixing.

UNIT DIMENSIONING:

Using proprietary software.

MANUFACTURING:

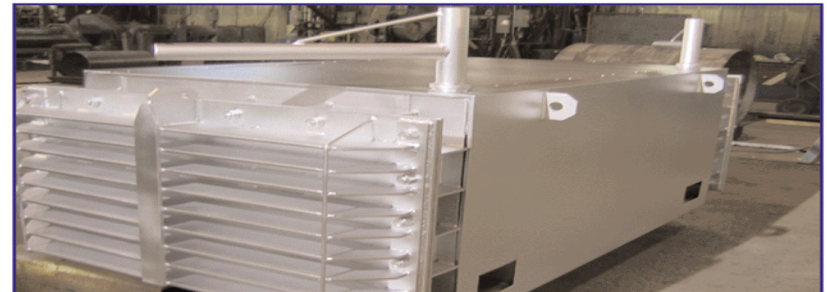
Standard and custom models available. Designed, fabricated, tested and stamped in accordance with ASME. Units fully tested.

MAJOR MATERIALS OF CONSTRUCTION:

Wetted components-SA 516-GR-70 or 304L or 316L or any weldable metal.

Access doors, gussets- ASTM A-570

Structural members- G40.21-44W



305 Baffin, D.D.O. (Montreal), PQ, CANADA H9A 3G4

TEL: (514) 696-7961 FAX: (514) 696-8344

Web: www.ddi-heatexchangers.com • E-Mail: info@ddi-heatexchangers.com

PATENTED

DDI HEAT EXCHANGERS

HIGH RATE ANAEROBIC DIGESTION HEAT RECOVERY FROM DIGESTED SLUDGE SLUDGE AND HOT WATER SYSTEM CIRCUITS

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HOT WATER
SUPPLY &
RETURN
LINES FROM
BOILER

