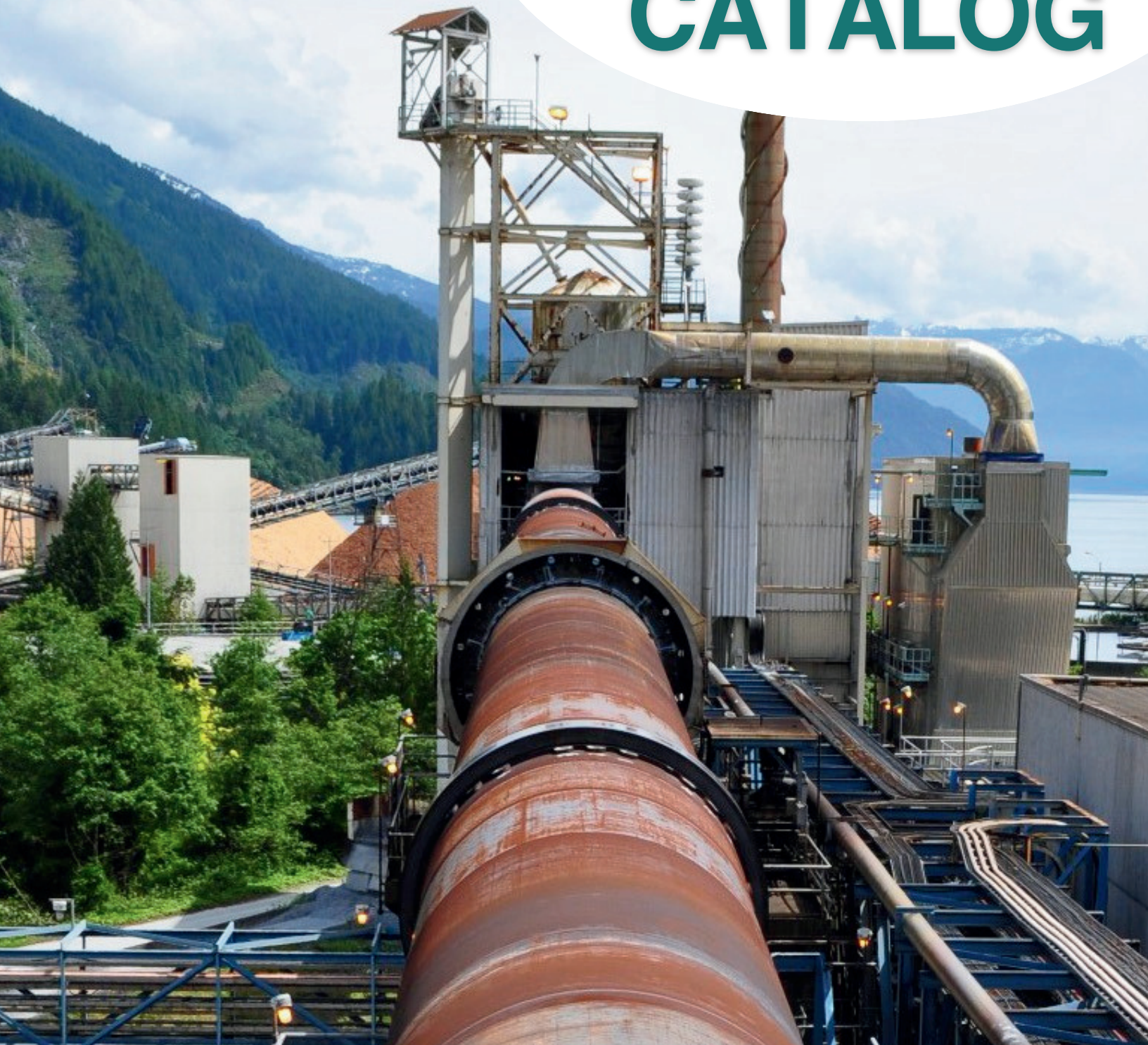


TECHNICAL PRODUCT SPECIFICATIONS CATALOG



JAMMBCO Industrial Solutions Ltd.
Rotary kiln efficiency experts
providing custom solutions
for over 50 years.

