Pulleys & Idlers

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Pulleys & Idlers

Basics & Grain Application Review

Dallas Houchins

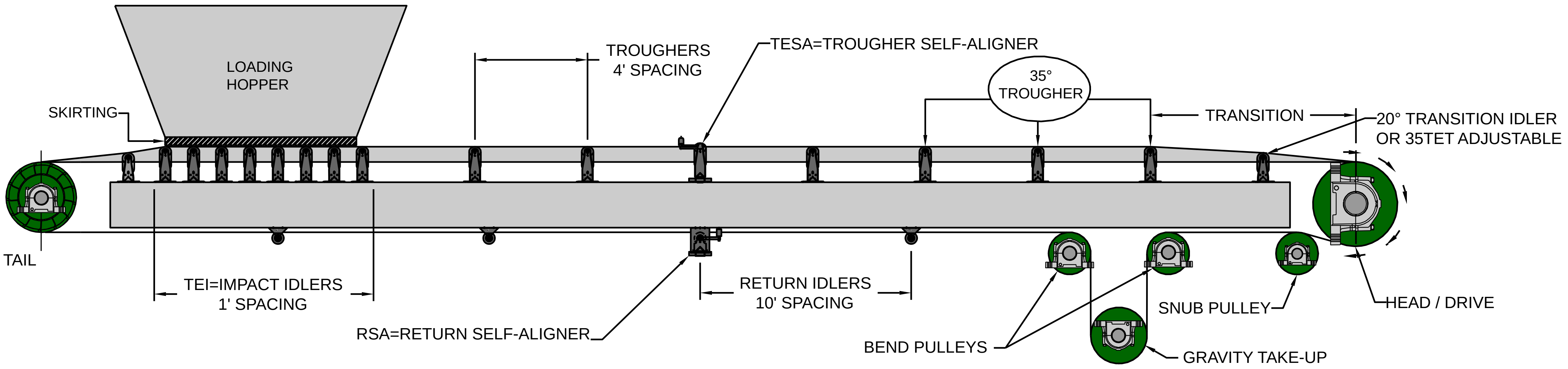
Precision Pulley & Idler

Field Applications Engineer

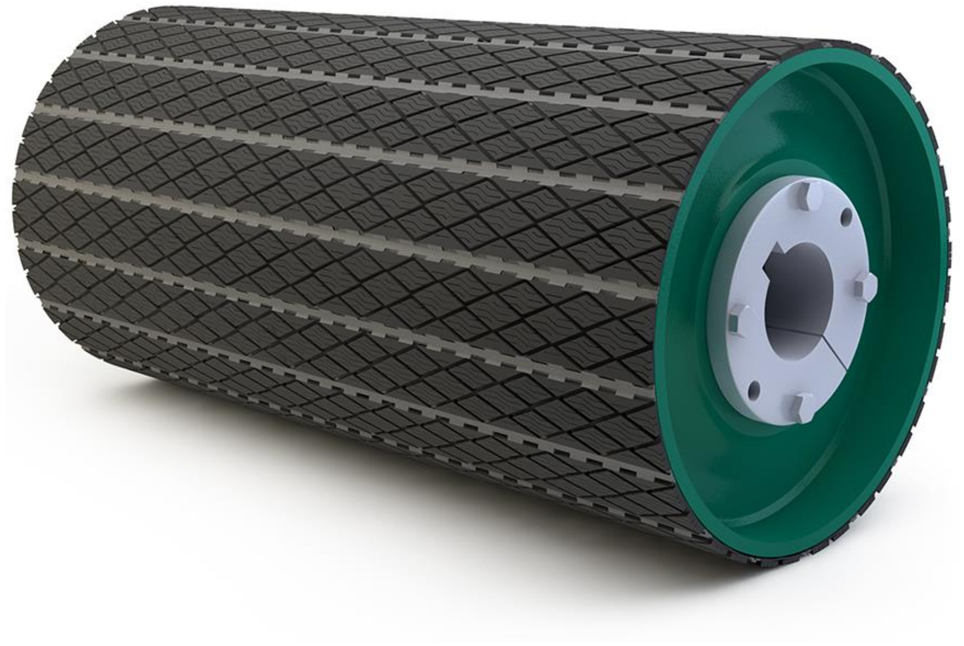
Pulleys & Idlers

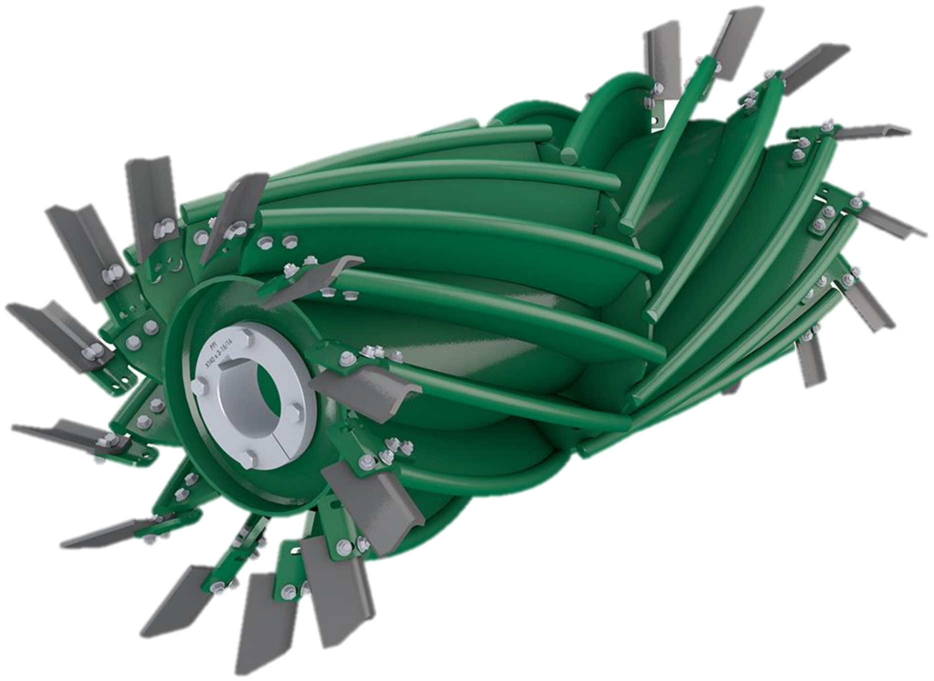
Basics & Grain Application Review

Conveyor Legend

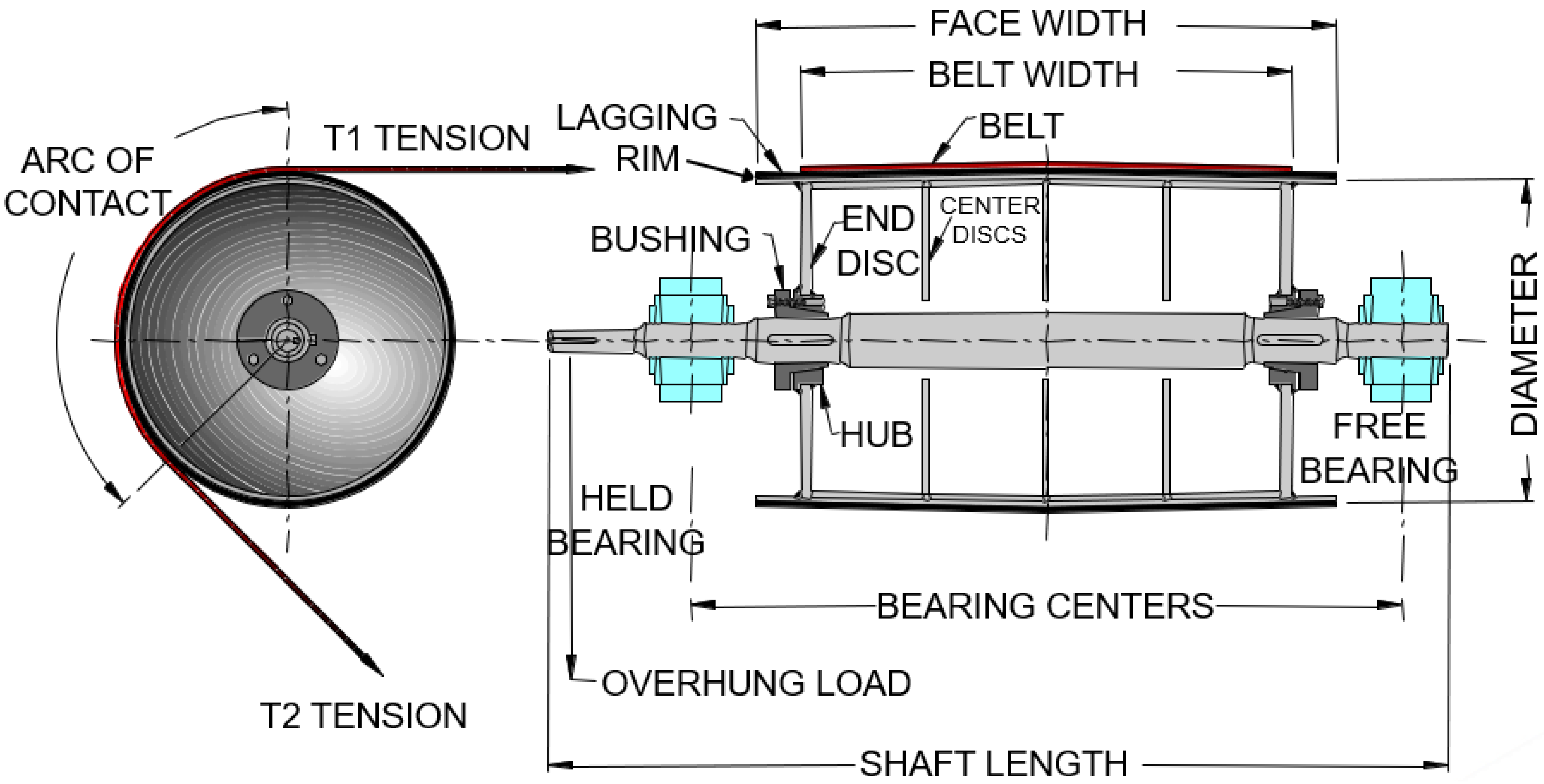


Pulleys





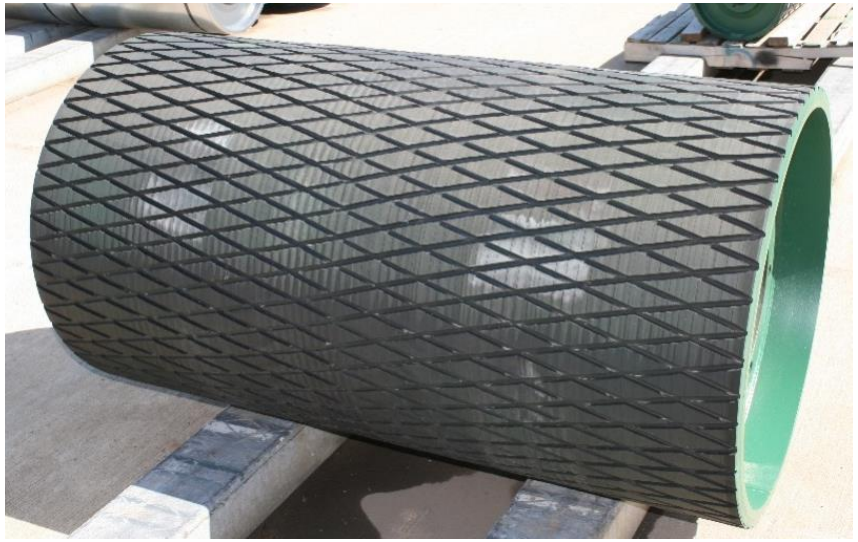
Pulley Legend



Pulley Dimensions

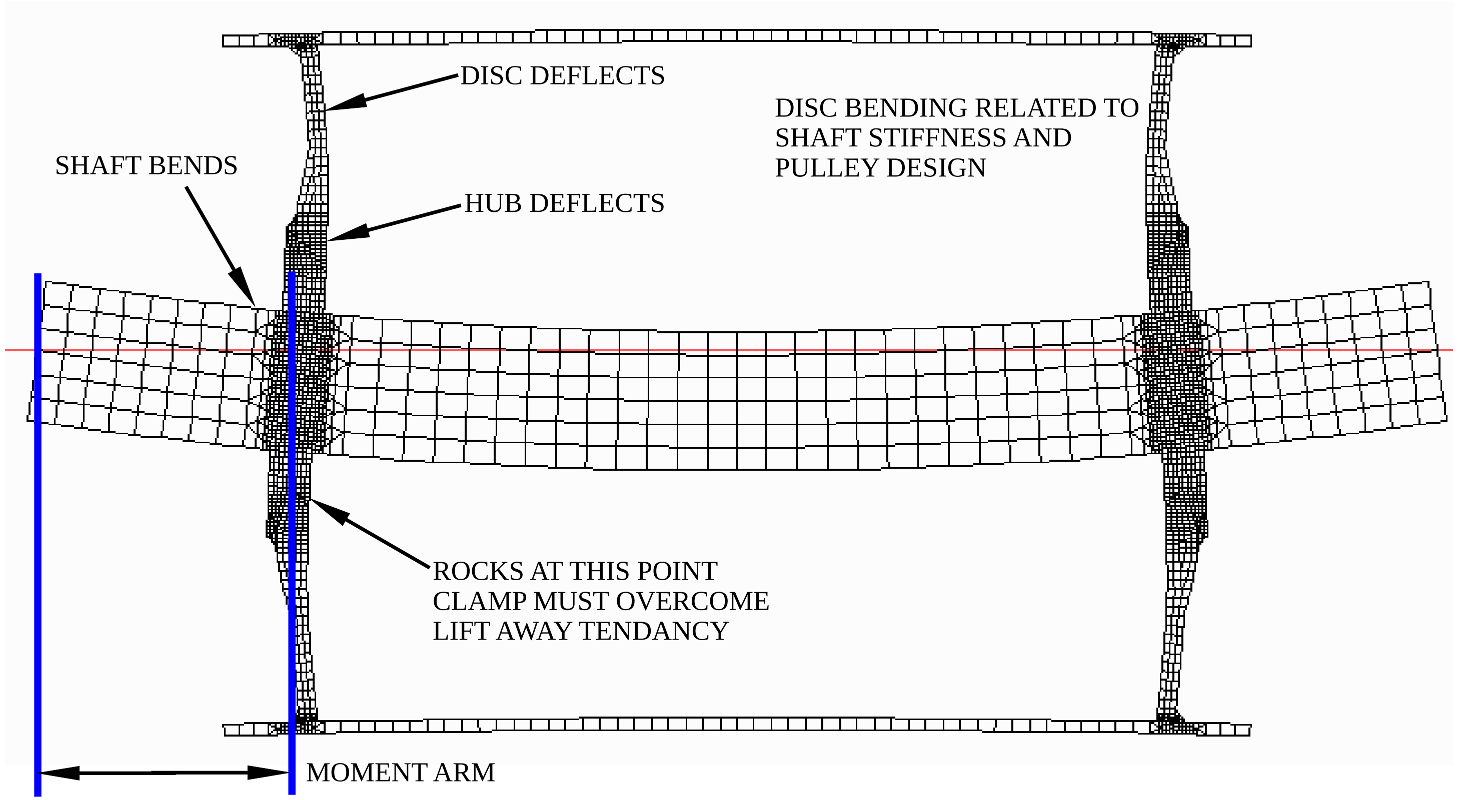
- Pulley outside diameter (OD)
- The OD goes by 2” increments from 12” to 20”
- Then by 6” increments at 24” and above

Pulley Dimensions



- The rim surface is known as the face
- Face widths are usually wider than the belt
- Common face widths are: 26, 32, 38, 44, 51, 57, 63
- Wider to allow belt wander
- Does vary from these standards