ONLY 50%
OF NEW
ENERGY
REQUIRED

DDI CUBE
WATER TO
SLUDGE HEAT
EXCHANGER

BIOGAS WITHDRAWAL

COMPRESSED BIOGAS
TO MIXERS

PRE-
HEATED
RAW
SLUDGE

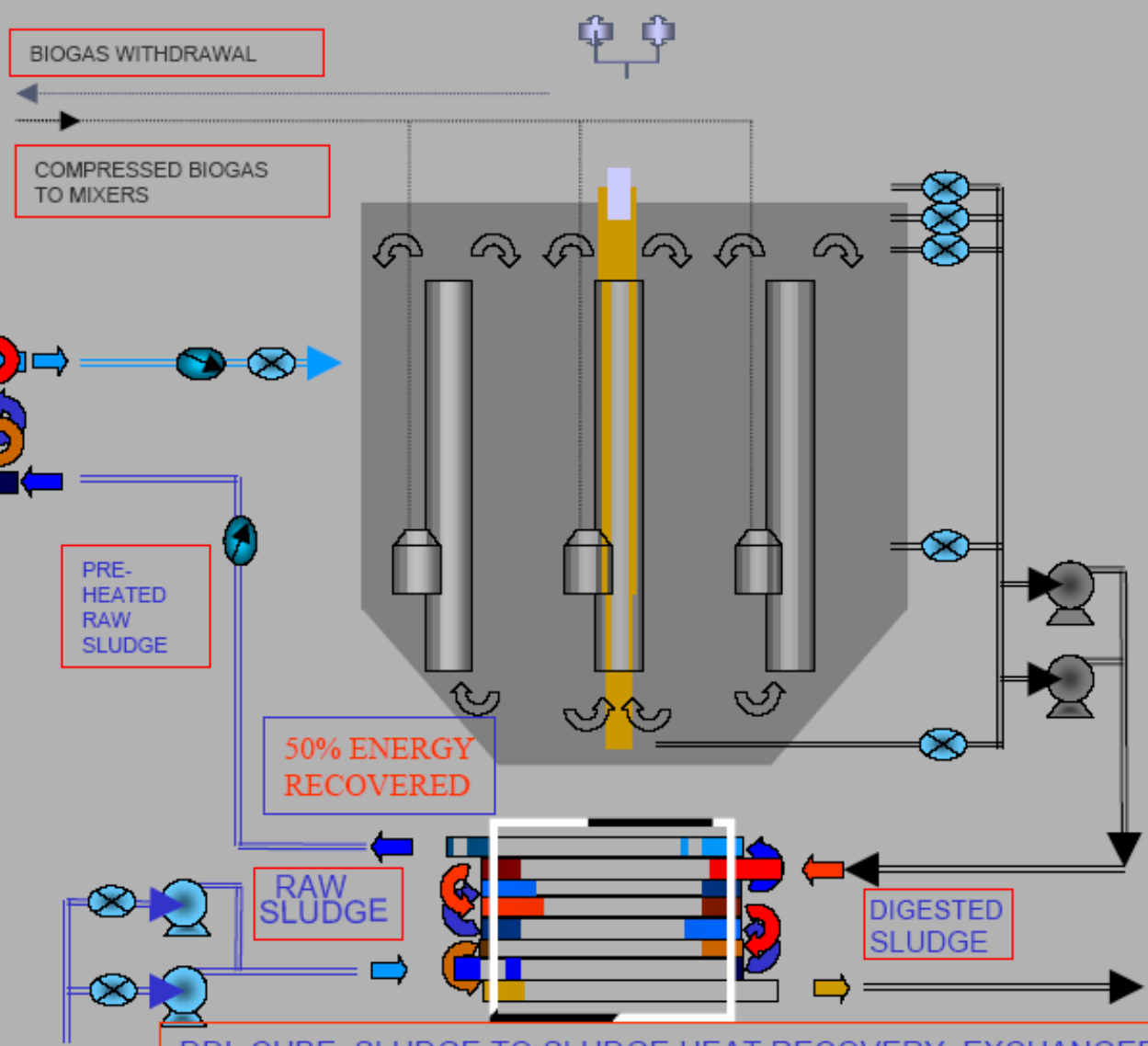
50% ENERGY
RECOVERED

RAW
SLUDGE

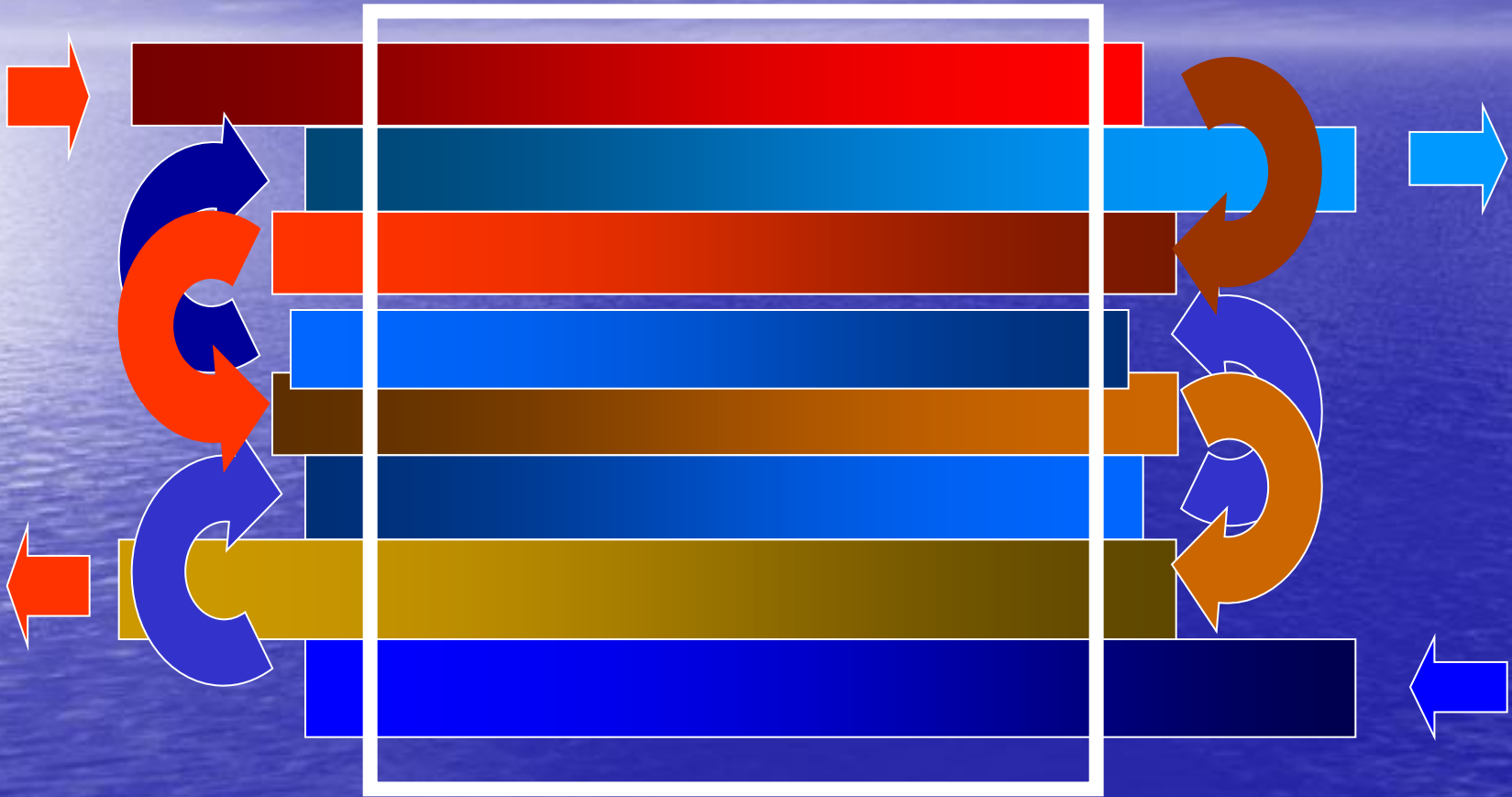
DIGESTED
SLUDGE

DDI CUBE SLUDGE TO SLUDGE HEAT RECOVERY EXCHANGER

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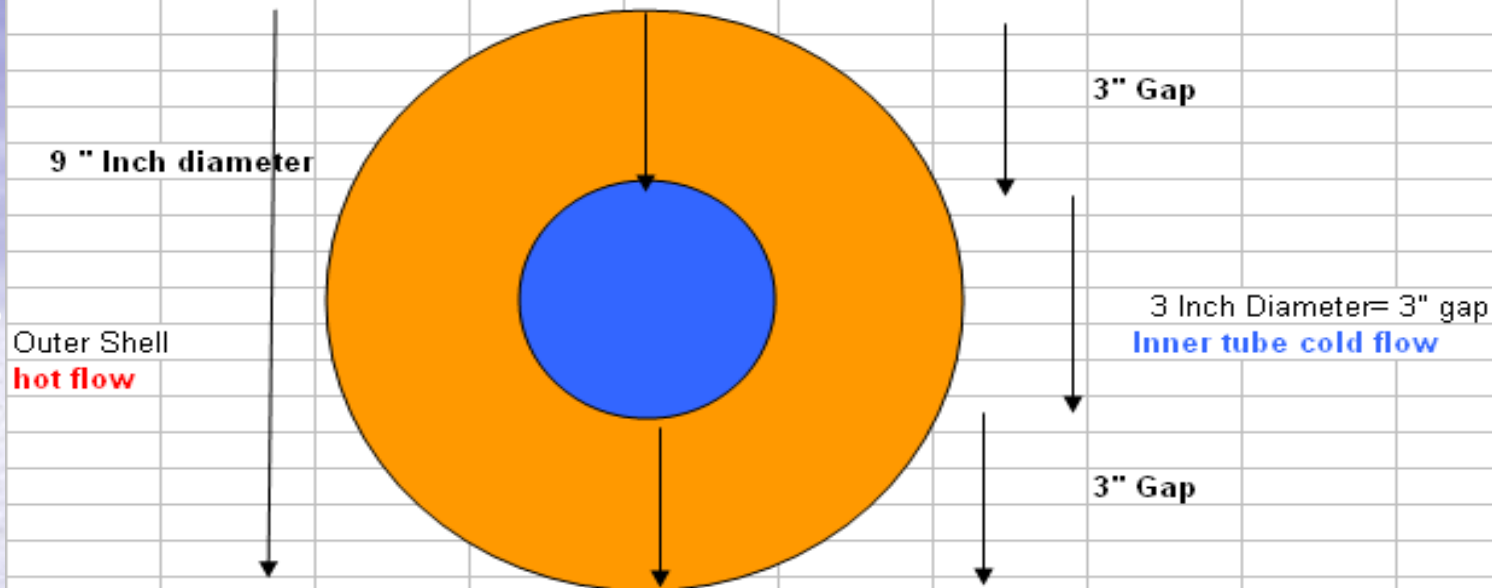


DDI HX-RECTANGULAR Channels



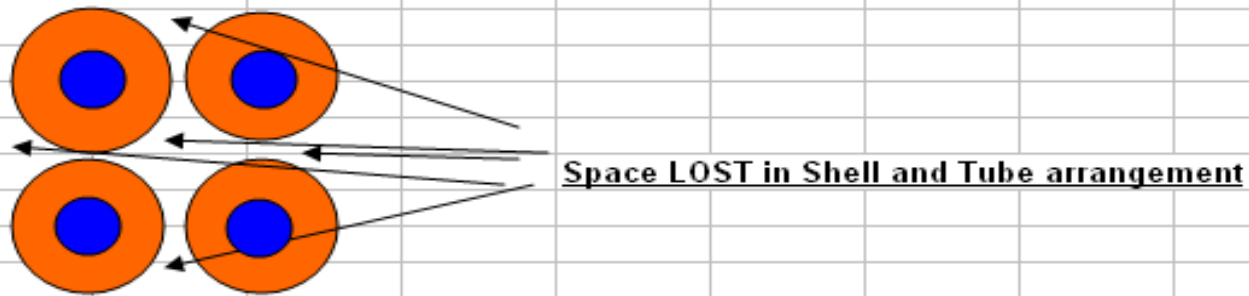
Shell in Tube NON-efficiencies

In Shell and Tube (side view) If would have 3" Gap for both flows



Above requires HUGE external Diameter to have 3" Gap. So flow in outer tube will be TOO SLOW
If try to achieve SAME flow in Outer and Inner tubes while maintaining 3" gap- it is NOT possible

Shell in Tube NON-efficiencies



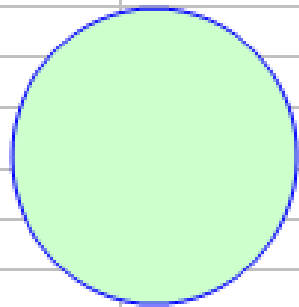
A lot of SPACE WASTED when tube in tube is stacked .
There for The Shell in Tube Heat Exchanger is MUCH much larger then the " Cube" " Square" Heat exchanger

DDI "CUBE" or "SQUARE" Wide Gap Heat Exchangers, Compared to Tube Technology

For the SAME FLOW and the SAME CROSS SECTION AREA,

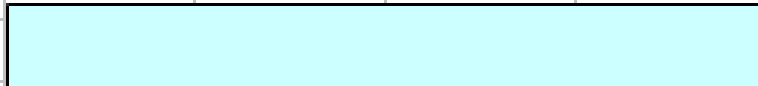
The outside WETTED Circumference is much MORE in the DDI Heat Exchanger.

This creates a better HEAT TRANSFER Coefficient.



Tube

3" ↑

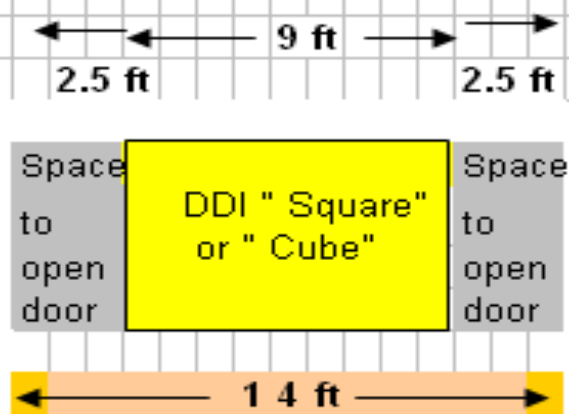


"Cube" or "Square"

DDI "Cube" or "Square" Heat Exchanger, still maintenance the required 3" GAP for NON PLUG DESIGN