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649 Welham Road, Barrie, ON L4N 0B7

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For over 50 years, JAMMBCO has delivered engineered rotary kiln solutions to customers throughout North America, South America, Europe, Africa, Asia and the Middle East. Our patented technologies, proprietary alloys and extensive field experience help industrial operations improve efficiency, increase production and reduce maintenance costs.

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06 HANGERS

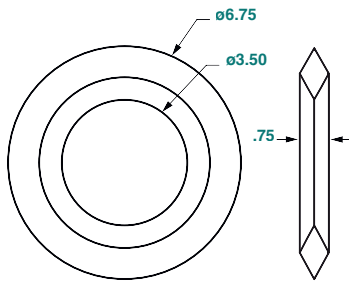
07 SHACKLES

08 ECONOLINERS

09 LINER ASSEMBLY

HEAT-X ROTARY KILN CHAIN

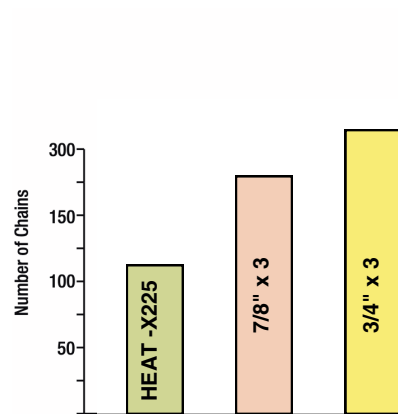
PATENTED TECHNOLOGY



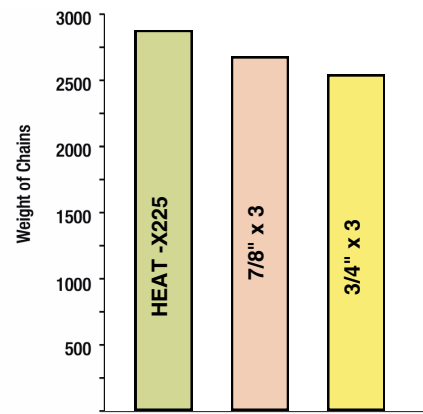
HEAT-X225

	Heat-X225	3/4" x 3"	7/8" x 3"
in ² /ft	215.7	110.7	132.0
lb/ft	12.14	5.92	8.08
Links/ft	3.43	4	4

COMPARISON OF 10' CHAINS FOR A 2.5 FT²/FT³ DENSITY IN A 10' SECTION OF 14' Ø KILN



Heat X Significantly Reduces
Number of Chain, Hardware and
Installation Costs



Comparable Weights Even
Though Fewer Chains

JAMMB HEAT-X ROTARY KILN CHAIN

PATENTED TECHNOLOGY

Designation	Comparison	Temp Range	Application Area and Firing Source	Resistance to Sulphur	Carburization Resistance	Sigma Phase Res.
JBC 60	Carbon Steel	Up to 932°F (500°C)	Inlet Areas Gas, Oil, Coal Fired	Average	Poor > 500°C	Good
JBC-1600	9F, Ferritic	932°F - 1652°F (500°C - 900°C)	Mid Position Areas Oil and Gas Fired	Good	Good	Good
JBCA 18-18 Micro	304, Austenitic	932°F - 1652°F (500°C - 900°C)	Mid Ranged Areas Gas and Coal Fired	Below Average	Good	Good
JBCA 20-10 Micro	309, Austenitic	1472°F - 1922°F (800°C - 1050°C)	Mid to Burning Areas Gas and Coal Fired	Below Average	Excellent	Good
JBCA 1650	85MA, Aust/Mang	932°F - 1652°F (500°C - 900°C)	Radiation/Burning Areas Oil, Gas, Coal Fired	Good	Good	Average
JBCA-1675	105MA, Austenitic	1675°F (913°C)	Radiation/Burning Areas. Oil, Gas, Coal Fired	Good	Good	Good
JBCA 1750	115MA, Aust/Mang	1562°F - 1750°F (850°C - 954°C)	Radiation/Burning Areas Oil, Gas, Coal Fired	Excellent	Good	< 1382°F (750°C)
JBCA-1800CW	HH + CW, Aust/Mang	1600°F - 1800°F (871°C - 982°C)	Radiation/Burning Areas. Oil, Gas, Coal Fired	Good	Good	< 1100°F (596°C)