- Pulley nomenclature = diameter before face width - 1638 (16” x 38”)

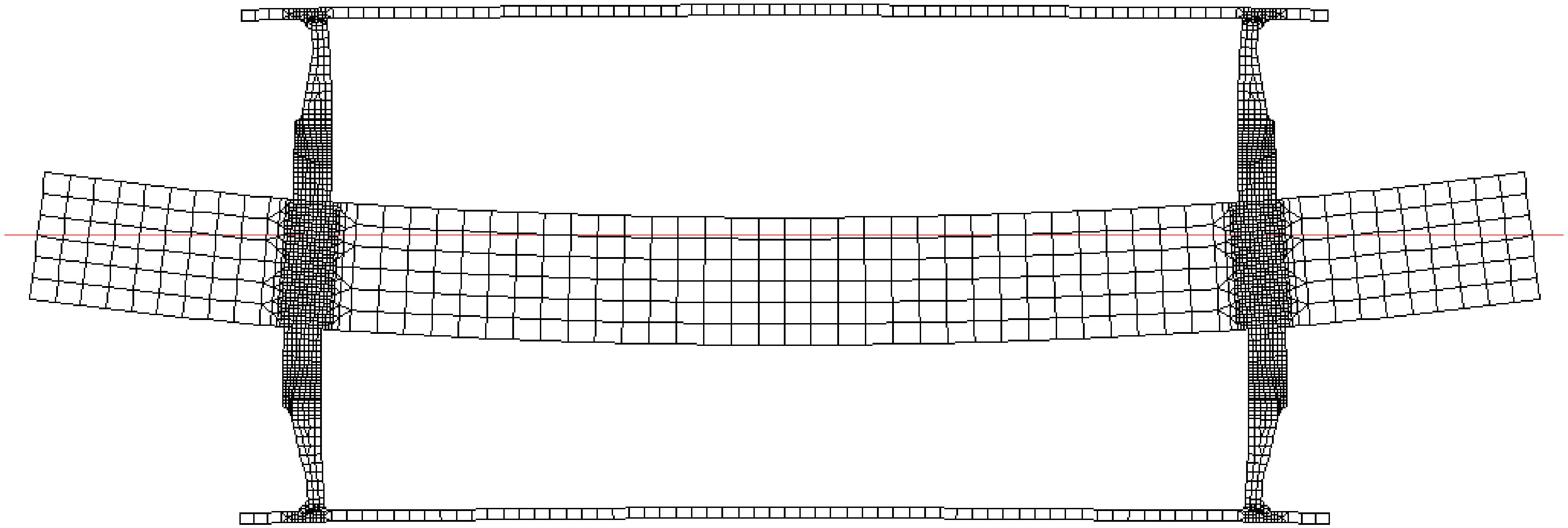
Shaft Bending Effects



ALL FORCES AND BENDING ARE PROPORTIONAL
TO RESULTANT BELT LOAD AND MOMENT ARM

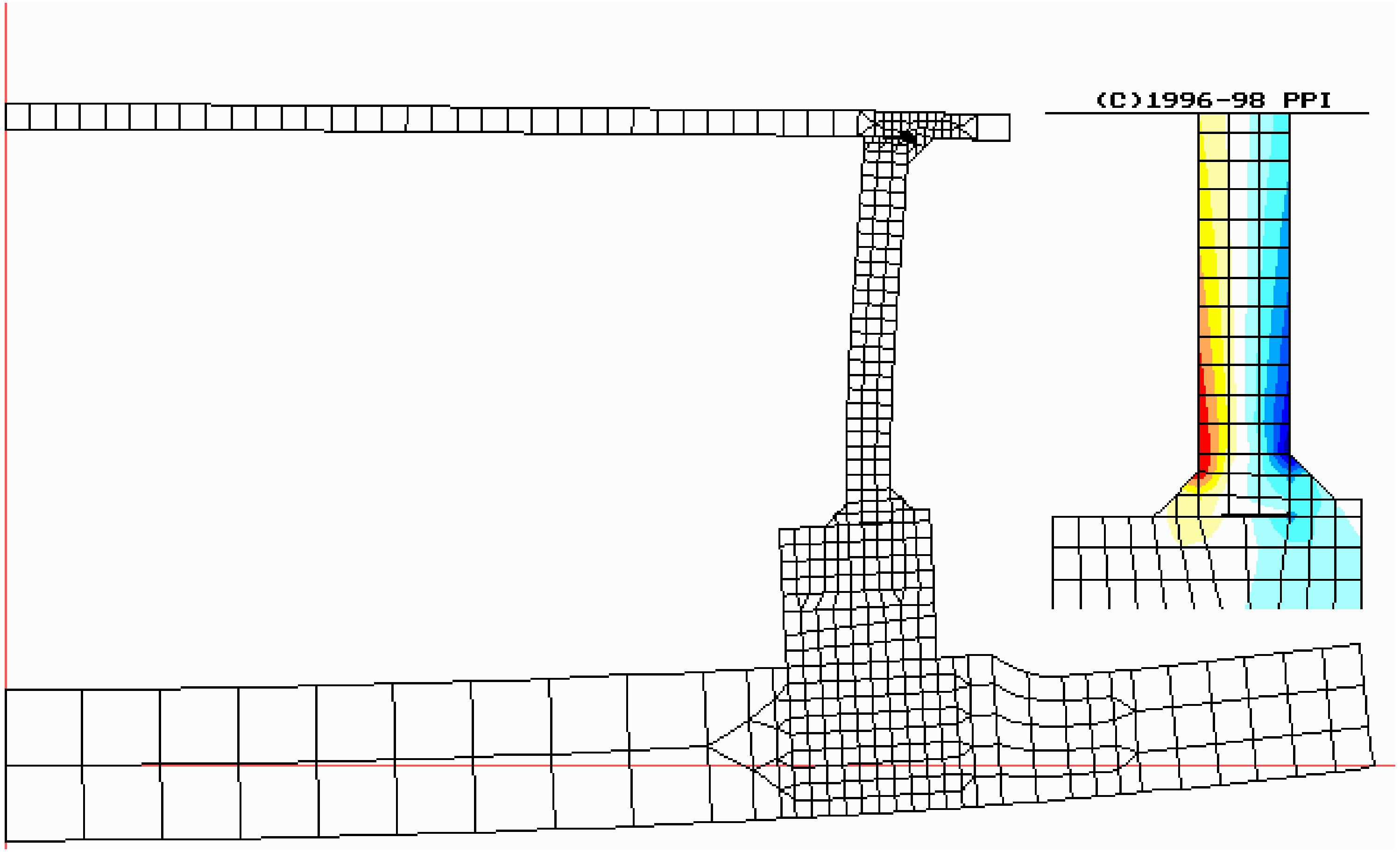
DIRECT DISC STRESSES (IN PLANE) ARE NEGLIGIBLE FOR
"THICK" DISCS BUT IMPORTANT IN THIN DISCS

Shaft Bending Effects



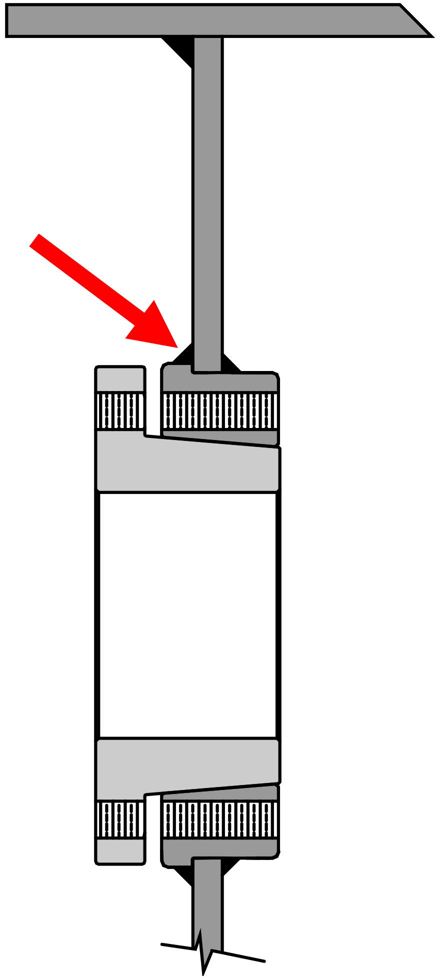
*Displacements have been multiplied by 100 for easier viewing

Shaft Bending Stress Concentration



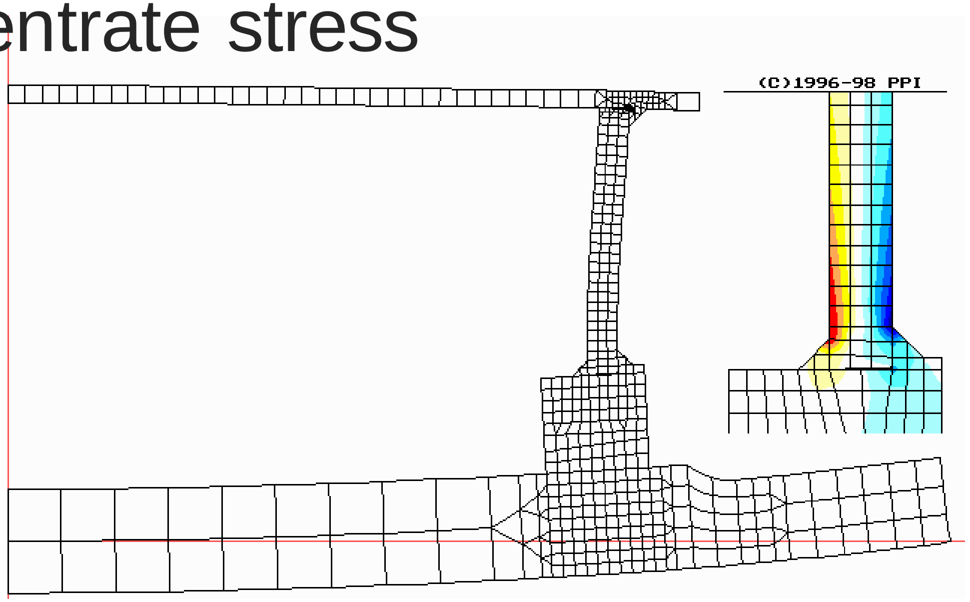
End Disc Inspection

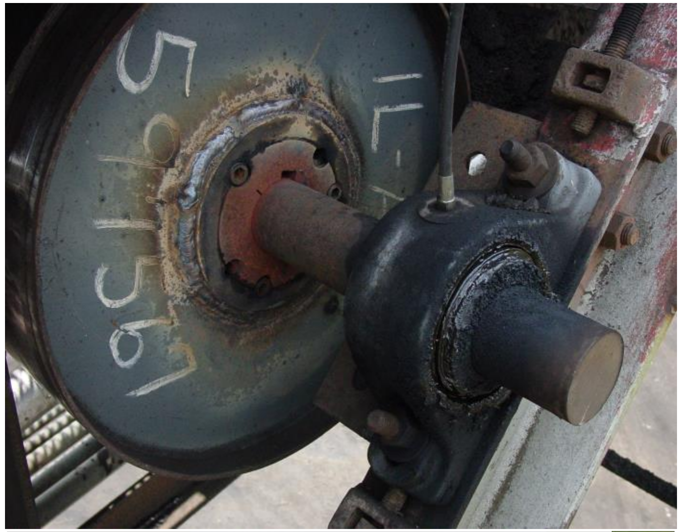
- Shaft deflection puts the most stress into the pulley
- This bending moment concentrate hub/disc connection
- Welded connections will fail next heat affected zone
- Highest concentration of stresses occurs at the weld
  - Radial, axial, & weld stresses increase simultaneously here