Size (floor space) Comparison of DDI -to Tube in Tube -or- Tube in Shell

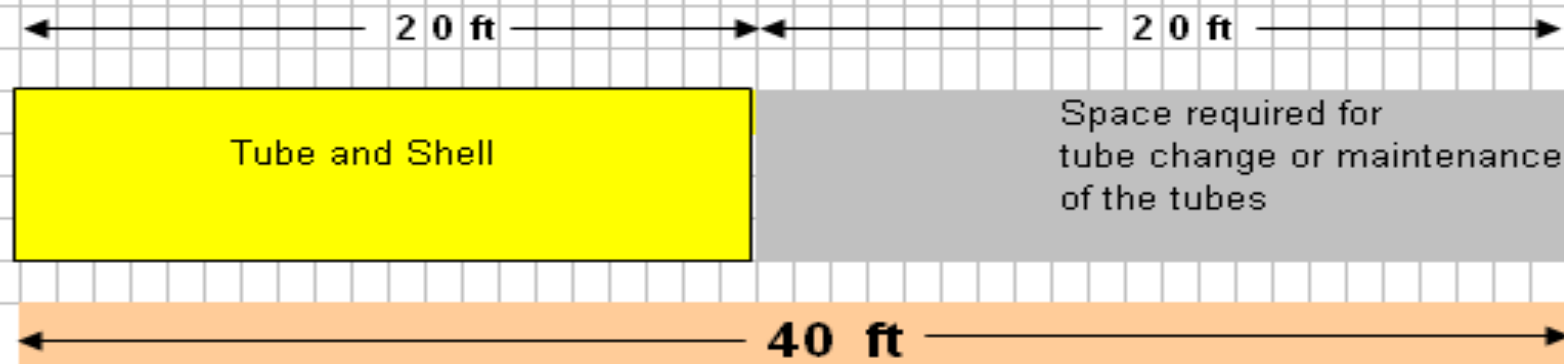
DDI



DDI = 14 ft total = 9 ft length + 2.5 ft x 2 free space for opening doors. If so required

**** If water is on one side, then, there may be no need for door in that side, i.e. total 12 ft only**

Tube in Shell (or Tube in Tube)

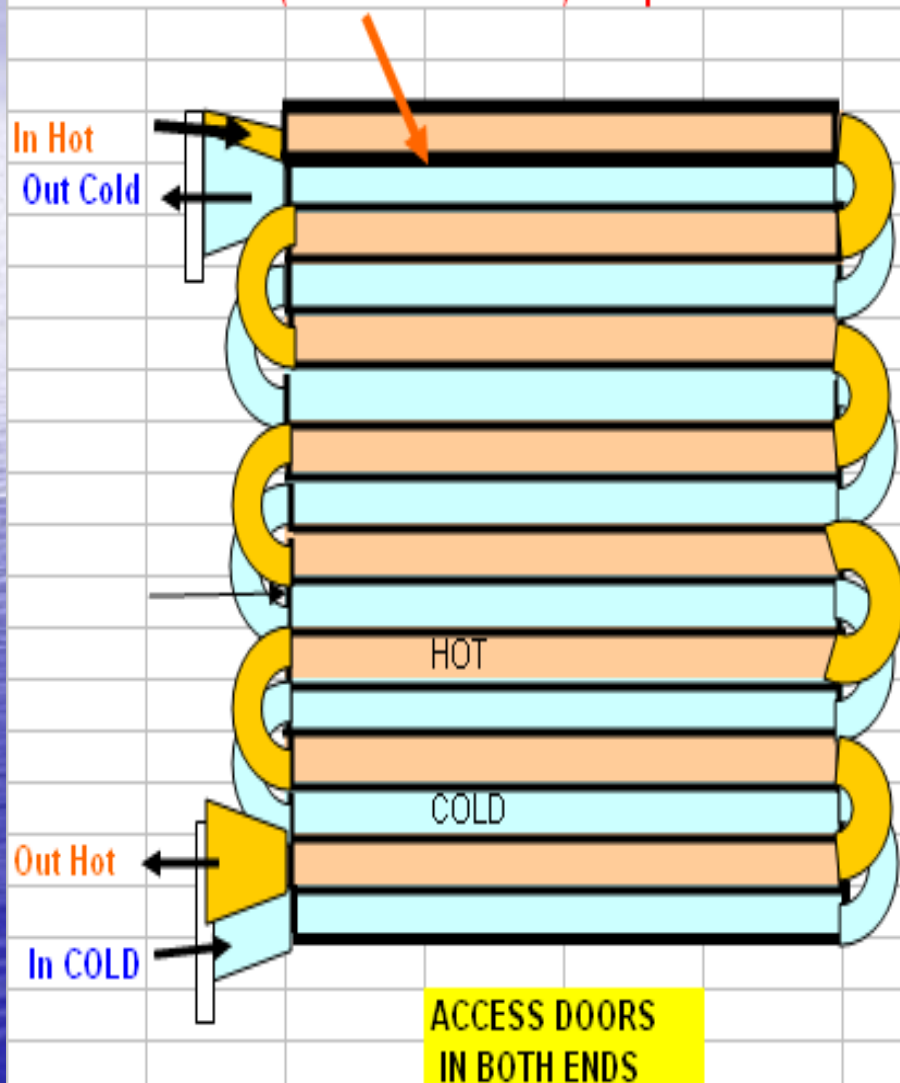


Tube in Tube = 40 ft, free space required for heat exchanger and maintenance

DDI Advantages

DDI HEAT EXCHANGER "CUBE" OR "SQUARE"

Heat Transfer area (between the 2 flows) Compact and efficient



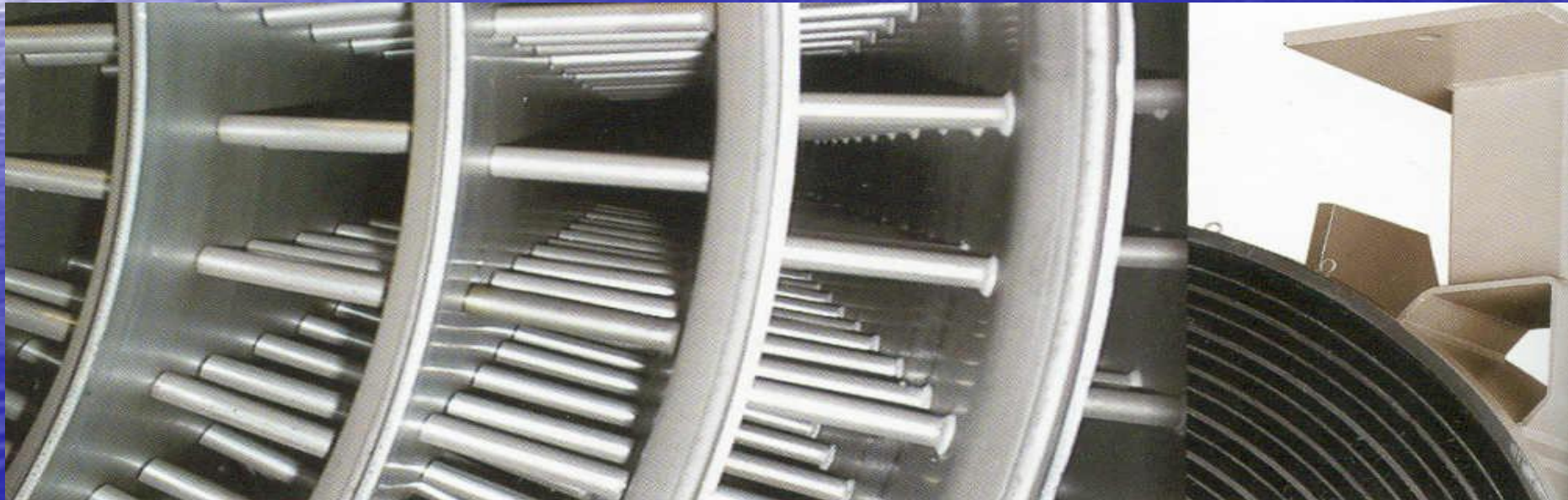
Advantages Of DDI "Cube", "Square" Non-Block Heat Exchanger and Heat RECOVERY Systems.

- 1) Larger Circumference compared to Tube in Shell (round).
For the same flow area, *LARGER Heat Transfer Surface*.
- 2) *Smaller foot print* then Tube. Less area required (about 1/3).
- 3) *More Turbulence* flow then in Tube or Spiral.
i.e. better Heat Transfer in zigzag channels.
- 4) *Non-Block design*, no spacers (obstacles) as in Spiral type.
- 5) *Gaps of 3 " Inches Min, no Sludge blockage*.
- 6) *No need for expensive Macerator & Blades* to grind Sludge.
- 7) Both sides have doors, with *full access to internals*.
- 8) Designed for *Optimum Height (Non Plug)* for each liquid,
And *Optimum Width* (for best flow speed, to *avoid BAKING*).
- 9) Quotes with Viscosity=1CPS as others, and with Computerized, assumed, more *realistic Viscosities*.
- 10) *VERY LOW MAINTANCE* (once in a few years).
(Some competition requires back flush every shift..!)
- 11) Can be used in *Municipal or Agriculture or Pulp & Paper*.
- 12) Can be manufactured from *different metals or alloys*.
- 13) *Modular system*, Can be used for *Water-to-Sludge or Sludge-to-Sludge Heat Recovery*.
- 14) *HEAT RECOVERY*, can have a Payback within a year.
- 15) Tested, in Use for 9 years, with *NO need to open doors*.