HEAT-X KILN CHAIN

JAMMBCO patented HEAT-X CHAIN SYSTEMS have many advantages over conventional round link chain.

- Reduced Dust Generation
- Increased Heat Transfer
- Increased Fuel Efficiency
- 100% more surface area per link
- 50% fewer rings compared to round
- Lower installation cost
- JAMMBCO exclusive Alloys

For your kiln operations, this means:

- Fuel savings
- Reduces hardware costs
- Reduces installation costs
- Improved kiln production
- Reduces dust recycle

As shown in the chart and graph, the “HEAT-X FACTOR” for JAMMB HEAT-X chain is higher than that of old style round chain.

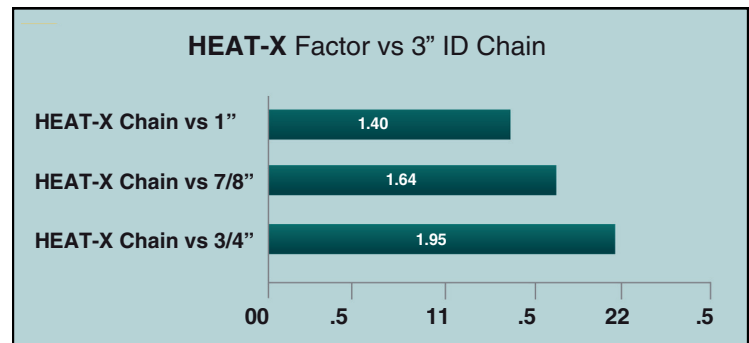
For example:

- 1 ft of HEAT-X Chain = 1.95 ft of 3/4" x 3"
- 1 ft of HEAT-X Chain = 1.64 ft of 7/8" x 3"
- 1 ft of HEAT-X Chain = 1.4 ft of 1" x 3"

In addition, HEAT-X dust generation can be expressed as the inverse of the “HEAT-X Factor” and thereby dramatically reducing your dust recycle.

For example:

- $1/1.95 = 51\%$ less dust, HEAT-X vs. 3/4" x 3"
- $1/1.64 = 61\%$ less dust, HEAT-X vs. 7/8" x 3"
- $1/1.4 = 71\%$ less dust, HEAT-X vs. 1" x 3"



	Weight/ft (lbs/ft)	Surface Area (ft²/ft)
HEAT-X Chain	12.07	1.50
Style Round 3/4"	5.86	0.77
Style Round 7/8"	8.1	0.92
Style Round 1"	10.79	1.08

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ROUND KILN CHAIN



ROUND CHAIN

- Aids Heat Transfer
- Enhances Production
- Readily Available
- Various Materials

Wrought Type Chain:

- Carbon Steel
- Abrasion Resistant
- Ferritic Stainless
- Austenitic Stainless

Cast Type Chain:

- Abrasion Resistant
- Ferritic Stainless
- Austenitic Stainless
- Ductile Iron

Popular Sizes:

- 3/4" Cross Section x 3" I.D.
- 7/8" Cross Section x 3" I.D.
- 1" Cross Section x 3" I.D.
- Other Sizes on Demand