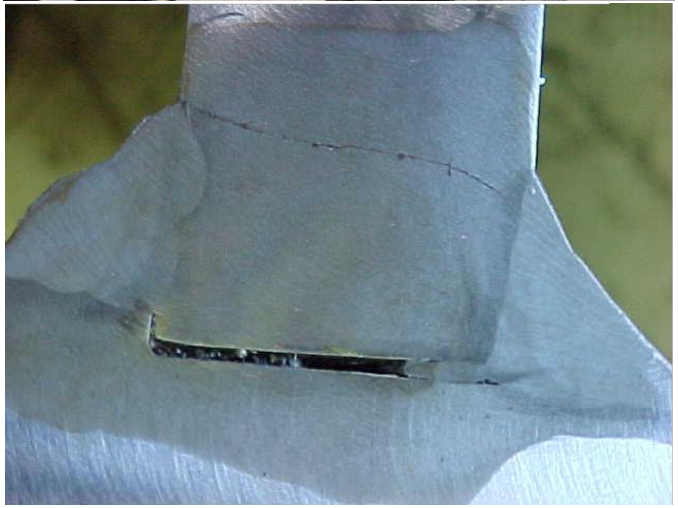


The Problem

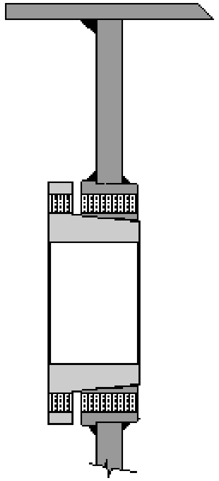
- Estimated 90% of pulley failures
- Sharp edges and weld notches concentrate stress





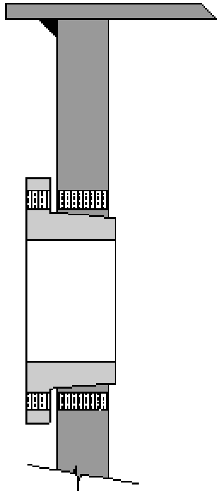


DISC CONFIGURATIONS



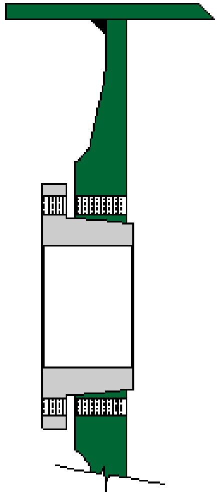
WELDED PLATE

Generally the most common and cost effective design.



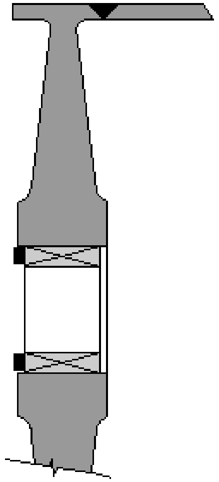
INTEGRAL HUB (IH)

Eliminates hub weld for added reliability. Extreme disc rigidity puts added load on bushings and rim.



PRO-DUTY PROFILE END DISC

Eliminates hub weld for added reliability. Profiled shape reduces bushing load and rim stress at the weld.

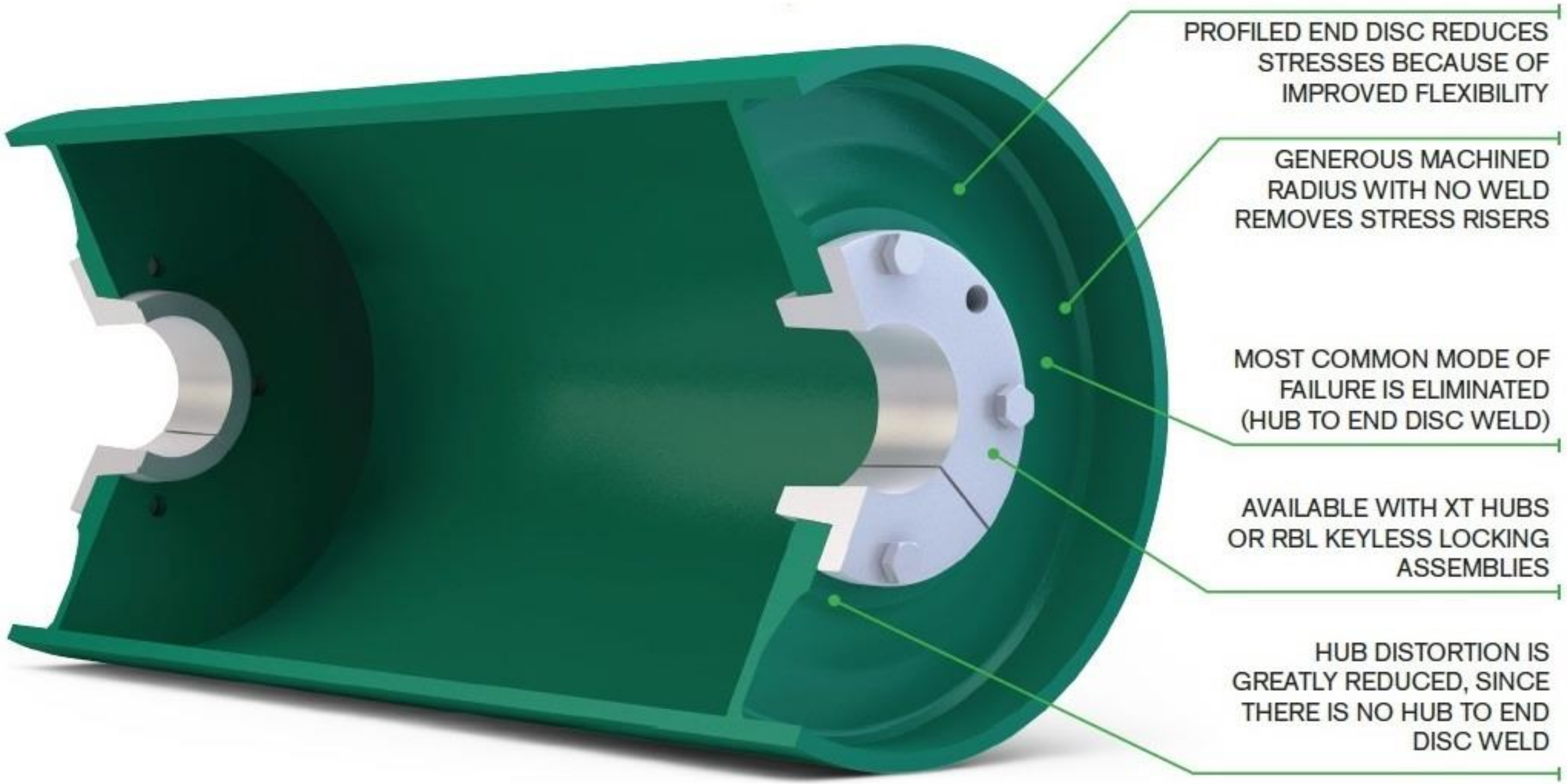


TURBINE-T DISC

Ultimate in reliability, due to welds in areas of lower stress and weld inspection is more effective.

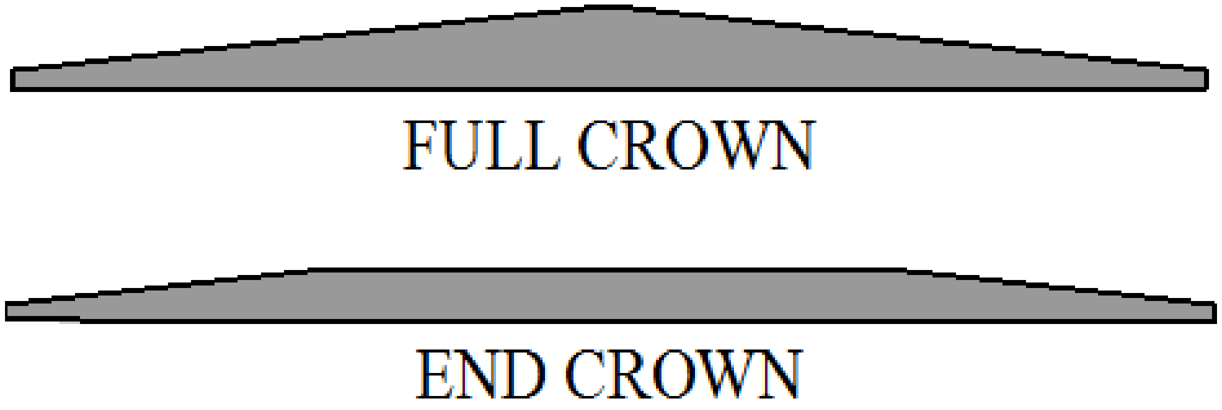
RELIABILITY

PRO DUTY® DRUM



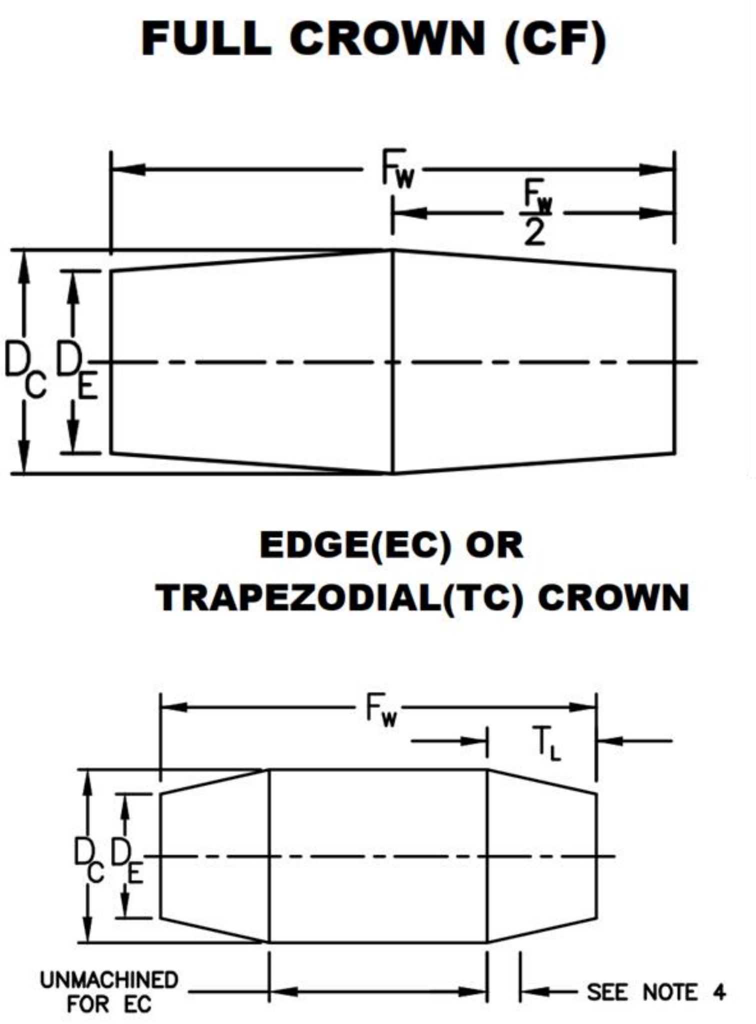
Pulley Crown

- Most pulleys are crowned
- Crowning a pulley helps to track the belt
- The diameter of the pulley will increase toward the center
- Crowns should not be used on steel cable or Kevlar belting

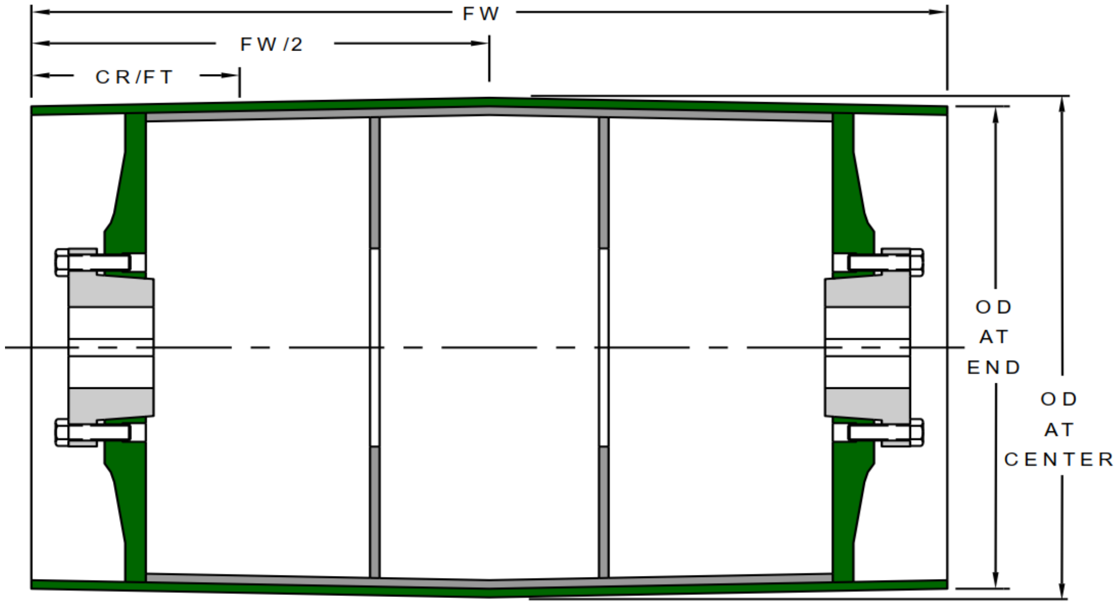


Pulley Crown

- Two types of crowns
  - Machined edge/trap crown at outside 15” (rate of 0.100” per ft taper)
- Drum – 1/8” per foot on the diameter
- Wing – 1/4” per foot on the diameter
- 24” Face width drum is 1/8” larger in center
- 48” Face width drum is 1/4” larger in center
- 48” Face width wing is 1/2“ smaller on ends
- Drum OD is defined at end
- Wing OD is defined at center