SPIRAL technology gets PLUGGED

Max. gap 1"-1.5" for sludge side,
and pins on other liquid side
(no % solids there).

-1"-



TUBE –in-Tube Technology

can't have same flow
for both liquids *with 3"*
gap in each,
at the same time.

Davit Arm – swings door in a limited space



DOOR OPENING VIDEO-ddi_Cooler.avi

Subject: Cogeneration

An independent article from WaterWorld (April 2003).

A) For Cogeneration - They will spend 245,000 \$ to save 30,000 \$ per year.

Compared to *DDI "Cube" or "Square" Heat Exchanger* that will cost (for example) 97,900\$ (with installation) and will save about 366,000 \$ PER YEAR as Sludge to Sludge Heat Recovery system.

B) DDI Heat Exchanger will probably have less maintenance cost then the Micro-Turbines in the Cogeneration solution.

C) Market has over 3,300 Anaerobic Digestion Waste Water Treatment Facilities, (Maybe x 3 Heat Exchangers). So many, many WWTF can use Heat Recovery.

D) DDI estimated cost per 1 million B TUH at Minimum 7 \$ only. (Now it is much higher). See "Energy Saved by using Heat-Recovery" program on the web

This study claims cost at 24.3 \$ per 1 million B TUH

(1 KWH = 3415 B TUH

292.8 KWH = 1 million B TUH

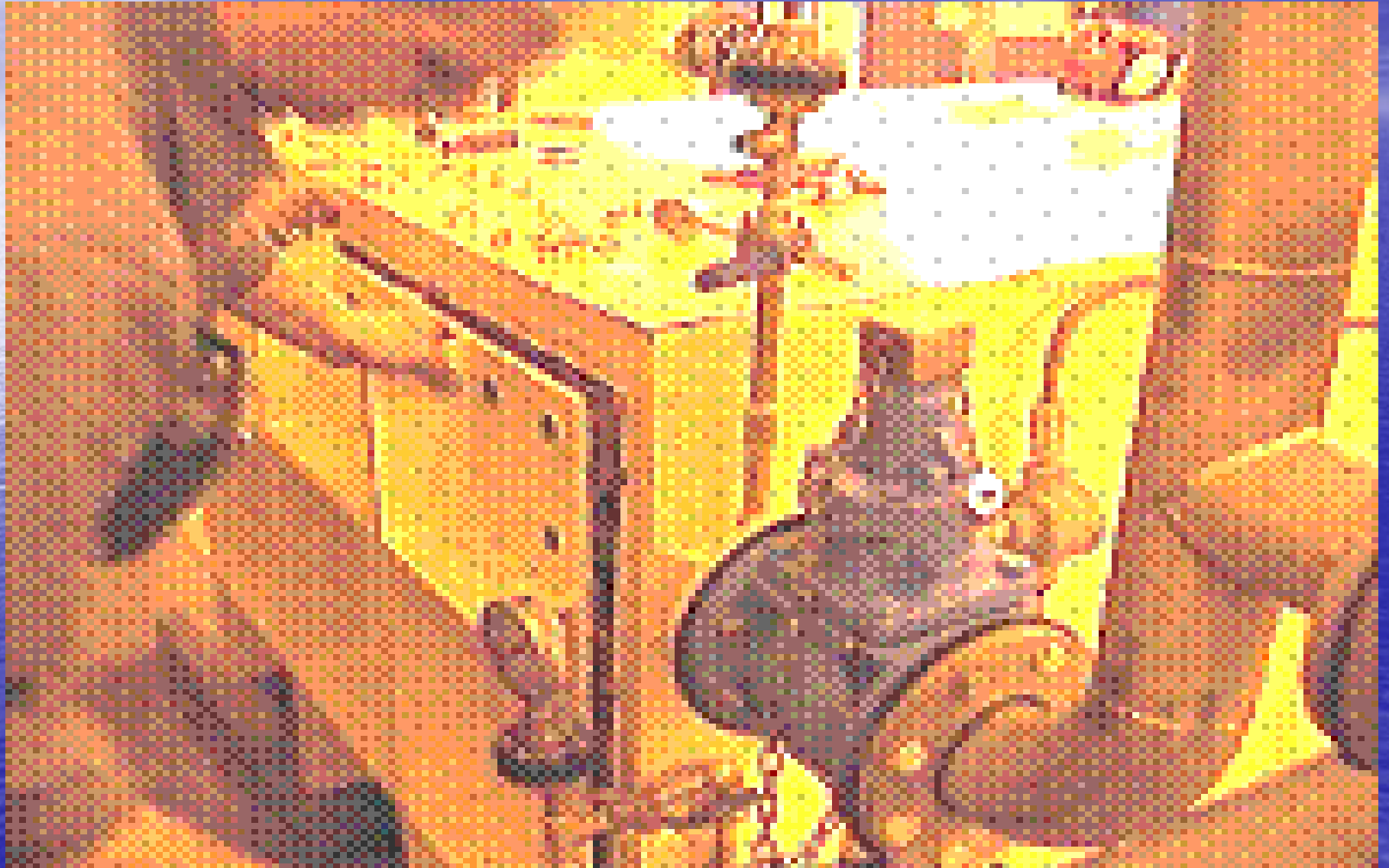
Cost per KWH $2.46 + 6.37 = 8.83$ cents

$292.8 \times 0.083 \$ / \text{KWH} = \text{cost per 1 million B TUH} = 24.3 \$ = \text{cost for 1,000,000 B TUH}$

E) Cogeneration will generate ONLY 41 % of Annual Energy demand in the plant.

But with DDI Heat Recovery System installed they can achieve much more.