Diameter		Pitch		Weight/Ring		Weight		Surface area per unit length	
mm	inch	mm	inch	kg	lbs	kg per m	lbs per 100 ft	cm²/m	ft²/ft
16	5/8	70	2 3/4	0.43	0.95	6.14	413	1940	0.637
18	5/8	100	4	0.74	1.63	7.40	497	2096	0.688
19	3/4	65	2 5/16	0.65	1.43	10.00	672	2423	0.795
19	3/4	70	2 3/4	0.63	1.39	9.00	605	2384	0.782
19	3/4	76	3	0.67	1.48	8.82	592	2344	0.769
20	3/4	65	2 5/16	0.67	1.48	10.31	693	2581	0.847
20	3/4	70	2 3/4	0.70	1.54	10.00	672	2538	0.833
20	3/4	76	3	0.75	1.65	9.90	665	2493	0.818
20	3/4	78	3 5/16	0.77	1.70	9.87	663	2480	0.814
20	3/4	80	3 1/8	0.78	1.72	9.75	655	2467	0.810
20	3/4	100	4	0.93	2.05	9.30	625	2369	0.777
22	7/8	76	3	0.93	2.05	12.24	822	2802	0.919
22	7/8	80	3 1/8	0.97	2.14	12.13	815	2768	0.908
22	7/8	100	4	1.14	2.51	11.40	766	2649	0.869
23	7/8	76	3	1.02	2.25	13.42	902	2957	0.970
23	7/8	80	3 1/8	1.07	2.36	13.38	899	2923	0.959
23	7/8	100	4	1.14	2.51	11.40	765	2792	0.916
25	1	76	3	1.23	2.71	16.18	1088	3279	1.076
25	1	80	3 1/8	1.29	2.85	16.12	1083	3238	1.062
25	1	89	3 1/2	1.40	3.09	15.73	1057	3160	1.037
25	1	100	4	1.52	3.35	15.20	1021	3084	1.012
28	1 1/8	100	4	1.95	4.30	19.50	1310	3537	1.161
30	1 3/16	100	4	2.28	5.03	22.80	1532	3849	1.263
32	1 1/4	100	4	2.65	5.84	26.50	1781	4169	1.368

LINK HANGER ASSEMBLY

PATENTED TECHNOLOGY



JAMMB LINK HANGER

- No Chain Hangups
- Heavy Duty
- Easily Installed
- Alloy Flexibility
- Exclusive JAMMB Lock



