

IDLERS & PULLEYS



Be'RolleX

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Need of the hour for material handling industry is to upgrade engineering and manufacturing technologies to meet ever growing need of increased conveying capacities combined with product reliability and cost effective solutions.

Pulleys and idlers play a very crucial role in material conveying. The core purpose of 'Be'RolleX' is to manufacture Innovative Idlers and Pulleys which meet market expectations like:

- ➔ High capacity conveying
- ➔ High speed conveying
- ➔ Low life cycle costs
- ➔ Low noise and vibrations
- ➔ Low energy consumption
- ➔ On time deliveries

To address the above said needs, a totally automated Idler & Pulley manufacturing plant, Be'RolleX has been established at Sricity in Andhra Pradesh, India. Salient feature of this manufacturing plant is that, it operates with the state-of-the-art technologies viz., automated robotics to ensure reliability and consistency of quality in idlers and pulleys manufacturing.

Be'RolleX is an organization where Value Innovation, Execution Excellence & "Customer for life" matters a lot. Be'RolleX manufactures extensive range of idlers and pulleys meeting Indian and international standards. Custom developed software allows us to optimize the component design and selection process whilst maintaining flexibility. Be'RolleX in-house testing facilities allow for continual product monitoring to meet every customer demand as promised.



As a Solution Provider

Be'RolleX is an associate company of Bevcon Wayors who is a leading material handling projects and equipment supplier for the last two decades in India. Known for bringing in best of new generation technologies for the material handling industry, Bevcon invaluable industry experience is a fuel to the growth of Be'RolleX.

Exceptional product application knowledge and industrial experience allow Be'RolleX engineers to develop products designed for new generation material handling demands. Be'RolleX can deliver both catalogue and customize products to meet customer requirements.

As a part of our service offering, we provide complete belt conveyor design services that include selection and recommendation of various conveyor components including pulleys, idlers, drive system and other accessories.

Be'RolleX product development and innovation is based on close interaction of our engineers with Industry experts. All products and developed solutions are constantly tested in our own testing center.

Our Core Values

At Be'RolleX, treating people & partners with respect, dignity and compassion is the way of conducting business and governance. Commitment and conviction to this philosophy has led Be'RolleX to build an enduring organization.

The Core Values of the organization christened as "PEAK" stands for

- P - Personal Humility** : Demonstrating compelling modesty
- E - Execution Excellence** : Delivery of results, innovatively, flawlessly, timely & cost effectively
- A - Agile** : Adapting quickly to new challenges, spotting opportunities and threats
- K - Knowledge Mastery** : Learning is the strategy in times of change



Our Mission

Manufacturing of Idlers and Pulleys in a state-of-the-art plant to meet current and future bulk material handling needs through Value innovation.

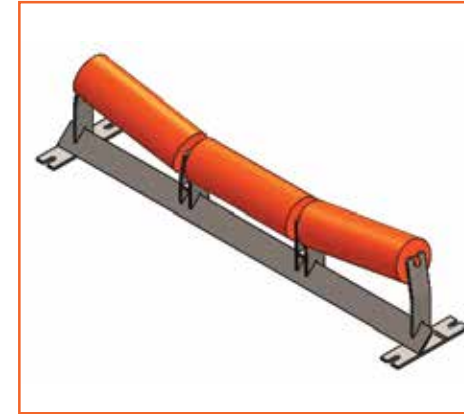
Our Vision

To be the Market Leader in Bulk Material Handling and Processing Solutions through Dynamism, Innovations, Technologies, Operational Excellence and Enhanced Value for Stakeholders and the Society.



IDLERS

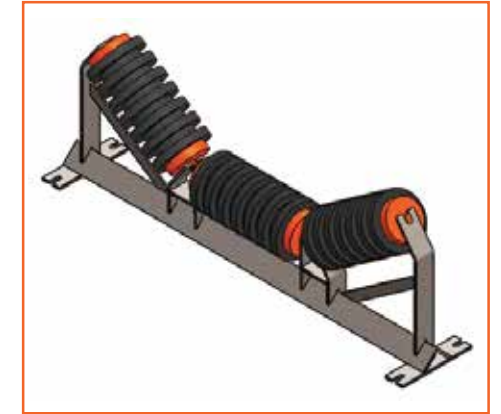
Types of Idlers (Carrying, Return & Special)