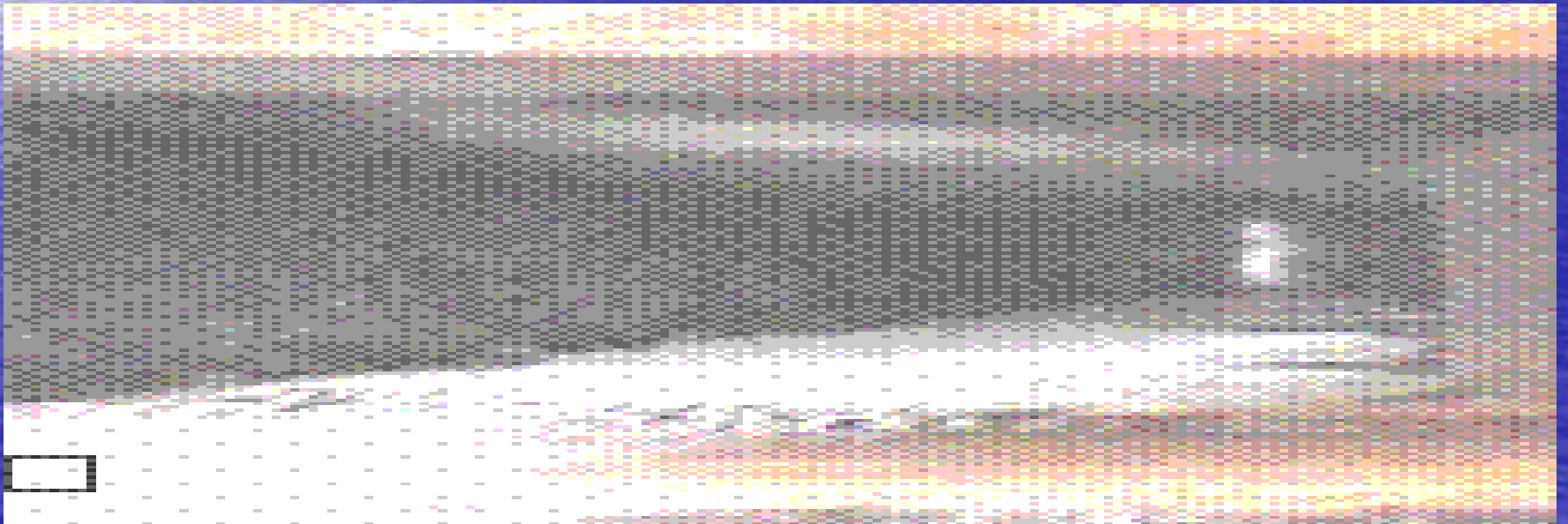
Doors opened after 8.5 years



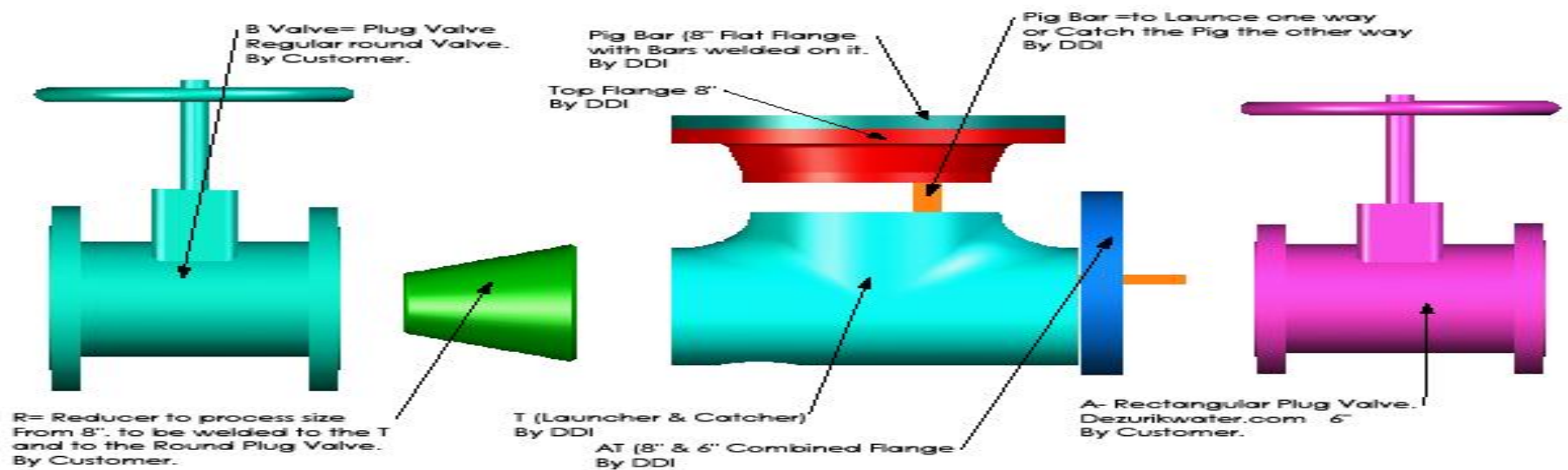
The Gaskets after 8.5 Years



Inside – Clean and without damage after 8.5 years



Pig Cleaning - Rectangular



COMPARISON: **DDI "RECTANGULAR, SQUARE, CUBE"™**

DESCRIPTION	DDI	Spiral or Tube in Shell or Tube in Tube
INITIAL COST 1,250,000 BTUH:	EQUAL	EQUAL
APPLICATION:	Sludge to Sludge and/ or Water to Sludge	Water to Sludge mainly
SLUDGE SIDE GAP:	3" to 6" channel or more	0.75" to 1" channel with studs or annulus 4" in 6" tube has 1" gap only
WATER SIDE GAP:	1" to 6" channel	0.5" to 1" channel or annulus
INSTALLATION COSTS:	EQUAL	EQUAL
MAINTENANCE COSTS:	—	—
<i>Frequency of cleaning due to plugging with rugs etc.</i>	Scheduled once in 5 years	As often as every two weeks (26/year)
<i>Cost per clean-up 16 Man/hour at \$40/hr</i>	\$640	\$640
<i>Annual cost of clean-up</i>	\$128	\$16,640 or more
<i>TOTAL Cost of clean-up pro rated 20 yrs.</i>	\$2,560	\$332,800
GASKETS:	\$8,000	\$8,000
MACERATOR:	Not required	\$15,000
<i>Initial installation</i>	Not required	\$8,000
<i>Installation (piping, valves)</i>	Not required	\$20,000/20 years
<i>Replacement Parts (blades etc)</i>	Not required	\$73,320/20 years
<i>Electric power 10 hp</i>	Not required	\$4,000/20 years
TOTAL MAINTENANCE: FOR 20 YEARS CYCLE	\$10,560	\$461,120
NET SAVING OF: OVER 20 YEARS	\$450,560	

NOTES:

- DDI's Heat Exchangers are generally less costly to purchase due to **direct** efficient Heat Recovery
- DDI's Heat Exchangers are built with **large gaps** (Non Plug feature).
- DDI's Heat Exchanger Design has **No obstacles in the flow.**
- DDI's Heat Exchanger can pass more hot water for increased heating capacity and efficiency at a lower operating pressure with **round curves.**
- DDI's Heat Exchanger requires minimal maintenance.
- DDI's Heat Exchanger are less costly to operate and stand-by can be used for Heat Recovery
- DDI's Heat Exchanger can achieve efficient flow in both sides for Heat Recovery of Sludge-to-Sludge and DDI can still keep minimum Gap for non-plug conditions (where as Tube in Shell cannot).

The heat exchangers in our new pasteurization complex (the **sludge-to-sludge heat recovery, the hot water-to-preheated sludge, and the cold water-to-sludge**) have been working great. We have not had any problems or concerns with the heat exchangers, and I would recommend these units. Shawn Glen - Northslope Superintendent City of Tulsa, Water Pollution Control



REPRESENTATIVE (DDI Has 38 Representatives)

305 Baffin, D.D.O., (Montreal), PQ, CANADA H9A 3G4

TEL: (514) 696-7961 FAX: (514) 696-8344

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PATENTED

DDI Rectangular Channels, Direct-Sludge-to-Sludge Heat-Recovery.

Compared to:

INDIRECT , Sludge-to-Water then Water-to-Water then Water-to-Sludge Heating, in Tubes.

DDI requires Smaller space.

DDI has Better heat transfer (direct sludge to sludge heat recovery) (DDI losses of 10 %, compared to 10 % x each HX and 5% water circulation= 25 % total).

DDI Need one HX, not 2.

DDI does not need an EXTRA pump for water.

DDI can use Carbon Steel 516-70- which is less expensive and better heat transfer coefficient, 2.5 times higher, and it is better metal against Erosion and Abrasion than Stainless steel..

DDI Using Minimum 0.25" Thick Layers against Erosion, while competition is using less than 1/8" pipes.

DDI has side outside bends that create more turbulence for better RE numbers and better heat transfer.

DDI Can have larger flows i.e. channels minimum 3" x 6", or larger as much as needed.

DDI does not have the risk of contaminating the Water of the plant.

DDI quotes Temp gain in 1 fluid, compared the temp loss of the other fluid, and pressure losses, are more realistic data.

DDI has the optional pig cleaning system.

DDI has Doors with Davit Arms for both liquids is needed

DDI has no or less plugging since the DDI channels have no obstructions in the flow.

DDI- Heat Exchangers Inc

DDI (since 1980)

Tel: 514-696-7961 Fax: 514-696-8344

Email: erwin@ddi.ca WebPage: www.ddi-heatexchangers.com

DDI "RECTANGULAR, SQUARE, CUBE" TM
Don't Waste the Waste, Use DDI HEAT RECOVERY.

**ROI - Payback is
possible in 1 year.**

For

**Direct-Sludge-to-Sludge
HEAT RECOVERY**



Energy Saved by using Heat-Recovery

Simply fill in the requested information in the text-boxes and press the calculate button. All energy savings are in US Dollars.