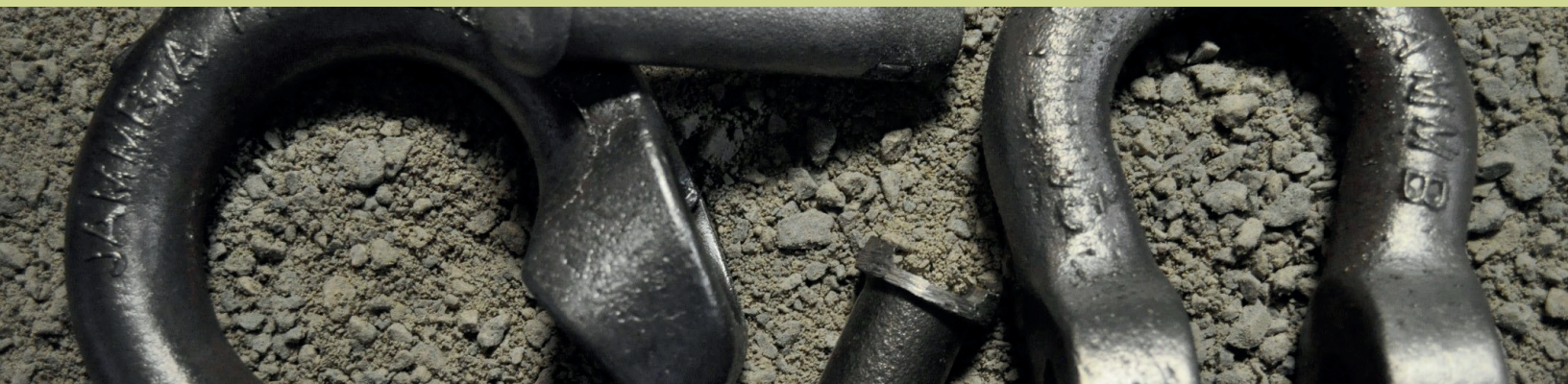
**CAP EASILY
SLIDES BASE
ONTO BASE**

JAMMBCO Patented LINK HANGER ASSEMBLY (2 PART) comes with our unique base and cap that replaces a traditional hanger and shackle assembly. The advantages of the JAMMBCO Link Hanger Assembly are:

- Free rotation of the chain prevents chain hang-ups
- The cap can be replaced and/or re-used
- Easy removal during a turnaround
- Heavy duty design increases life
- Easily installed with our exclusive locking system
- Material for base can be matched to the shell to avoid any welding issues
- Used with any refractory thickness
- Can be used on a bare kiln shell
- Provided in numerous alloys depending on service temperature
- Minimal heat loss through the shell
- JAMMBCO on-site installation supervision is available

SHACKLES

PATENTED TECHNOLOGY



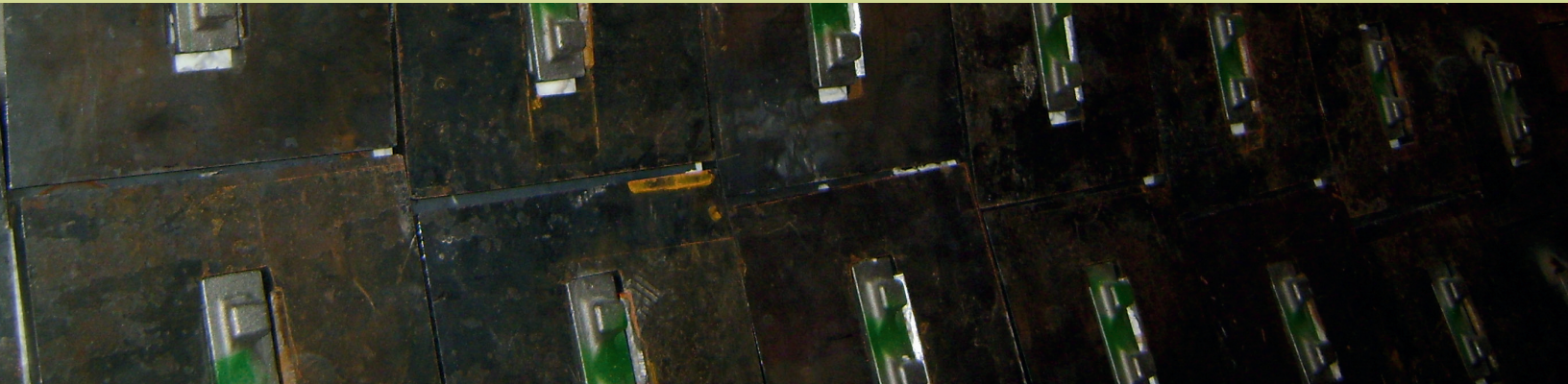
Experience has shown that the kiln chain area the actual temperatures are approx. 100-150°C (212-302°F) lower than in the kiln centre, therefore, a lower heat resisting grade for shackles and hangers is recommended and more cost effective.