Pulley Crown Extra Notes



- Be sure to specify crown details if not the previous standards
  - E.g. crown per foot or total difference
  - Simply specifying 3/8” crown leaves too much to interpretation
- Equations

Full crown

$$C_{Full} = \left[\left(\frac{FW}{2}\right)/12\right] * C_{rate} = \frac{FW * C_{rate}}{24}$$

Edge crown

$$C_{Edge} = \left[\left(\frac{C_{Length}}{2}\right)/12\right] * C_{rate} = \frac{C_{Length} * C_{rate}}{24}$$

Basic Design Requirements

- Length
- Lift
- TPH
- Material conveyed
- Belt width

Additional Information

- Max lump size and drop height
  - Sizes impact area
- Skirting details
  - Adds friction into the system
- Belt feeder?
  - Hopper dimensions become critical
- Idler spacing (typical below)
  - 1’ Impact idlers
  - 3’ Carry idlers
  - 10’ Return idlers

Pulley Failure

Consideration:

- Was it sized correctly?
- Were the design loads correct?
- Have the design loads changed?
- HP or speed changes
- Increased tonnage
- Over tensioned screw take ups
- Increased take up weight

Conveyor Design

CONVEYOR DESIGN INFORMATION

Customer:	City / State:
Conveyor:	Project:
Contact:	Engineer:
Phone:	Date:

Please Provide A Sketch Of The Conveyor Profile:

PLEASE PROVIDE ALL INFORMATION BELOW

Material:	Take-Up Type:
Material Density:	Weight Of Gravity Take-Up:
Capacity (TPH):	Trough Angle (20°,35°,45°):
Belt Speed:	Trough Idler Spacing:
Motor HP:	Return Idler Spacing:
Conveyor Length:	Bearing Centers For Each Pulley:
Conveyor Incline / Lift:	Belt Material (Fabric Or Steel):
Belt Width:	Belt Wrap On Drive Pulley:

Comments : *Add any additional information that would help with design. (EXAMPLE: tail pulley is a wing, lagging requirements, specific pulley diameters, etc.*

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www.ppi-global.com

Conveyor Design

USA | CANADA | CHILE

1300' BELT CONVEYOR

GRAVITY TAKE-UP, HEAD DRIVE WITH SNUB

Precision Pulley & Idler
Pella, IA
Ph: (641) 628-3115
Fax:(641) 628-3658
www.ppi-global.com
Date : 2022-[illegible]

Comments: Design w/ dual 250 motor config 1/2" Craft lag for head/drive CEMA E idlers are suffi[illegible], E plus is only called out due to program limitations

CONVEYOR DESIGN DATA

Belt Width (in):	66	Material:	Wheat	Temperature Range (°F):	0 To 70
Belt Speed (fpm):	500	Material Density (lb/ft³):	48	Number of Belt Cleaners:	2
Belt Load (stph):	2,241	Surcharge Angle (°):	14	Number of Belt Plows:	0
Horizontal Centers (ft):	1,302.0	Maximum Lump Size (in):	6	Skirtboard Length (ft):	15.0
Vertical Centers (ft):	102.5	Volumetric Capacity (%):	98	Slider Bed Length (ft):	0.0
Incline/Decline Angle (°)	4.5	Edge Distance (in):	[illegible]		

POWER AND TENSION

	Running	Full Motor
HP	401.5	2 x 250.0
Effective Tension (Te)	25,177	33,000
Tight Side Tension (T1)	34,744	45,540
Slack Side Tension (T2)	9,567	12,540
Take-up Tension (Ttu)	8,962	11,935
Tail Tension (Tt)	8,357	11,330
Stationary Tension (Ts)	8,357	11,330

ALL TENSIONS ARE IN LBF

Drive Pulley Rotational Speed (rpm): 76.4

BELT

Specification:	4P800
Covers (in):	1/4 x 1/8
Elastic Modulus (PIW):	68,000
Weight (lb/ft):	23.49
Sag (%):	1.0

TAKE-UP

Type:	Gravity
Location :	50 % of Horizontal Centers
Required Counterweight (lb):	17,924 *
Required Take-up Travel (in):	N/A

* The required counterweight includes the weight of the pulley assembly.

DESIGN LIMITS

PULLEY:	
Designed To:	Running HP
Take-up Safety Factor:	1.25
SHAFT:	
Max. Shaft Slope (in/in):	0.0017
Max. Shear Stress (psi):	10,667
Bending Factor (Kb):	1.5
Torsion Factor (Kt):	1.0
BEARING:	
Min. L10 Life (hr):	60,000
Seal Type:	Standard
Seal/Turndown Clearance (in):	0.5

PULLEYS AND SHAFTS

	Dia x FW (in)	Style	Lagging (in)	Hub	Shaft (in)	Bearing	Bore (in)	T1 (lbf)	T2 (lbf)	Wrap	BC (in)
Drive	24 x 69	CF - Drum	1/2 HBG	PXT80	7.938 x 5.93[illegible] 116.625	SAF 22534	5.938	36,985	11,808	210	82
Snub	18 x 69	CF - Drum	3/8 PL	PXT60	4.938 x 4.938 x 86.[illegible]	E4B415	4.938	11,808	11,808	30	78
Bend	18 x 69	CF - Drum	3/8 PL	PXT60	5.438 x 4.938 x 86.250	E4B415	4.938	11,203	11,203	86	78
Take-up	18 x 69	CF - HB Wing	None	PXT60	5.938 x 4.938 x 86.750	[illegible]B415	4.938	11,203	11,203	180	79
Bend	18 x 69	CF - Drum	3/8 PL	PXT60	5.438 x 4.938 x 86.250	E4B4[illegible]	4.938	11,203	11,203	95	78
Tail	18 x 69	CF - HB Wing	None	PXT60	5.938 x 4.938 x 86.750	E4B415	[illegible].938	10,598	10,598	180	79

Note:
RIGHT ANGLE SHAFT MOUNTED REDUCERS MAY CREATE OVERHUNG LOADS AND/OR REQUIRE TIGHTER THAN STAN[illegible]RD SHAFT TOLERANCES OR SHAFT EXTENSION TIR.
PLEASE CONTACT PPI ENGINEERING FOR ASSISTANCE IF THIS DRIVE OPTION IS USED.

IDLERS

	TROUGHING SIDE	RETURN SIDE
CEMA Series	EP	EP
Basic Load (lb)	692	235
Calculated Idler Load (lb)	1,053	275
CEMA Rated Load (lb)	2,100	930
Minimum L10 Life (hr)	818,723	15,835,884
Rotational Speed (rpm):	318	318

Qty	Part #	Description
2	E6P-20TE-66SB	20° Troughers, 4.0 ft. spacing
309	E6P-35TE-66SB	35° Troughers, 4.0 ft. spacing
10	E6P-35TEI-66SB	35° Impact Troughers, 1.0 ft. spacing
12	E6P-35TESA-66SB	35° Trough Trainers
118	E6P-R-66SB-4	Flat Return, 4.5 in. Drop, 10.0 ft. spacing
12	E6P-RSA-66SB-4	Flat Return Trainer, 4.5 in. Drop

Designed by: **Dallas Houchins** | **Precision Inc.** | Email: dhouchins@ppi-global.com | Phone: 5153600570

Belt Width (in):	66
Belt Speed (fpm):	500
Belt Load (stph):	2,241
Horizontal Centers (ft):	1,302.0
Vertical Centers (ft):	102.5
Incline/Decline Angle (°)	4.5

POWER AND TENSION

	Running	Full Motor
HP	401.5	2 x 250.0
Effective Tension (Te)	25,177	33,000
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ALL TENSIONS ARE IN LBF

Drive Pulley Rotational Speed (rpm): 76.4

Bucket Elevator Design

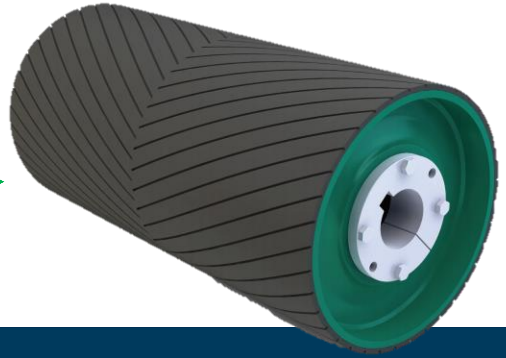
Engineer:	Ron Schuring	
Customer:	Bulk Conveyor	
Project:		
	INPUTS	
Bucket info		
Bucket Weight (lbs/bucket)	3.64	Use only if total bucket weight is unknown
Bucket Spacing (inches)	10	Use only if total bucket weight or capacity and motor horsepower unknown
Rows of Buckets	3	Use only if total bucket weight or capacity and motor horsepower unknown
Bucket Capacity (cubic inches)	273.4	Use only if capacity and motor horsepower unknown
Percent fill (eg 75 for 75%)	100	Use only if capacity and motor horsepower unknown
Belt Info		
Belt Weight (lbs/ft)	2.8	Use only if total belt weight is unknown
Belt Speed (ft/min)	603	Always use this value if available
One Half the Total Bucket Weight (lb)	5000	Use this value if known
One Half the Total Belt Weight (lb)	6000	Use this value if known
Drive Info		
Drive Pulley Diameter including lagging (in)	49	Use this value only if belt speed is unknown
Drive Pulley Rotation (rpm)		Use this value only if belt speed is unknown
Drive Pulley Lagging (Y/N)	Y	Always use this value
Elevation (feet)	260	Use only if motor horsepower or total bucket weight are unknown
Capacity (Tons/hr)	1100	Use only if capacity is known and motor horsepower is not known
Material Density (lbs/cubic foot)	55	Use only if capacity or motor horsepower unknown
Motor Horsepower (hp)	350	Always use this value if it is available

Bucket Elevators

	OUTPUTS	
Belt Speed	603	Belt speed used in calculations. Always used.
Capacity (Tons/hr)	N/A	Capacity used in calculations. Used only if motor horsepower is unknown.
Number of buckets on one side of conveyor	N/A	Number of buckets on one side of the conveyor. Used only if the bucket weight or motor horsepower are unknown.
1/2 weight of belt and buckets	11000	One half the total weight of belt and buckets. Always used.
Material Weight (lbs/foot of belt length)	N/A	Pounds of material held per foot of belt length. Used only if motor horsepower is unknown.
Flexure resistance	N/A	Pounds of force required to bend belt around pulleys. Used only if motor horsepower unknown.
Tension to accelerate material	N/A	Pounds of force required to accelerate material. Used only if motor horsepower is unknown.
Wrap factor	0.8	Wrap factor based on whether or not there is lagging on the head pulley. Always used.
Effective Tension	19154.23	Effective tension across the drive pulley. Always used.
T2	15323.38	T2 on the drive pulley. Always used.
T1	34477.61	T1 on the drive pulley. Always used.
T Tail	4323.383	Tension on both sides of the tail pulley. Always used.
Motor Horsepower	350	Motor horsepower used for calculations. Always valid.

Pulley Refurbishment Service

- Inspection of all pulley components
- Recommendations for reusing/new components of pulley
- Strip and relag
- Higher resolution testing available
- More cost effective for larger pulleys
  - Consider freight, cost benefit of new, and chance of failed integrity upon review



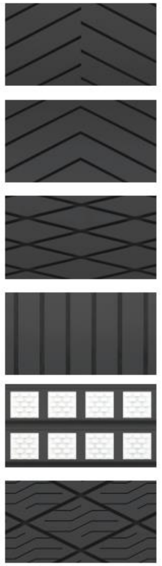
Pulley Refurbishment Services

Pulley Solutions

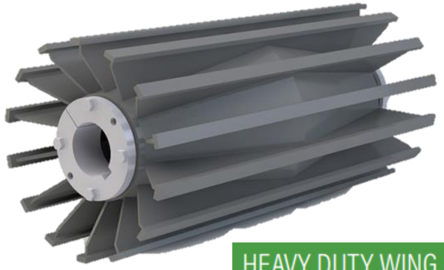
Material buildup on belt and pulleys

- Belt scrapers
- Wing pulleys
- Lagging options
- Belt sprays
- Air knife

HERRINGBONE WING® PULLEY



MINE DUTY WING PULLEY

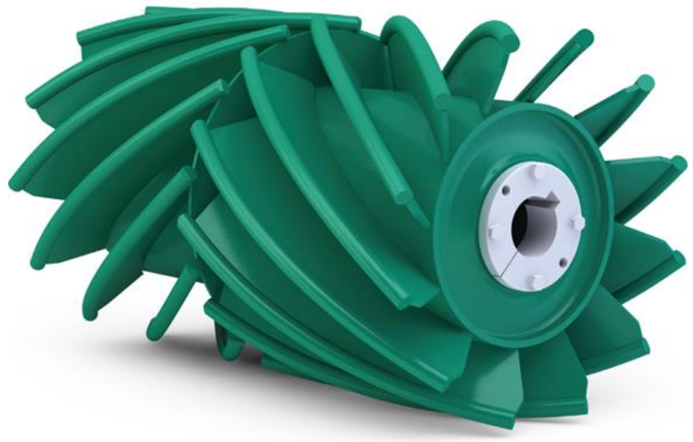


HEAVY DUTY WING (HDW) PULLEY

Pulley Solutions – Herringbone Wing (HBW)