Size of Exchanger: (BTU/hour)

Rate of Energy: (\$/1,000,000 BTU)

Boiler efficiency (%):

Number of hours running per day:

Number of days used per year:

Cost Savings:

For One Year: \$356,224.00

For 5 Years: \$1,781,120.00

For 10 Years: \$3,562,240.00

For 15 Years: \$5,343,360.00

Results

Cost of Exchanger:

Comments:

Full Spec must be provided

very detailed- to protect the Consulting Engineer

HEAT EXCHANGER APPLICATION		DDI Heat Exchangers Inc	
Project name:		CONFIDENTIAL	
DATE			
Tel = 514.696-7961			
	Rease Note= Cold		
	GIVEN =Color		
	Result= Color		
	REMARKS		
DUCT HIGH Cold	in	3.0	3.0
DUCT WIDTH Cold	in	6.0	6.0
Channels Gap (Cold) dimention in Metric	cm	7.6	7.6
DUCT HIGH Hot	in	3.0	3.0
DUCT WIDTH Hot	in	6.0	6.0
Channels width Hot dimention in Metric	cm	15.2	15.2
LINEAR VELOCITY (hot))	fps	3.0	3.0
FLOW (hot)	usgpm	168	168
FLOW (hot)	L/S	10.6	10.6
LINEAR VELOCITY (cold)	fps	3.0	3.0
FLOW (cold)	usgpm	168.3	168.3
FLOW (cold)	L/S	10.6	10.6
SHEAR RATE HOT	/sec	72	72
SHEAR RATE Cold	/sec	72	72
VISCOSITY (hot)	cps	4	0.5
VISCOSITY (cold)	cps	40	1
% of solids (Cold)	%	2.5	2.5
DENSITY (Cold))	lbs/cu.ft.	62.4	62.4
% of solids (HOT)	%	0.0	0.0
DENSITY (Hot)	lbs/cu.ft.	61.2	61.2
HEAT CAPACITY (Cold)	BTU/lbs F	0.999	0.999
FLUID THER. CONDUCT (Cold)	BTU/hr ft F	0.36	0.36
FLUID THER. CONDUCT (Hot)	BTU/hr ft F	0.38	0.38
WALL THICKNESS (Bends are 0.5" thick)	in	0.375	0.250
WALL THERMAL COND.	BTU/hr ft F	24	24
LOC. O/A HEAT TRANSF. COEFF.	BTU/hr F sq.ft.	137	193
LOC. O/A HEAT TRANSF. COEFF. B- (WITH FOULING)B	BTU/hr F sq.ft.	121	161
Heat Duty input BTUH	(BTU/HR)	1,400,000	1,400,000
Heat Duty input KW	KW	410	410
Hi Temp Media IN (hot)	(deg.C)	68.3	68.3
Hi Temp Media IN (INPUT) (Hot)	(deg.F)	155	155
Mass rate of Hi T. media (Hot)	lb / hr	82620	82620
Heat Cap.of media (Hot)	(BTU/(lbs)(deg F)	1.0	1.0
Hi Temp Media out (Hot)	(deg.F)	138	138
Hot out put in Deg.C (Hot)	(deg.C)	58.9	58.9
LO Temp Media IN (Cold)	(deg.C)	21.1	21.1
LO Temp Media IN (INPUT) (Cold)	(deg.F)	70.0	70.0
Mass rate of LO T. media (Cold)	lb / hr	84240	84240
LO Temp Media Out (Cold) (at 100%) estimated before losses	(deg.F)	86.6	86.6
LO Temp out (Cold) (at 100 %). Estimated before Losses	(deg.C)	30.4	30.4
Fouling Factor for Sludge	hr-sq.ft-F /Btu	0.001	0.001
Area required 100% eff	(sq.ft.)	150	107
Area required with fouling B	(sq.ft.)	170	127
AREA AVAILABLE	(sq.ft.)	168	168
AREA AVAILABLE	Meter Sq	16	16

LENGTH PER Heating LAYER	(ft)	8	8
CHANNELS PER LAYER	#	6	6
# OF Heating LAYERS USED		7	7
# OF Total Flowing LAYERS		8	8
Advantages Of DDI "Cube", "Square" Non-Block Heat Exchanger and Heat RECOVERY Systems:	Width Ft	4.9	4.5
1) Larger Circumference compared to Tube in Shell (round).	Width in Meter	1.5	1.4
For the same flow area, LARGER Heat Transfer Surface.	Recommended Ft Clearance Door swing side	2.2	2.0
2) Smaller foot print then Tube. Less area required (about 1/3).	Recommended Clearance Door swing sideMeters	0.7	0.6
3) More Turbulence flow then in Tube or Spiral.	Length Ft WITH DOORS	9.5	9.0
i.e. better Heat Transfer in zigzag channels.	Length in Meter WITH DOORS	2.9	2.7
4) Non-Block design, no spacers (obstacles) as in Spiral type.	Recommended Ft Clearance each side	2.1	5.5
5) Gaps of 2, 3, 4 Inches Min, no Sludge blockage.	Recommended Clearance each side Meters	0.6	1.7
6) No need for expensive Macerator & Blades to grind Sludge.	Height Ft +40" required for removable	4.6	4.0
7) Both sides have doors, with full access to internals.	Height in Meter +1.1 m for D.Lifting lugs included	1.4	1.2
8) Designed for Optimum Height (Non Plug) for each liquid.	Recommended Clearance toFor davit arm removal	3.4	1.0
And Optimum Width (for best flow speed, to avoid BAKING).	Recommended Clearance toFor davit arm removal	1.0	0.3
9) Quotes with Viscosity=1CPS as others, & with Computerized assumed, more realistic Viscosities.	Material of heating Layers	516-70	516-70
10) VERY LOW MAINTANCE (once in a few years).	Gaskets Supplied for doors		
(Some competition requires back flush every shift..).	Weight Approx Empty	Lbs 18,651	18,651
11) Can be used in Municipal or Agriculture or Pulp & Paper.		KG 8,460	8,460
12) Can be manufactured from different metals or alloys.	Weight Approx Full	Lbs 23,973	23,099
13) Modular system, Can be used for Water-to-Sludge or Sludge-to-Sludge Heat Recovery.		KG 10,874	10,478
14) HEAT RECOVERY, can have Payback within a year.	ANSI 150 # flanged		ANSI 150 # flanged
15) Tested, in Use for 9 years, with NO need to open doors.	Cold side flg. connection	Inches IN 4	4
	Cold side flg. connection	Inches OUT 6	6
	Hot side flg. connection	Inches IN 4	4
	Hot side flg. connection	Inches OUT 6	6
	Operating- Hot - m WC-Estimated only	4	3
	Operating- Hot -PSI-Estimated	5	4
	Operating Pressure KPA- Hot side	34	32
	Operating -Cold Sludge-PSI	7	5
	Operating Pressure KPA- Cold	45	35
	Operating Pressure m WC- Cold side	5	4
	Max TEST & Pump Pressure PSI	95	50
	Max TEST & Pump Pressure KPA	655	345
	Max TEST & Pump Pressure m WC	67	35
	Notes	ASME spec	Static head & losses in external pipings are not included
	Static head & losses in external pipings are not included, Hydrostatic test pressure is pressure rated x 1.3 as per ASME Code		
	Performance conditional to the Customers ability to supply equipment and fluids as the data specified here		
	Warranty= Limited 1 (one) year from start up or 15 month from delivery. First to occur.		
	Delivery time=		
	Not Included: Taxes, Unloading at customer, Piping, Installation, Pressure & Temp gages & Flow measurements, nor PRV (Pressure Relief Valves).		
	Due to recent and possible future price fluctuations, as well as material availability, prices and delivery time must be verified at time of order placement.		
P/N			DDI-3 x 6 x 8 x 3 x 6 x 7 x 0.25M-50
P/N			DDI-3 x 6 x 8 x 3 x 6 x 7 x 0.375M-95
Quote USD / Each			
Shipping Estimate			
Engineering / Specials			

Viscosity Influence on required area

Influence of Viscosity on Heat available, ignoring Viscosity results in the HX to have too small of a heat transfer area

	Water side Theoretical	Digested Sludge side TEMP Out is less	Digested Sludge side Should have been for fully rated HX
KWH rated /asked for	750	750	750
BTUH	2,561,100	2,561,100	2,561,100
Temp in C	65.0	36.0	36.0
Temp In F	149.0	96.8	96.8
Temp out C	51.0	41.0	43.8
Temp out F	123.8	105.8	110.8
Flow in L/S	12.8	23.1	23.1
Flow in Usgpm	203.0	365.5	365.5
BTUH achieved	2,559,846	- 1,646,066	- 2,560,547
KWH ACHIEVED	750	- 482	- 750
	RATED HX size	When Commit to less temp Out, get less Heat Transfer	Temp out of sludge should have been higher
If Viscosity CPS =	1		4
Area required	X Sq Ft		X+35 % Sq Ft

By guaranteeing LESS TEMPERATURE OUT for the Digested Sludge, the manufacturer assumes about 35 % less efficiency and there for less by 35 % of Temp rise and he supplies heat transfer area too low by 35%

The end result for the plant is: that they get about 65% Heat Rated Heat Exchanger only??
It is based on the Water side, on the theoretical side only??
Not on the Sludge side, which is the real, required rating for the Heat Exchanger.