- Reduces dust generation by up to 50% over common sizes of round link chain
- Twice the surface area per link compared to 3/4" x 3" roundlink chain
- Half the required links means reduced installation cost
- Proprietary Alloys for optimized chain link life
- Often less than 12-month Return-On-Investment

Diameter															weight	drawing
D	D1	a	b	c	d	e	f								kg	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	
19	¾	19	¾	95	3 ¾	50	2	34	1 1/8	22	7/8	14	9/16	45	1 ¾	0.75 1216/1782
22	7/8	22	7/8	100	4	55	2 5/32	36.5	1 1/16	26	1	16	5/8	52	2 1/16	1.05 9471120
27	1 1/10	22	7/8	95	3 ¾	50	2	27		26		20	¾	48		1.30 977556
24	1 5/16	20	¾	93	3 5/32	48	1 57/64	27	1 1/16	26	1 1/64	20	¾	48	1 57/64	1.20 975676
24	1 5/16	20	¾	95	3 5/64	46	1 1/16	27	1 1/16	26	1 1/64	20	¾	48	1 57/64	1.20 3087116
25	1	25	1	102	4	58	2 5/16	38	1 1/2	29	1 5/32	18	23/32	59	2 15/16	1.50 950
25	1	25	1	102	4	58	2 5/16	38	1 1/2	26	1 5/32	18	23/32	59	2 15/16	1.50 950-M 24
25	1	25	1	102	4	58	2 5/16	38	1 1/2	24	1 5/32	18	23/32	59	2 15/16	1.50 950-M 22
25	1	25	1	102	4	58	2 5/16	43	1 1/2	26	1 5/32	18	23/32	59	2 15/16	1.50 950-43-M 24
25	1	20	¾	100	4	60	3	26	1	26	1	20	¾	50	2	1.30 3123
25	1	25	1	122		58	2 5/16	45	1 25/32	27.5	1 5/64	22.5	7/8	57	2 1/4	1.70 M5
25	1	25	1	122		58	2 5/16	45	1 25/32	26		22.5	7/8	57	2 1/4	1.70 M 5-Pi 25
25	1	33	1 3/64	92		58	2 5/16	41	1 39/64	27		23	7/8	56	2 13/64	2.00 B 25
28	1 1/8	28	1 1/8	130	3 ¾	70	2 ¾	34	1 3/4	31	1 7/32	27	1 1/16	68	2 49/64	2.00 B 28

METAL ECONOLINER

PATENTED TECHNOLOGY



ECONOLINER SYSTEMS

JAMMBCO ECONOLINER SYSTEMS have many advantages over conventional castable linings when used in the chain area of the kiln:

- **Increases Kiln Effective ID**
- **Longer Life**
- **Increases Production**
- **Reduces Kiln Dust**
- **Low Installation Cost**

JAMMBCO Patented ECONOLINER SYSTEMS have many advantages over conventional castable linings when used in the chain area of the kiln.

- **Significant increase in Kiln working internal diameter**
- **Reduced Dust Generation due to pressure drop**
- **Increased lining life**
- **Easily Installed plus no bake out required**
- **Lower installation cost due to reduced hardware**
- **Provided in numerous alloys depending on temperature including JBCA-1750 Austenitic Stainless-Steel**
- **Minimal heat loss through the shell**
- **Protects the shell and eliminates chain wear on the refractory**
- **JAMMBCO on-site installation supervision is available**

Case History: On a 12' ID kiln our customer was able to increase the internal diameter by 12.5%.