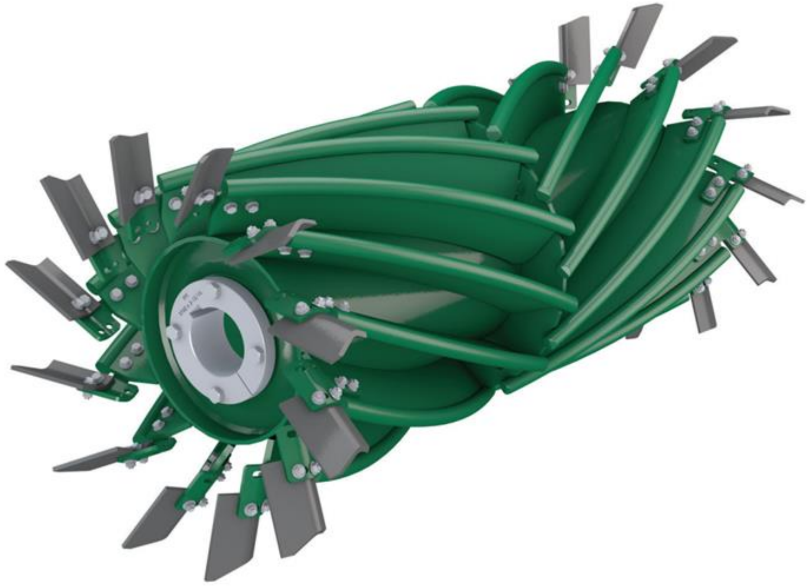
Herringbone Wing Pulley (HBW)

- Available in two classes:
- CEMA HBW
  - ¾” wings
  - No contact bar, wing acts as wear surface
  - Normally used on small diameter <12”
  - Or boot pulleys on bucket elevators
- HBW
  - 3/8” wings
  - 1” cold drawn round contact bar diameters <24”
    - 1-1/4” diameters ≥24”
  - Optional 1” AR400 round bar
    - Optional 1-1/4” AR400 bar on diameters ≥24”



Grain Herringbone Wing Pulley

PPI's Grain Herringbone Wing combines improved wear, quieter operation and gentle grain handling compared to standard wing pulleys



FEATURES AND BENEFITS

- Bolt-on brackets with rubber flippers gently scoop up grain and circulates it back onto the belt
- Angled wings direct grain to the outside edges of the pulley more efficiently
- Increased number of wings gives more support to thin grain belting
- 3/8" wings standard, 1" AR contact bar extends wear life

Grain Herringbone Wing Data Sheet

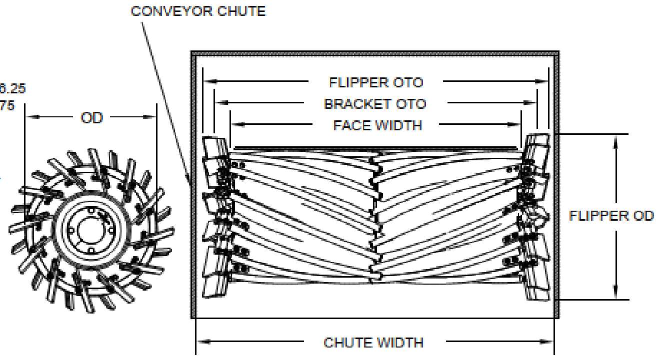
GRAIN HERRINGBONE WING DATA SHEET

BELT WIDTH MUST BE LESS THAN FACEWIDTH
TYPICAL FW IS BW +1.5" OR 5.5" FOR WIDER BELTS

(RUBBER) FLIPPER OD = PULLEY OD + 3.625
OUT TO OUT OF (RUBBER) FLIPPERS = FACE WIDTH + 6.25
OUT TO OUT OF FLIPPER BRACKET = FACE WIDTH + 3.75

GRAIN HBW HAS AR BAR AND EXTRA WINGS
BRACKET HAS 1/2" OF ADJUSTMENT IN BOLT HOLES
THAT ARE SLOTTED. BRACKETS ARE SHIPPED LOOSE.

FLIPPER OTO	
FLIPPER BRACKET OTO	
BELT WIDTH	
FACE WIDTH	
CHUTE WIDTH	
PULLEY DIAMETER (OD)	
FLIPPER OD	



COMPANY NAME ______________________

LOCATION ______________________

CONTACT NAME ______________________

PHONE ______________________

E-MAIL ______________________ NOTES ______________________

DATE ______________________

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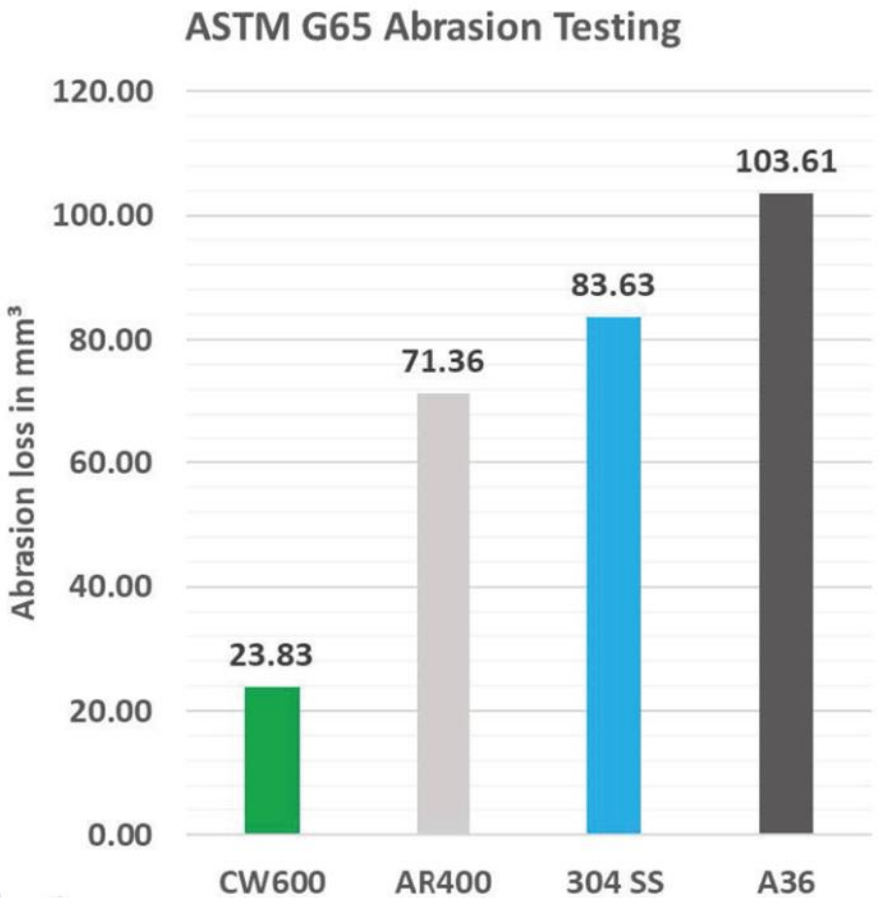
ContinuWing® Technology

- Provides unmatched wear resistance in abrasive applications
  - Chromium carbide
- Contact bars twisted for optimal belt contact
- Wings formed with crown for belt tracking

ContinuWing® Technology



3-4 times wear life of AR400 round bar

harder than AR400

- Not key factor in abrasion resistance

Austenite (Gamma Iron)

- Specific crystal structure to iron/carbon mix and heat treatment
- Structure increases sliding wear resistance

Boot Herringbone Wing® Pulley

- Long lasting
- Quiet operation
- Gentle on grain
- Sensor ring for use with proximity or heat sensors
- AR contact bar extends wear life

PPI Lagging

Lagging Options to Consider

- Thickness & Compounds
  - Resistances
  - Durometer (Hardness)
  - Economical
- Grooving
  - Diamond
  - Herringbone
  - Chevron
  - Etc.

- Adherence
  - Cold bond
  - Hot Vulcanized
  - Craft-lag
- Ceramic tile options
  - VEC
  - Richwood Combi-Grip
  - Smooth/Rough tiles
  - Tile thickness

Why is Lagging Used/Important?

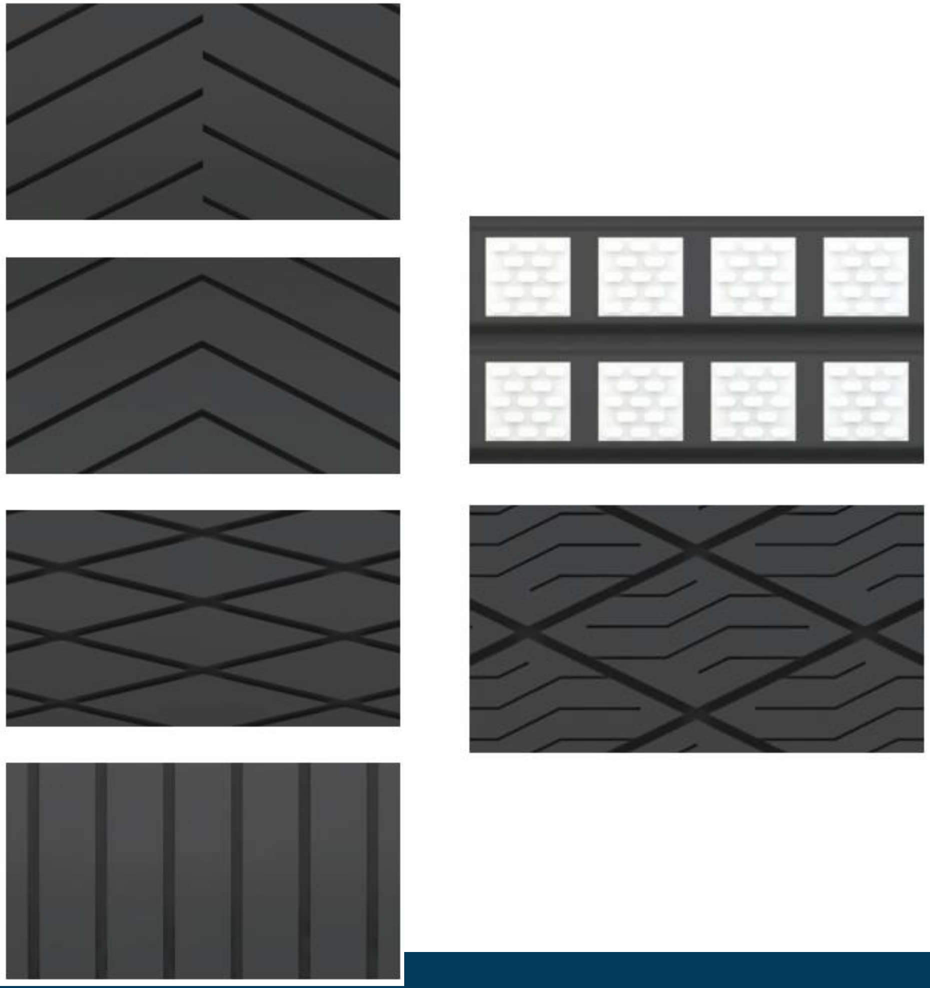
- Provides increased friction at belt/drive interface
  - Due to higher friction factor between belt and pulley
  - Rubber to rubber > Rubber to steel
  - Ceramic to rubber > Rubber to rubber

Pulley/Lagging surface and Belt Surface Coefficient of Friction	
0.25	Rubber belt on bare steel pulley
0.35	Rubber belt on rubber lagged
0.50	Rubber belt on patterned hard surfaces (i.e. Ceramic Lagging)

From CEMA Belt Conveyors for Bulk Materials (7^{th} Edition), p.206

Why is Lagging Used/Important?

- Wear life
  - Wear of non-structural material of pulley
  - Abrasive/Corrosive environment resistances
  - Relag for continued pulley life
- Material properties
  - MSHA/OSHA safety requirements
    - Flammability/Static resistances
  - Temperature resistance
  - Oil resistance, gas permeation resistance, etc



Why is Lagging Used/Important?

- Application considerations
  - Environment: moisture, cold, hot, dusty, muddy, etc.
  - Past issues
    - Belt tracking
    - Belt slippage
  - Conveyed product
  - Pulley accessibility

Chemical and Environmental Properties

LAGGING COMPOUND			CHEMICAL RESISTANCE PROPERTIES						REMARKS
Material	Shore A Duro ±5	Color	Oil & Gas	Animal/Veg. Oils	Alcohols	Alkalies	Acids	Oxygen Solvent	
SBR	45,60,70,80,90	BLACK	D	C	B	C	C+	B	Low Cost
NEOPRENE	45*,60*,75	BLACK	C+	B	B+	A	B	D+	Grain & MSHA
URETHANE	45,60,90	RED	B+	B	C+	D	D+	D	Low Temp
NITRILE	45,60	BLACK	B+	B+	C+	B+	B	D	Oil Resistant
EPDM	60-BLK,70-WHT	BLK/WHT	D	B	C+	B+	B	B+	High Temp
NATURAL	60,70-BLK/60-WHT	BLK/WHT	D	C	B	C	C+	B	
NEOPRENE(FDA)	60	WHITE	C+	B	B+	A	B	D+	Food Service
NITRILE(FDA)	50,90	WHITE	B+	B+	C+	B+	B	D	Food Service

A-Excellent, B-Good, C-Fair, D-Poor. *Requires a stamp for MSHA Approval.