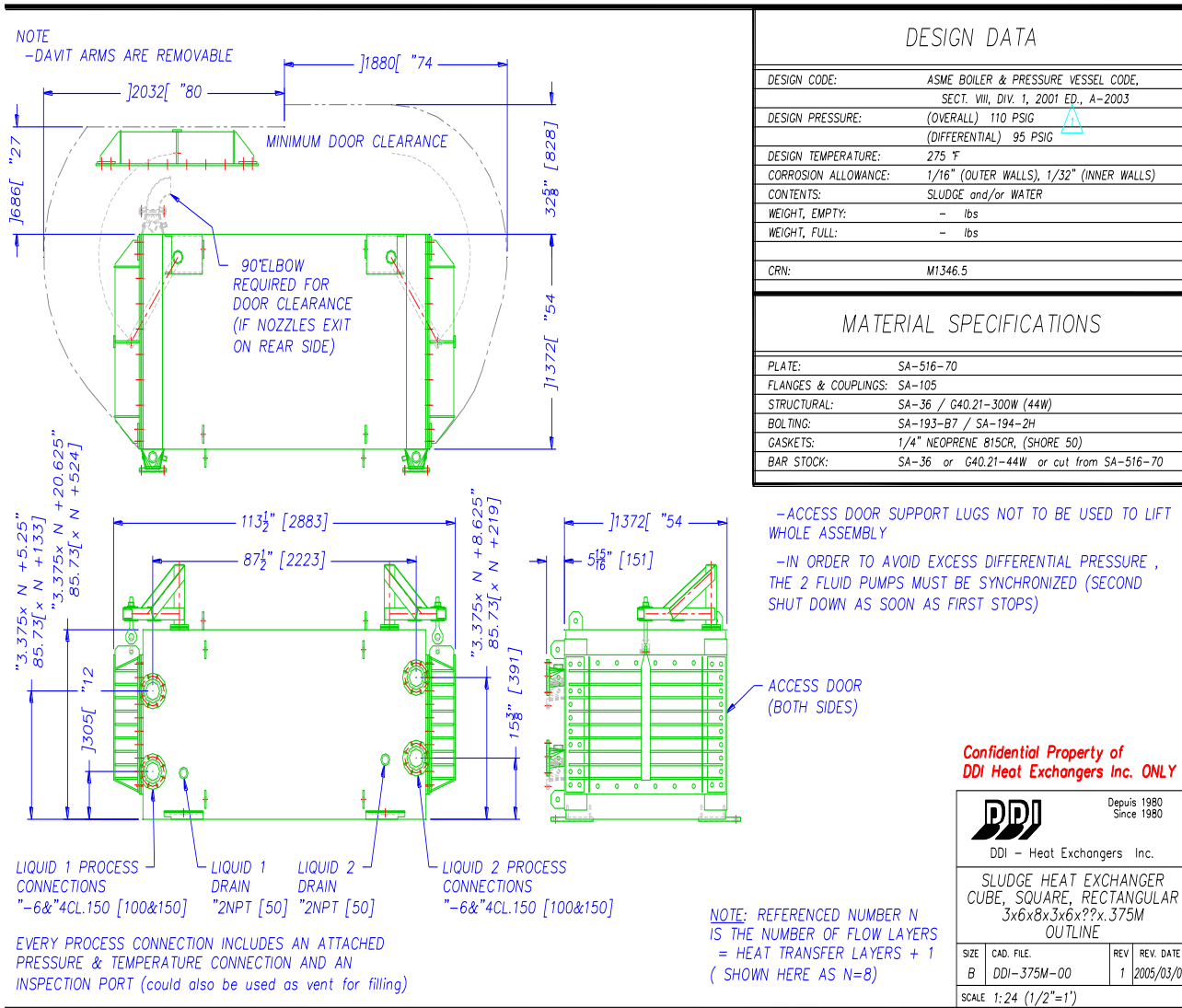
So the plant is forced to INCREASE Hot Water Temp (might cause baking), or Increase the flow of Hot Water (if it is available?).

But if the manufacturer is forced to assume Viscosity.... I.e. CPS = 4 for Digested Sludge
Then The manufacturer will need a LARGER Heat Exchanger.

Also the Sludge side, should give the required Heat Exchanger Rating (only if Viscosity is assumed).

This will assure that there is enough Area for keeping the Sludge TEMP in the digester and for the losses, as per the consultants heat balance calculations.

Drawing, Davit Arm for the door



Don't Waste the Waste, Use DDI Heat Recovery

DDI HX in our Pasteurization (sludge-to-sludge heat recovery, hot water-to-preheated sludge, cold water-to-sludge) working great, No problems or concerns. I would recommend these units. **Shawn Glen – Tulsa City**

We were able to pump 26% solids through the DDI Heat exchangers.
Jeff Glover - HDR Denver

Raw sludge against re-circulated sludge flows resulted in substantial savings. No plugging occurred. Works as per specification. I am very satisfied with the results.
Blaine McEwen - City of Pembroke

Raw molasses 70% solids running. We are very pleased with the effectiveness & heat transfer. **Doug Olson - Vitalix**



Heat Exchangers Inc. supports - [Doctors without borders org](http://Doctorswithoutborders.org)

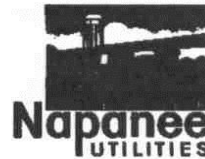
Water-to-Sludge in WWTP



06/14/2006 15:30 FAX 354 4983

GNWTP

02



45 Commercial Crt.
Napanee, Ontario
K7R 4A2

(613) 354-9338 (Office)
(613) 354-2836 (Fax)

June 14, 2006

Mr. Erwin Schwartz, B.Eng.
DDI Heat Exchangers
305 Baffin St.
Montreal, Quebec
H9A 3G4

Dear Erwin,

It has been approximately two years since Greater Napanee Utilities placed the order for a DDI model 3X6X8X3X6X7XM. The DDI exchanger was purchased to replace a unit used to provide continuous heat in a municipal sewage plant anaerobic digester.

It is our pleasure to inform you that we are pleased with the DDI unit and have experienced no maintenance issues whatsoever. Heating capacity has proven sufficient as the digester temperature was well maintained throughout the cold winter months. The relatively large channels of the DDI unit appear to be well suited to a municipal sludge application as no blockages have been encountered.

Given our satisfaction with the success with the new heat exchanger and with the service provided by DDI, Greater Napanee Utilities would definitely consider the purchase of a second unit from DDI should the need arise.

Yours truly,

Todd Harvey, M.Sc., C.E.T.
Manager of Operations



Sir John A's Napanee
A Great Place for Business

May 6, 2009

Mr. Erwin Schwartz
DDI Heat Exchangers Inc.
305 Baffin St.
Dollard-Des-Ormeaux (Montreal), P.Q.
Canada H9A3G4

Via Email: erwin@ddi.ca

Dear Mr. Schwartz,

**Product Review Committee Decision
A.03 0003.45**

Thank you for meeting with the Product Review Committee and providing further information on the DDI Heat Exchangers.

Please be advised that based on your submission and presentation, the committee has deemed the above named product *approved* for use and has added it to the Approved Product and Equipment List.

Should you have any questions, please feel free to contact me.

Sincerely,



Charles Rittner
Associate Director, W&WW Maintenance
charles.rittner@niagararegion.ca

J:\A.03 Corporate & Employee Committees\Product Review Committee\Correspondence\05 06 09 - SCHWARTZ - DDI Heat Exchangers.doc

Copy: PRC File

DDI HX and Boiler set

DDI in Pontiac with Boiler combined- (Cover removed)



Pembroke WWTP Direct Sludge-to-Sludge Heat RECOVERY

From: Blaine McEwen
Sent: July 6, 2010
To: 'erwin@ddi.ca'
Subject: Letter of Reference

The Pembroke Pollution Control Centre is using the DDI Heat Exchanger with very positive results. Raw sludge with an average temperature between 11* C to 19* C flows through one side of the heat exchanger and re-circulated sludge from the digesters with temperatures ranging in the high thirty's flows through the opposite side of the heat exchanger. **This has resulted in substantial savings** as the raw sludge is increased in temperature prior to entering the digesters at no expense to the City sewage system. **After almost five years of operation no plugging** has occurred and **it works as per specification.** I am very satisfied with the results of this piece of equipment.

Blaine McEwen / City of Pembroke
Utilities Supervisor
Office 613-735-6821 ext. 1481
Fax 613-732-7028

Already 7 years....

Pembroke- Direct Sludge-to-Sludge



Molasses

12 Sep 2007

- **Vitalix Inc. has been using the DDI heat exchanger almost a year now with very positive results. Raw molasses at 65% to 70% is running on one side and hot water on the other. We have had no problems with plugging or pressure build up. We are also very pleased with the effectiveness of this unit in heat transfer. Thank you for your help and support.**

**Plant Mgr. Doug Olson
308-762-8358**

Vitalix Inc. Alliance NE.