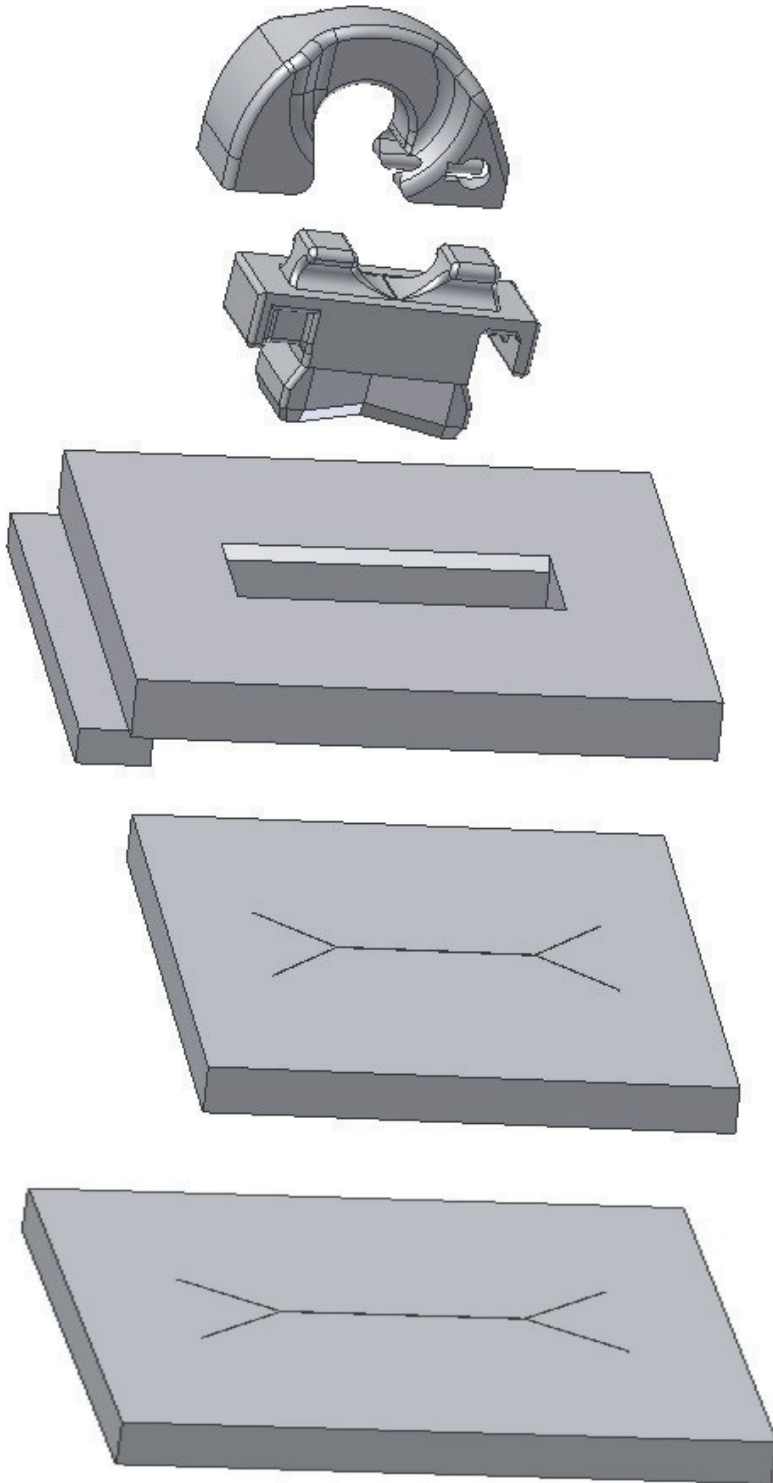


**LINER PLATE AND BASED SHOWING
FIBRE INSULATION**



**LINER SYSTEM SHOWING THE CAP
AND BASE DETAIL**

LINER ASSEMBLY



JAMMB LINK HANGER CAP

Install with the solid end in the direction of kiln rotation. Install the bolts with the nuts in the down kiln direction and tack weld the nuts to the bolts.

JAMMB 4" HANGER BASE

The 4" hanger base #HGRC700-14 is welded all around with 12" of 3/8" fillet using E-7018 electrodes or equivalent for the -A and SS309 electrodes or equivalent for the -B or -M materials.

JAMMB METAL ECONOLINER

They are installed with the spacer bar facing in the direction of kiln rotation. Weld to the -A hangers along both sides with 8" of 5/16" fillet using E-7018 electrodes or equivalent, and to the -B & -M hangers or -M liners with 8" of 5/16" fillet using SS309 electrodes or equivalent.