LAGGING COMPOUND			ENVIRONMENTAL RESISTANCE PROPERTIES						
Material	Shore A Duro ±5	Color	Oxidation	Ozone	Weathering	Sunlight	Water	Flame	Heat
SBR	45,60,70,80,90	BLACK	C+	D	C	C	B+	D	C+
NEOPRENE	45*,60*,75	BLACK	B+	B	B	B+	B	B*	C+
URETHANE	45,60,90	RED	B+	A	B+	B+	B	D+	C+
NITRILE	45,60	BLACK	C+	D	C+	D+	B+	D	B
EPDM	60-BLK,70-WHT	BLK/WHT	B+	A	A	A	A	D	B+
NATURAL	60,70-BLK/60-WHT	BLK/WHT	C+	D	C	D+	A	D	C
NEOPRENE (FDA)	60	WHITE	B+	B	B	B+	B	B	C+
NITRILE (FDA)	50,90	WHITE	C+	D	C+	D+	B+	D	B

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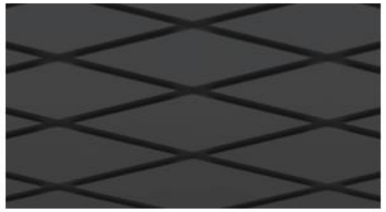
Lagging Grooving

HERRINGBONE GROOVE LAGGING (HBG) - The style of lagging required is usually influenced by operating conditions. With this style grooving, the points do not meet in the middle. This is normally used in drive pulleys, as water is channeled away from the center of the pulley/belt by the grooves (3/8" minimum thickness).

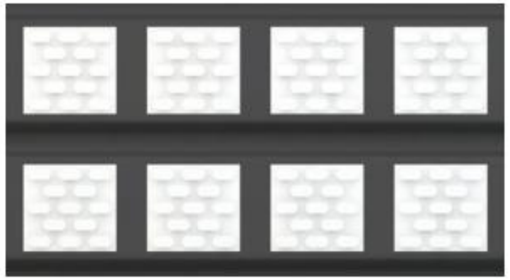
CHEVRON GROOVE LAGGING (CHE) - Some prefer having the points meet, as done in Chevron. This is normally used in drive pulleys, as water is channeled away from the center of the pulley/belt by the grooves (3/8" minimum thickness).



DIAMOND GROOVE LAGGING (DIA) - Diamond, sometimes referred to as double herringbone, is primarily, used for reversing conveyor drive pulleys. It is also often used for spare pulleys so that it can be used in either direction (3/8" minimum thickness).

CIRCUMFERENTIAL GROOVE LAGGING (CIR) - Circumferential Groove Lagging is used on non-drive pulleys for wet applications OR for cold temperatures. It allows the lagging to deflect and keeps material from building up on the lagging extending the temperature range of the lagging (3/8" minimum thickness).

Lagging – Ceramic Tiles & Craft-Lag



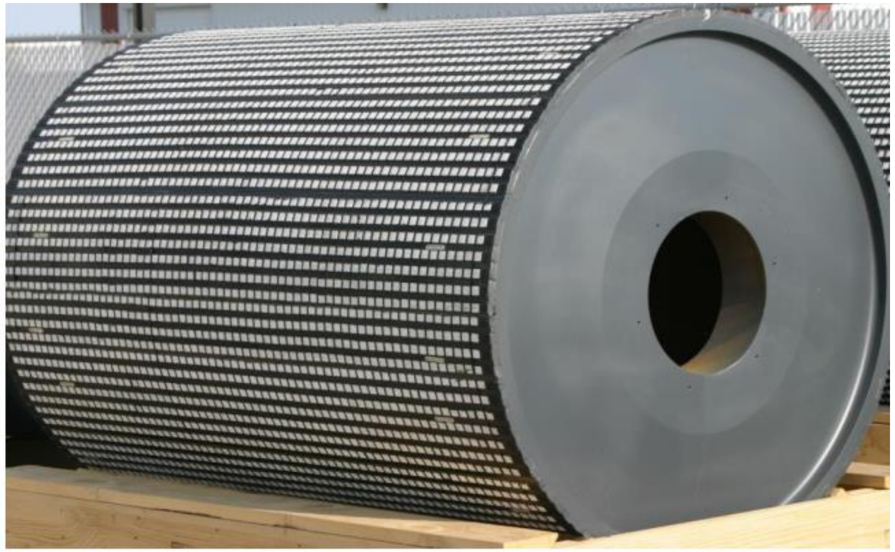
CERAMIC LAGGING - Ceramic lagging is a premium lagging where the ceramic tiles are molded into a rubber compound which makes for excellent traction, eliminates slippage, and offers excellent abrasion resistance. Available in 3 thicknesses; 5/8, 3/4 and 1". For tensions up to 1500 PIW, PPI recommends 5/8" and 3/4". For tensions over 1500 PIW please contact PPI Engineering Department as 1" thickness may be required.

CRAFT-LAG® REPLACEABLE LAGGING - Craft-Lag is bonded to rigid steel backing, which is then formed to a specific diameter. Craft-Lag can be used with or without retainers and is ideal for mining, crushed stone, sand and gravel, cement, agriculture, food processing, coal mining, power plants, feed and grain, and general industry.

Ceramic Tile Lagging – Partner Ceramic

- Richwood & Flexco premium options available
  - Various tile coverage and sizes (≈15%-50% Options)
  - Dimpled or smooth tiles?
- Ceramic tiles molded into rubber compound
- Hot vulcanized to our pulley structure
- Eliminate slippage by increasing traction
- Abrasion resistant
- Great for high & low tension applications
  - > 1500 PIW possible

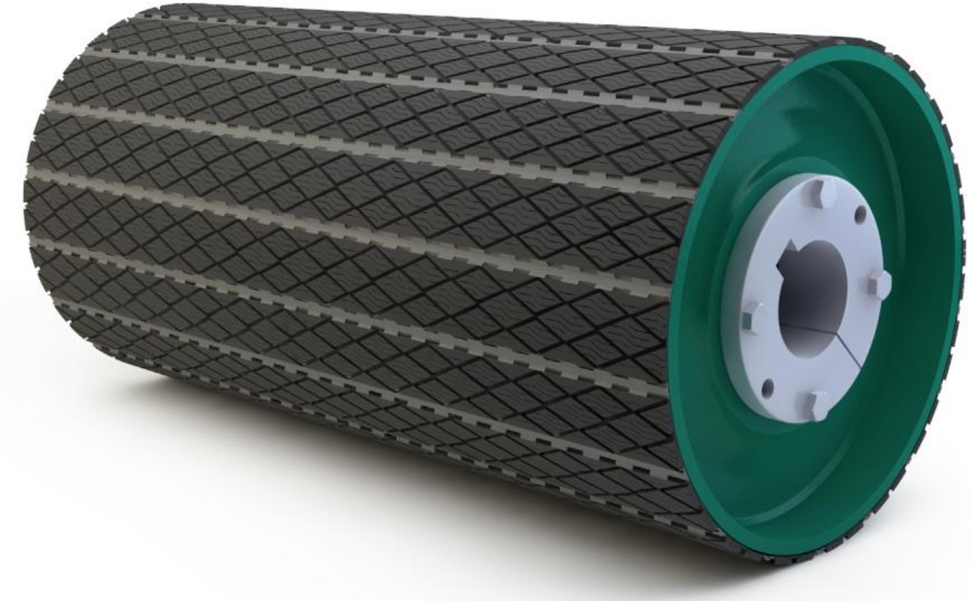
15 % Tile Coverage



48 % Tile Coverage

Craft-Lag

- Designed for field replacement
- Installed with retainers welded or bolted
- Ideal for less accessible pulleys (Bucket elevator head)
- Hot vulcanized rubber to backing plate
- Precision formed at the factory
- Grooving and spacing creates self cleaning properties
- Available in virtually all our compounds
  - Static conductive & fire retardant
- Ceramic options available

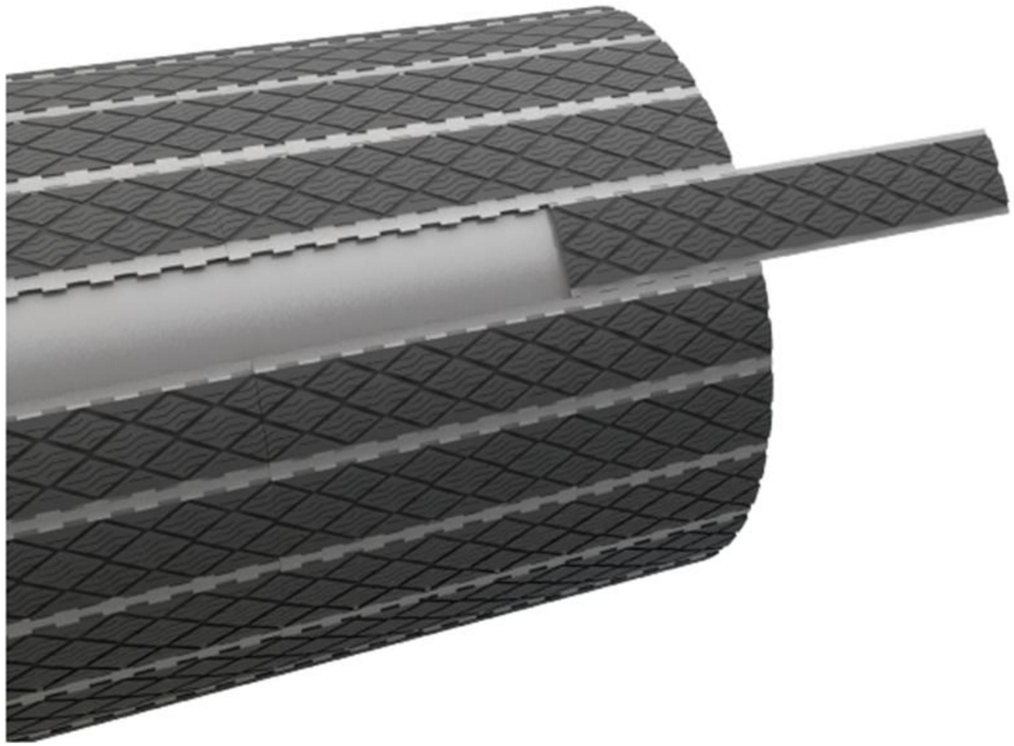


* Interchangeable with Holz brand Lagging

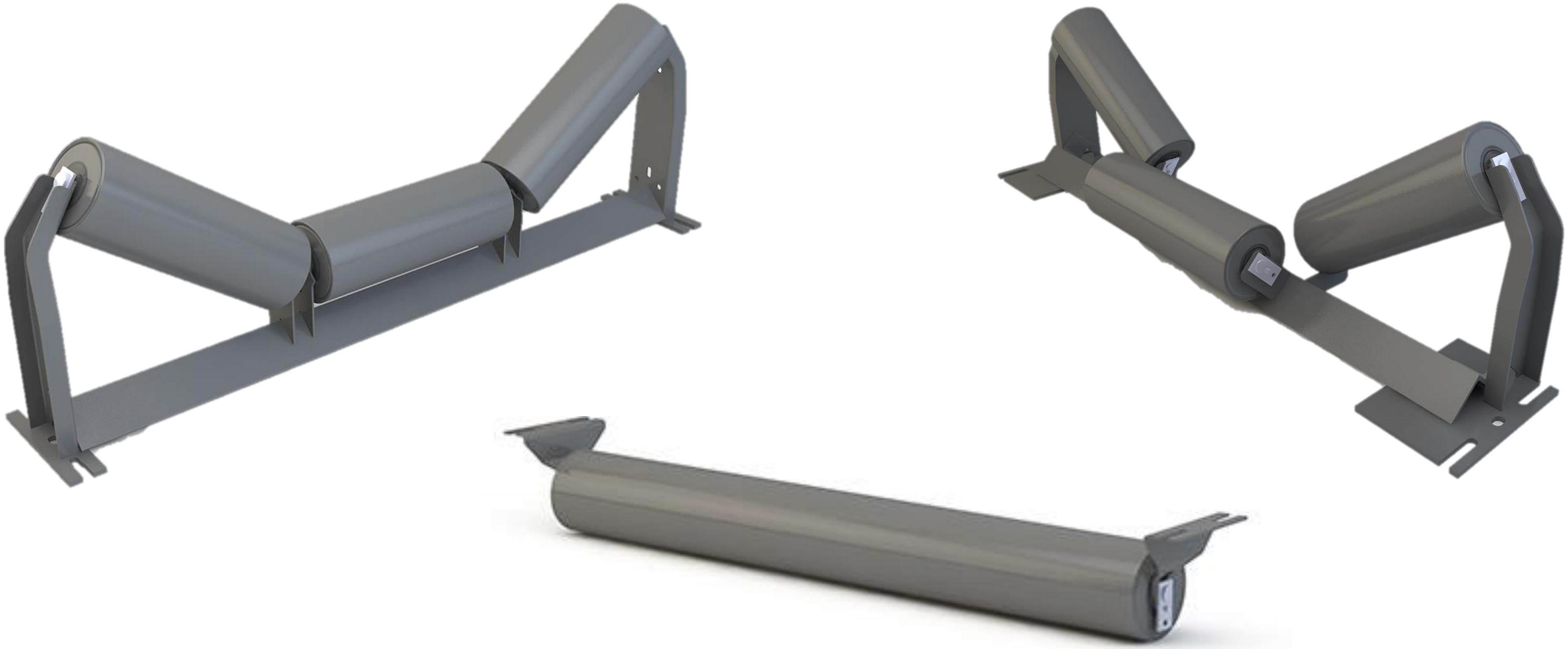
EZ Lag

- Field replaceable lagging
- Perforated backing forms to any pulley DIA > 12”
- Reduces inventory
- Interchangeable w/ Craft-Lag
- Available in 60 durometer