Molasses flows in DDI HX



Molasses with 65 %

Split Entry + Split Exit + OUTDOOR

Vitalix



21 December 2009

For three years now Vitalix Inc. has been using the DDI heat exchanger. We have never had to open it up or work on it in any way since it was installed. It has not been ANY trouble. I check it and smile at it every month or two but it shows no leaks, no pressure buildup or loss of efficiency. It was properly sized for our needs and has helped us to recycle a great deal of heat back into our mfg. process.

When expansion needs arise I won't be looking at any other heat exchanger but the DDI.

Thank you

Doug Olson

Plant Mgr.

Vitalix Inc.

Alliance NE USA

(308)762-8358, Ext 124

Pasteurization - 3 Types of HX

Subject : RE: Reference

Date : Wed, 20 Jan 2010 10:29:00 -0500

From : "Glen, Shawn" <SGLEN@cityoftulsa.org>

To : 'erwin@ddi.ca' <erwin@ddi.ca>

Cc : "Krueger, Thomas" <TKRUEGER@cityoftulsa.org>

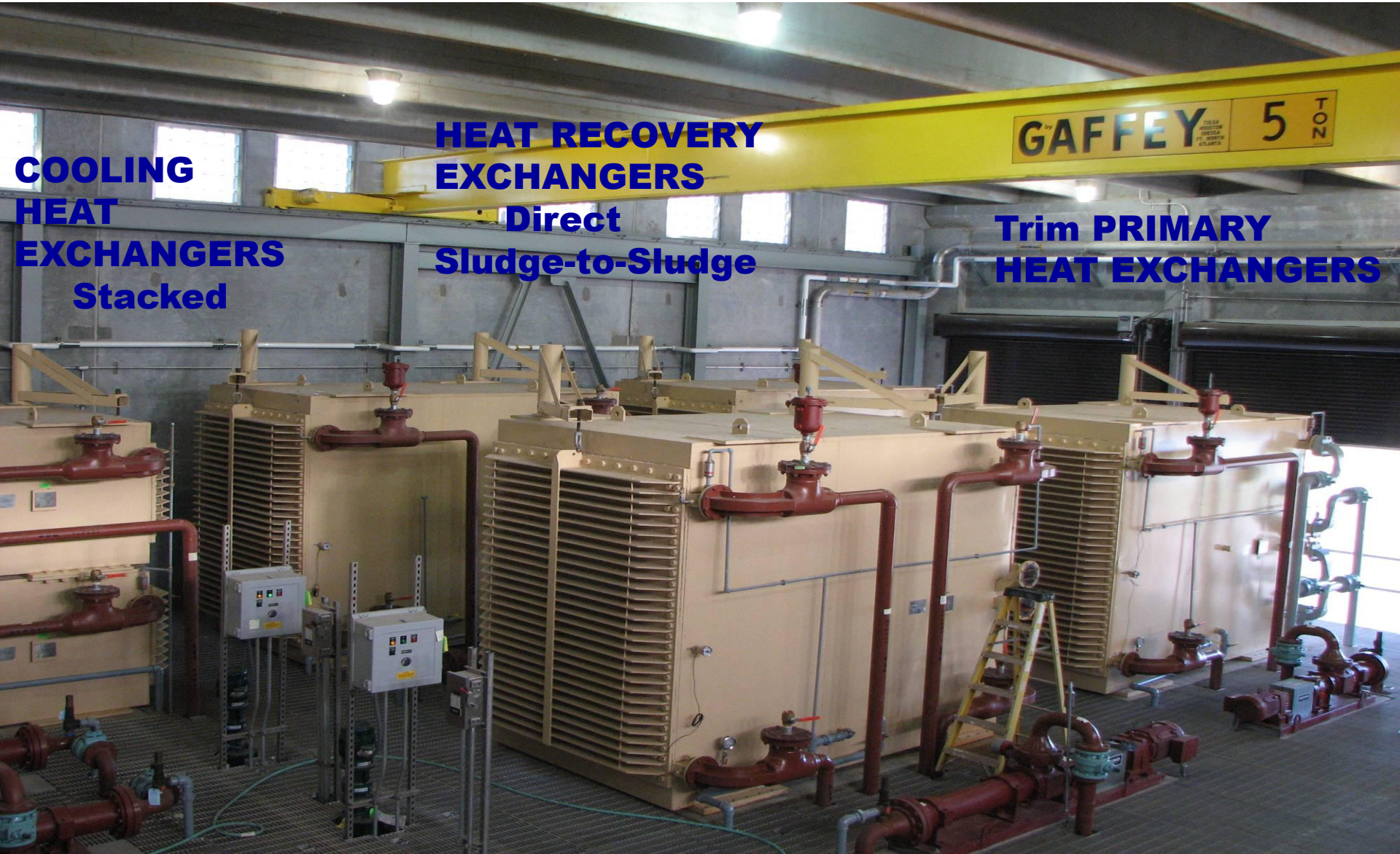
Erwin,

The heat exchangers in our new pasteurization complex (the sludge to sludge heat recovery, the hot water to preheated sludge, and the cold water to sludge) have been working great. We have not had any problems or concerns with the heat exchangers, and I would recommend these units.

Thanks.

Shawn Glen - Northslope Superintendent
City of Tulsa, Water Pollution Control
Off 918-591-4570
Fax 918-699-3019
sglen@cityoftulsa.org

Tulsa OK, Via Ashbrook & HDR



**HEAT RECOVERY
EXCHANGERS**

**Direct
Sludge-to-Sludge**

**Trim PRIMARY
HEAT EXCHANGERS**

**COOLING
HEAT
EXCHANGERS
Stacked**

Subject : RE: 20 % solids
Date : Mon, 15 Feb 2010 11:27:00 -0500
Linked to: Jeff Glover
From : "Glover, Jeff" <Jeff.Glover@hdrinc.com>
To : Erwin <erwin@ddi.ca>

At Rialto we were able to pump up to 26% solids through the DDI Heat exchangers. The material was either a mix of anaerobically digested dewatered sludge and slurry (biosolids converted by EnerTech's patented SlurryCarb process) or slurry alone.

Jeff Glover
HDR Denver
303-764-1523

Reactor - With Therminol and Duplex stainless Steel
used in Pasteurization process
of Sludge-to-Sludge Heat recovery



DDI HEAT RECOVERY EXCHANGER

"RECTANGULAR, SQUARE, CUBE"™

Water & Direct SLUDGE-to-SLUDGE Heat RECOVERY

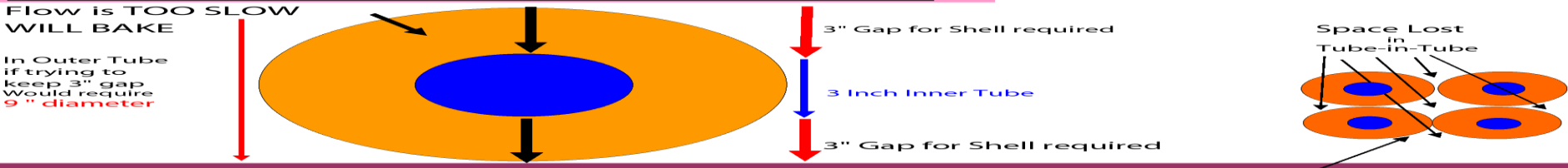
Compact & Efficient, WIDE GAP 3"+ limits Plugging & Baking, ROI in a few MONTHS

www.ddi-heatexchangers.com 514-696-7961 DDI Patented

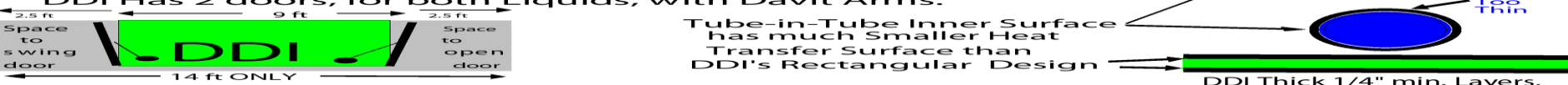


ACCESS DOORS for BOTH Liquids + Davit Arms STACKABLE, S/W Cold, SLUDGE/SLUDGE, S/W Hot

Tube-in-Tube NON-efficiencies



Size & floor space, Comparison of DDI Rectangular to Tube-in-Tube



Tube-in-Tube NON-efficiencies



SPIRAL

PINS do not allow Sludge on BOTH sides, Small 1" Gap, blocks flow.



1" Only



**Erwin Schwartz with JT
Foxx and Raymond Aaron**



Stedman Graham and Erwin Schwartz

Thank you Very Much

Questions?