TOP INSULATION PAD

The top insulation pad is shorter than the bottom pad and the cut for the hanger is centred. This pad fits between the liner spacer bars when installed.

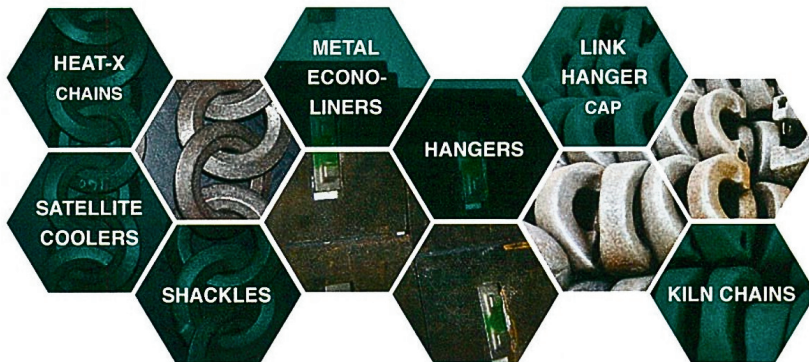
BOTTOM INSULATION PAD

The bottom insulation pad is installed with the longer end facing in the direction of kiln rotation. It completely covers the shell and the liner spacer bar sits on it.

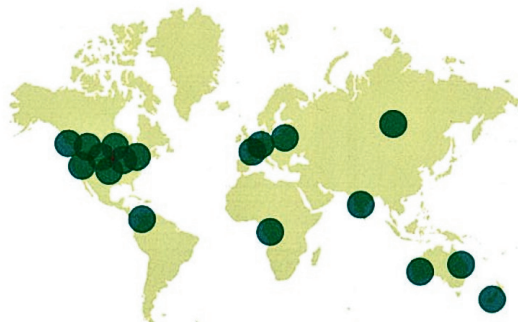
SAVINGS POTENTIALS OF A JAMMBCO SYSTEM

PLANT	AVG. FUEL SAVINGS/YR MMBTU/t	PRODUCTION INCREASE %/DAY	MAINTENANCE SAVINGS 10YRS
1	1.2	15%	\$1,000,000
2	0.99	10%	\$1,000,000
3	0.85	16%	\$850,000
4	0.84	12%	\$900,000
5	0.8	12%	\$925,000
6	0.77	8%	\$750,000
7	0.77	12%	\$740,000
8	0.75	9%	\$900,000
9	0.73	17%	\$800,000
10	0.71	15%	\$825,000

JAMMBCO'S SUITE OF PATENTED PRODUCTS



INSTALLED IN OVER 200 PLANTS WORLDWIDE



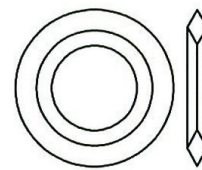
UNITED STATES
GABON
AUSTRALIA
CANADA (HQ)
COLUMBIA
FRANCE
GERMANY
INDIA
NEW ZEALAND



We are dedicated to efficiently optimizing the heat recovery from rotary kilns by utilizing our high quality wear performance products.

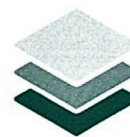
Jammbraco's name has become synonymous with professionalism, quality products, and expertise internationally over the past five decades.

REALIZE YEARLY SAVINGS OF
1MBTU PER TON



HEAT-X CHAINS
REDUCE DUSTING
10-20%

ECONOLINER SYSTEMS
CAN LAST UP TO **20^{yrs}**



**5-15% INCREASE
IN PRODUCTION**



AVG. FUEL SAVINGS/YR
OF \$700,000



**up to 117 lb CO2
REDUCTION**
per ton (natural gas)



ROTARY KILN EFFICIENCY

Increase Fuel Efficiency

Increase Production

Reduce Dust

Low Maintenance

Reliable & Safe

**Rotary kiln efficiency experts
providing custom solutions
for over 50 years.**

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