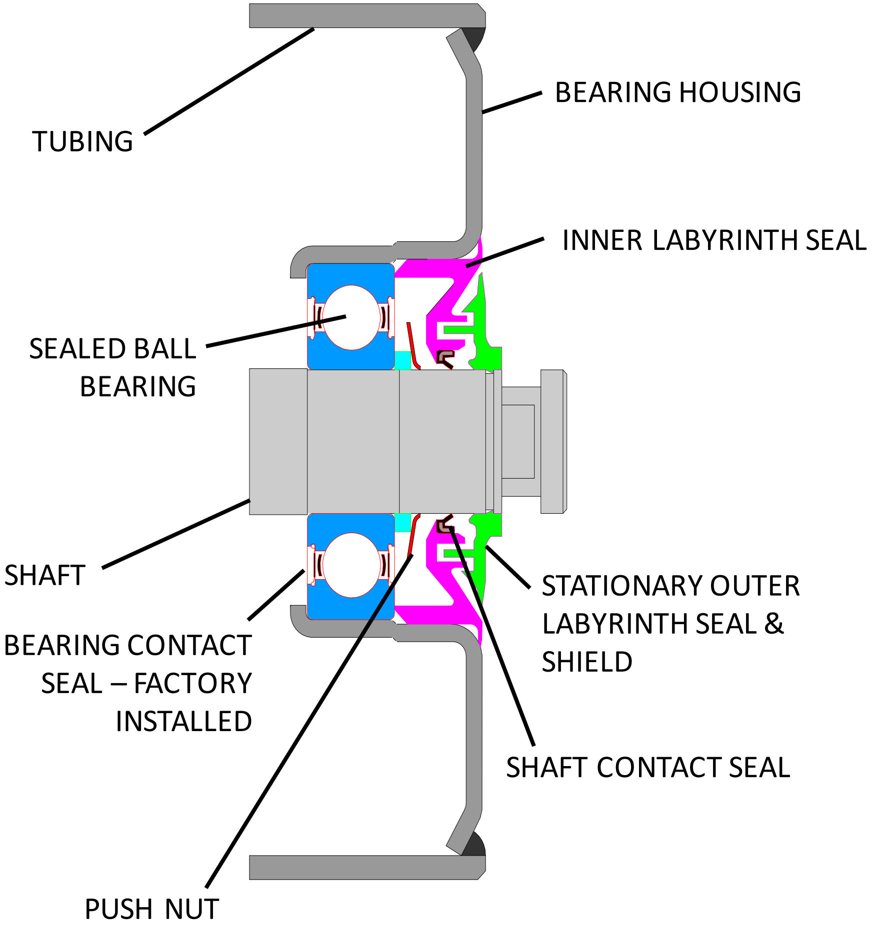
  SBR & Neoprene



Idlers in Grain Applications

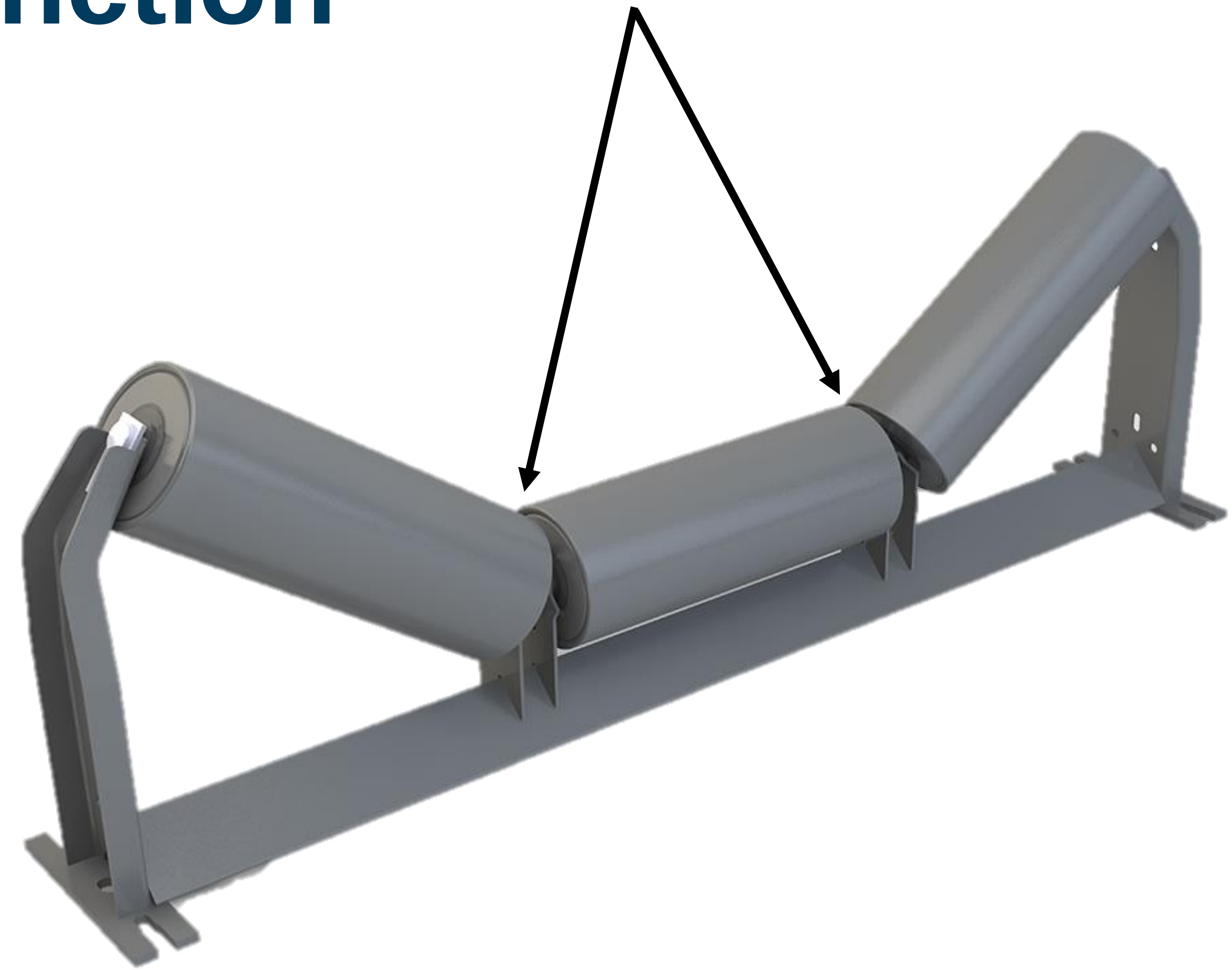


Regreasable vs. Sealed



- Regreasable idlers
  - Maintenance heavy design
  - Rolls would inevitably wear even if bearings maintained
  - Required a ***large idler junction*** to house grease fittings
  - Potential to fill can with grease
- Sealed bearing idlers
  - Reduced maintenance requirements
  - Wear item to be replaced (price ↓)
  - Simple design for manufacturing
  - ***Reduced idler junction***

Idler Junction

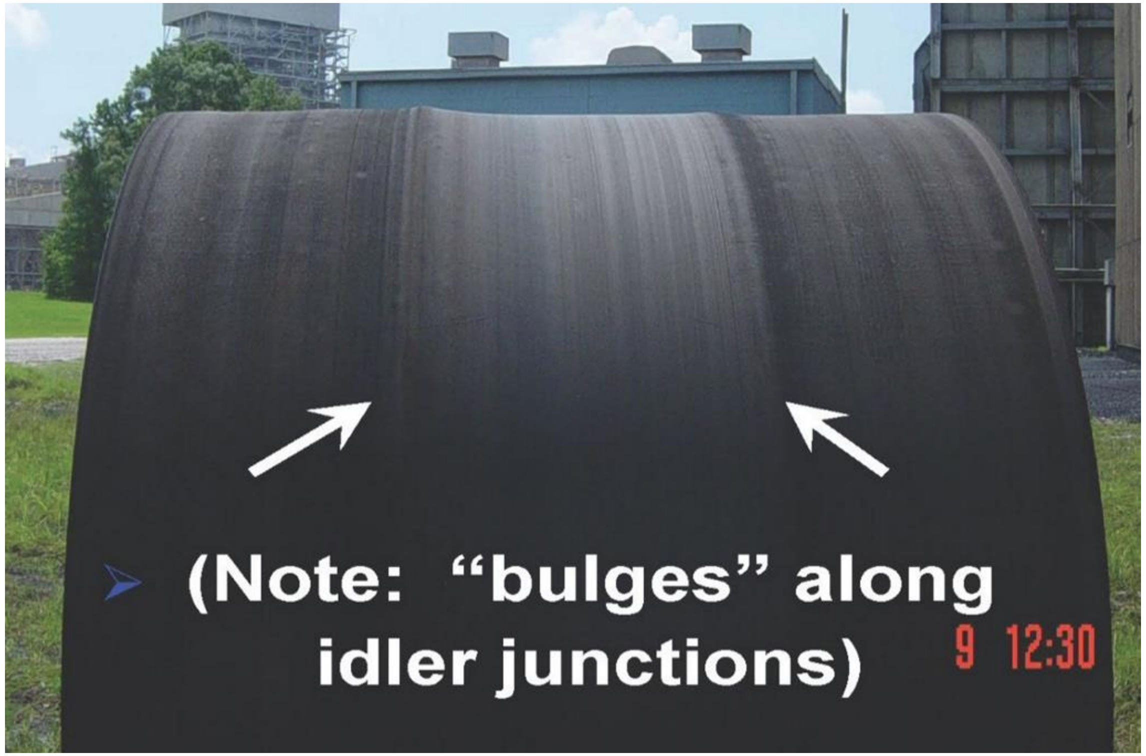


Idler Junction Failure

- Is the belt TOO “Troughable”?
  - Light weight belting known for this is common in the grain industry

Idler Junction Failure

- Belt does not support itself over the junction between idlers



Idler Junction Failure

- Can pull belt plies apart
- belt integrity/strength concerns
- Leads to tracking issues

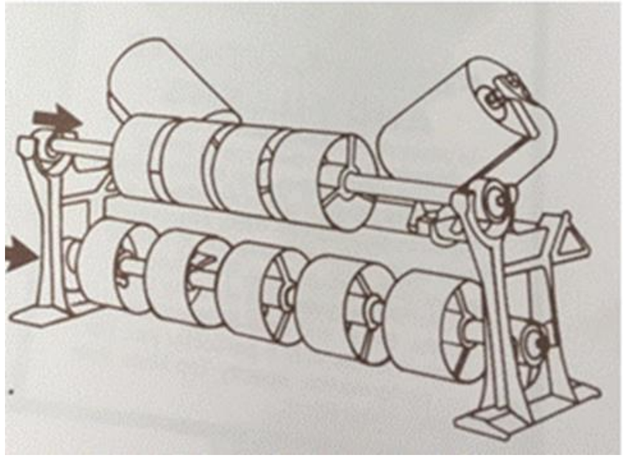
Inline vs. Offset

Solution: Grain Idlers

- Designed to preserve lightweight belting
- Offset center roll design to eliminate pinch points
  - i.e. Idler Junction Failure
- Available with CEMA C and D idlers
- Available in wide base
- Steel idlers or rubber discs

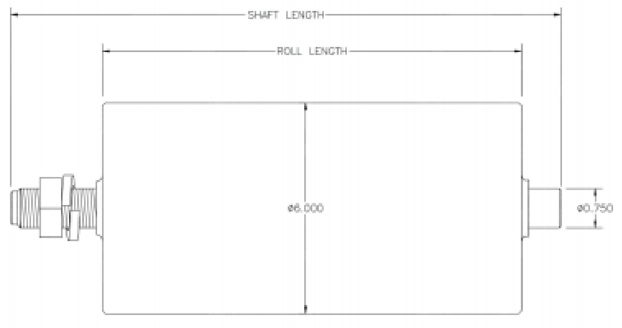
EHRSAM Grain Idler/Structure

- Heavy cast iron structure (top)
- Offset design for grain industry
- Built in Enterprise, KS until the late 1970’s
  - Bought out and then product support faded
- Currently supported w/ retro rolls and full replacement (bottom)



Retro Grain Idler

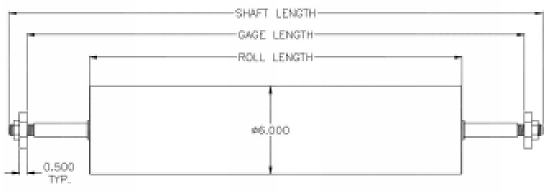
TROUGHING WING RETRO ROLL



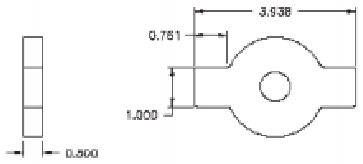
PART NUMBER	ROLL DIAMETER	SHAFT DIAMETER	ROLL LENGTH	SHAFT LENGTH
AE794-8.375A*	6.000	0.750	8.375	11.000
AE738-8.500A	6.000	0.750	8.500	11.000
AE595-8.750A	6.000	0.750	8.750	11.000
AE257-9.000A	6.000	0.750	9.000	11.000

*Standard option

TROUGHING CENTER/RETURN RETRO ROLL WITH WING NUT ADAPTER



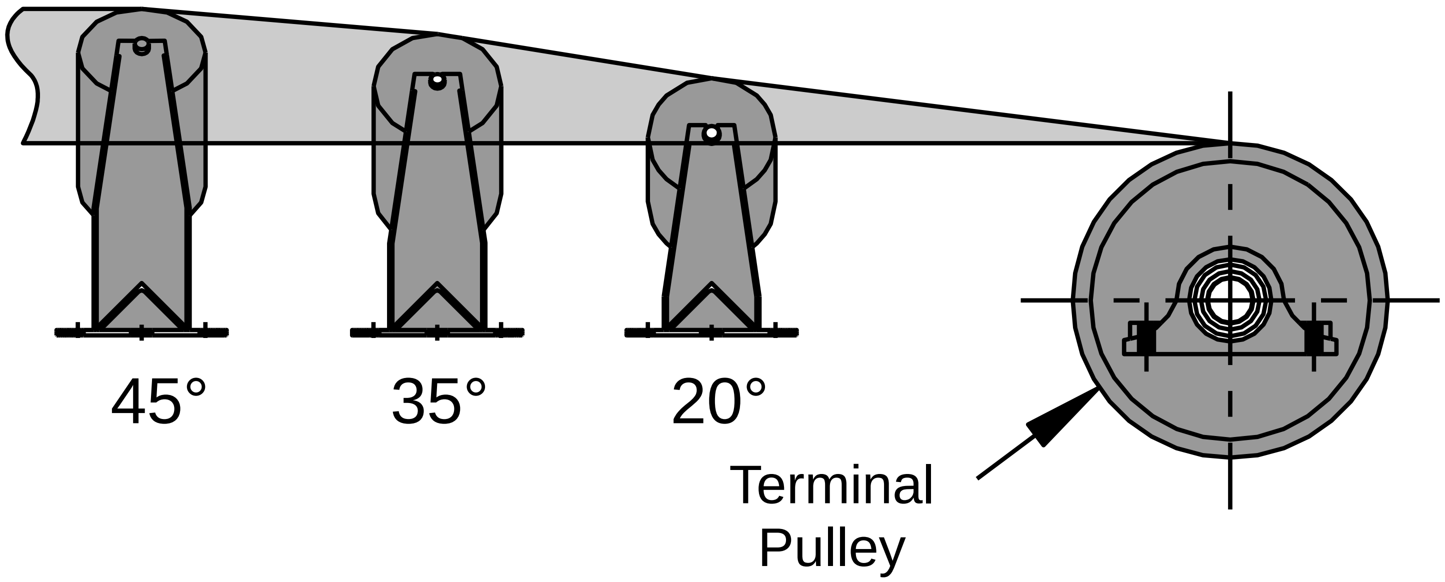
WING NUT DETAIL – P/N 40349



PART NUMBER	ROLL DIAMETER	SHAFT DIAMETER	ROLL LENGTH	GAUGE LENGTH	SHAFT LENGTH
AF245-27.000	6.000	0.750	27.000	32.000	35.500
40339-29.000	6.000	0.750	29.000	39.563	41.000
TB848-30.000	6.000	0.750	30.000	37.000	39.000
AF042-38.000	6.000	0.750	38.000	45.250	48.250
43421-12.000	6.000	1.000	12.000	16.000	18.500
AF914-14.000	6.000	1.000	14.000	32.000	34.000
AF914-21.000	6.000	1.000	21.000	38.750	41.000
TB401-23.500	6.000	1.000	23.500	32.750	35.500
AF914-28.500	6.000	1.000	28.500	46.000	48.500
AF939-28.750	6.000	1.000	28.750	45.250	46.750
43422-33.000	6.000	1.000	33.000	38.625	42.000
TB591-36.000	6.000	1.000	36.000	44.500	47.000
AF823-36.000	6.000	1.000	36.000	43.000	47.000
TB408-43.000	6.000	1.000	43.000	50.750	53.250
AE094-51.375	6.000	1.000	51.375	57.000	59.500

Alternate Cause: Belt Transition

- Transitions are important in conveyors, too little and it causes excessive wear of the belt and the pulley or pulley lagging

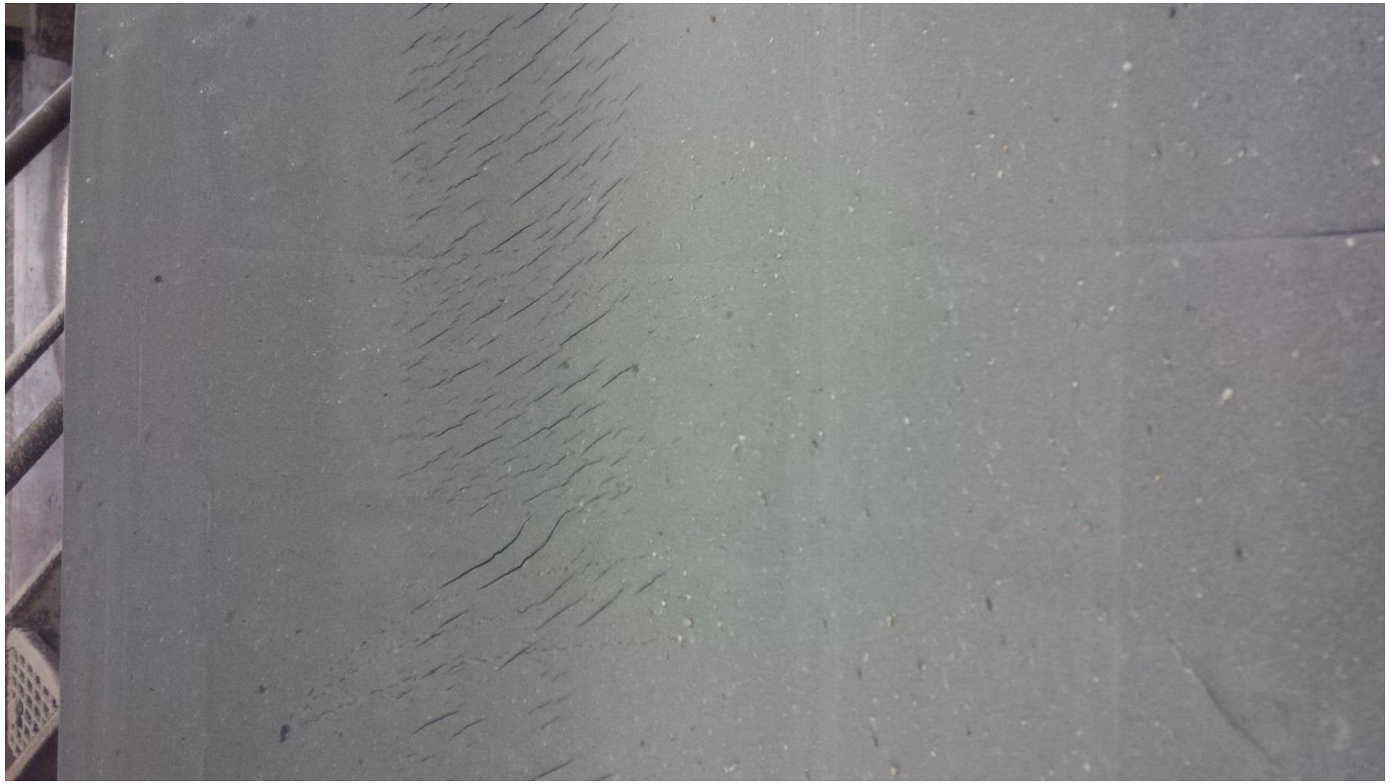


Belt Transition

- When troughers are too close to the pulley, the belt will buckle
- Which puts added stress and wear at the juncture of the troughers, 1/3 of the way across the belt

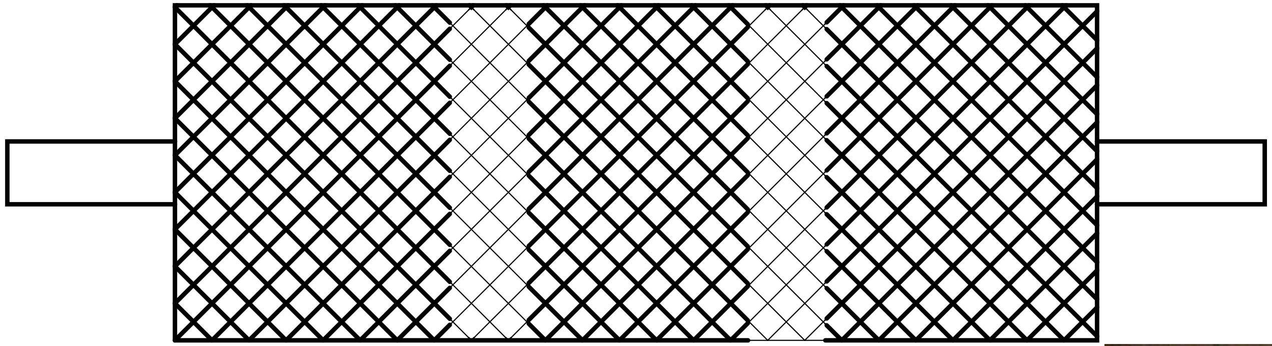
Belt Transition

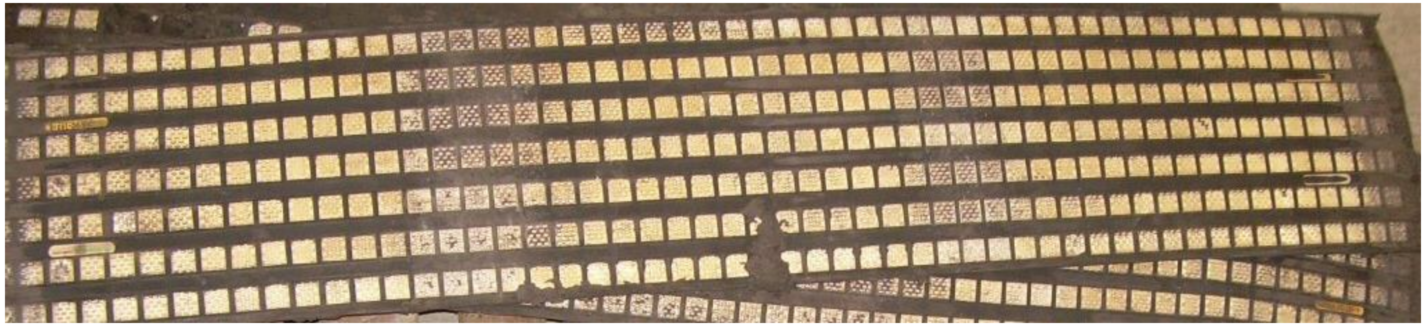
- Damage starting to occur due to too short of a transition



Belt Transition

- Lagging will wear on the pulley, that corresponding to the edge of the center roll (1/3) – even ceramic lagging will wear, and cause corresponding wear on the belt





CEMA Transition Distance Recommendations

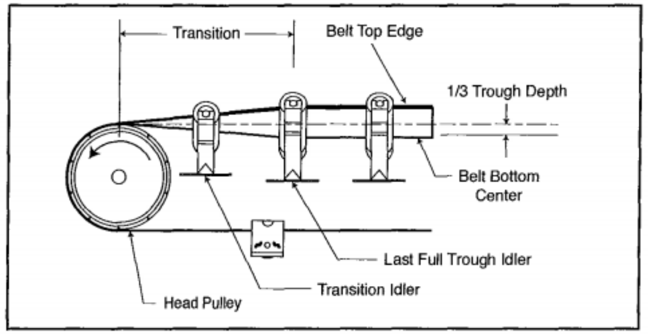


Figure 7.26
One third trough transition from last fully troughed idler to pulley

Idler Trough Angle	% Rated Belt Tension	Transition Distance = Factor × Belt Width (BW)	
		Fabric Belts	Steel Cord Belts
20°	> 90%	1.2	2.7
	60% to 90%	0.9	2.1
	< 60%	0.6	1.3
35°	> 90%	2.1	4.5
	60% to 90%	1.4	3.5
	< 60%	1.2	2.4
45°	> 90%	2.6	5.3
	60% to 90%	2.0	4.3
	< 60%	1.6	3.1

Table 7.27
One third trough minimum transition distance ratios

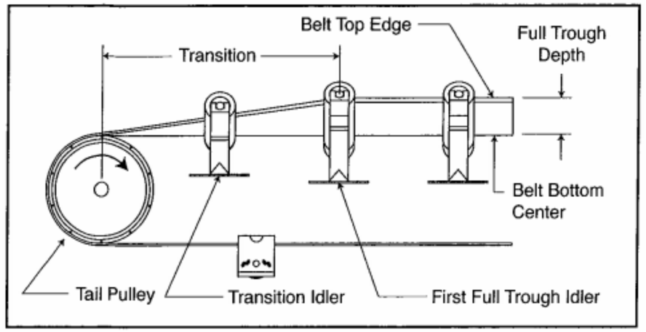


Figure 7.28
Full trough transition from tail pulley to first fully troughed idler

Idler Trough Angle	% Rated Belt Tension	Recommended Transition Distance = Factor × Belt Width (BW)	
		Fabric Belts	Steel Cord Belts
20°	> 90%	1.8	4.0
	60% to 90%	1.6	3.2
	< 60%	1.2	2.8
35°	> 90%	3.2	6.8
	60% to 90%	2.4	5.2
	< 60%	1.8	3.6
45°	> 90%	4.0	8.0
	60% to 90%	3.2	6.4
	< 60%	2.4	4.4

Table 7.29
Full trough CEMA recommended minimum transition distance ratios

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Pulleys & Idlers - Post Survey

SCAN FOR SURVEY

Please take a short survey for this session to help us plan for next year.

For every survey you submit you will be entered into a drawing.

GEAPS Prize Bundle

- $200 Visa Gift card and free registration to Leadership Conference
- Raffle will be drawn at Closing Celebration, Tue 2/28

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