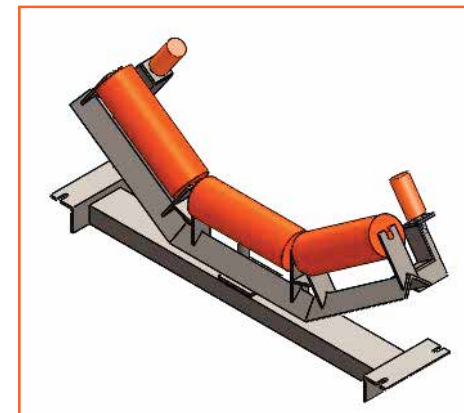
Transition Idler



Carrying Idler



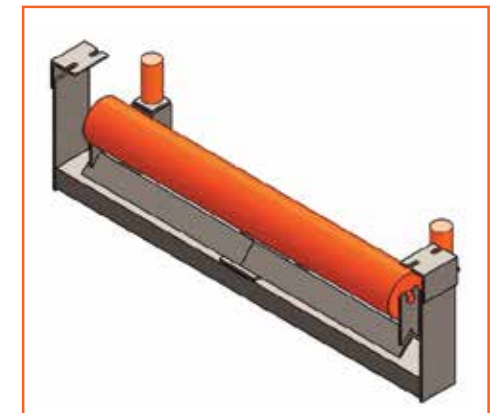
Impact Idler



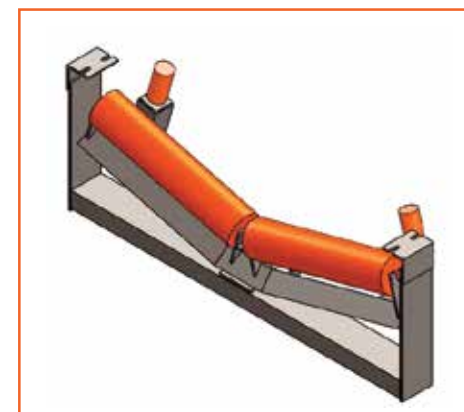
Self Aligning Carrying Idler



Return Flat Idler



Self Aligning Return Flat Idler



Self Aligning "V" Return Idler



Return Disc Idler

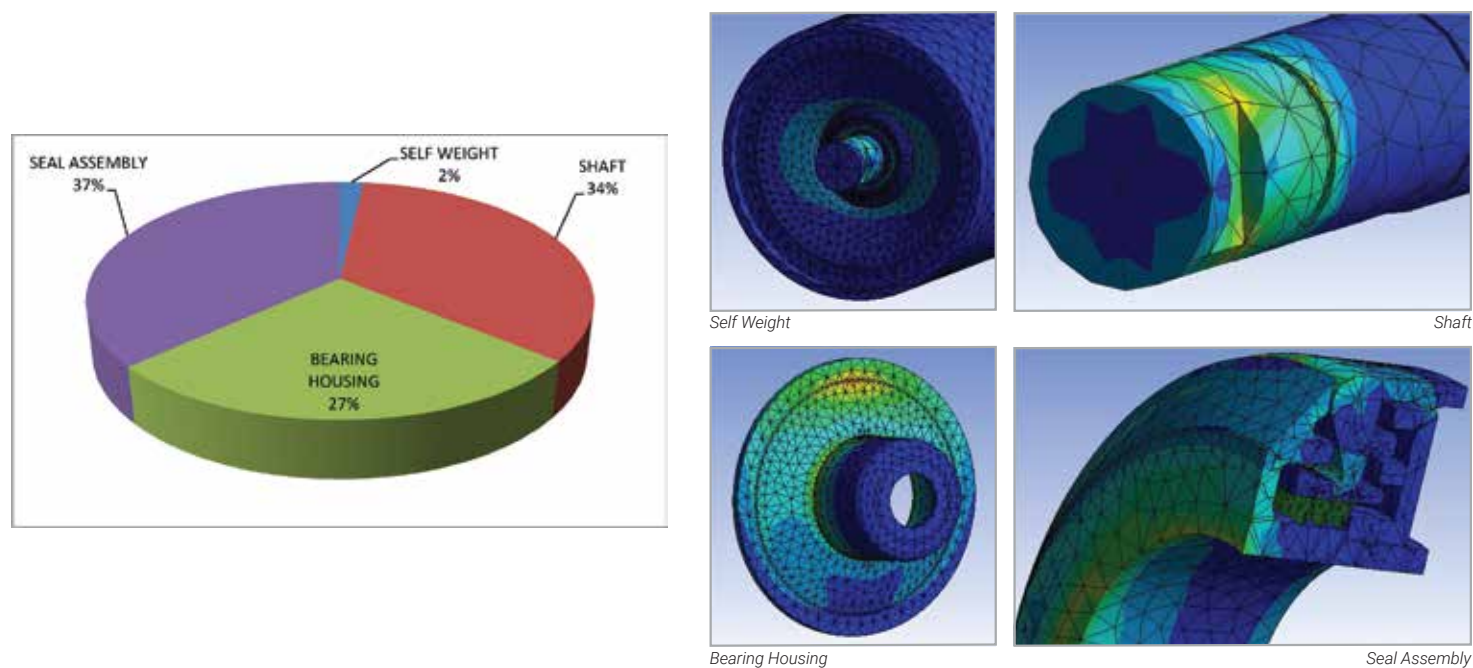


Garland Idler

Be'RolleX specializes in supply of conveyor Idlers and Idler brackets to meet critical requirements of bulk material handling industry and based on internally developed design softwares, leverages technology to optimize cost and performance in real time application.

- ⇒ **IDaAT (Idler Design and Analysis Tool)**: for Selection of rollers considering, idler bearing life expectancy, deflection and other aspects of idler engineering.
- ⇒ All the seal designs are subjected to Computational Fluid Dynamics (Fluid Flow and Ingress Analysis) for effective performance in real time operation.
- ⇒ **IBSAT (Idler Bracket Structural Analysis Tool)**: to determine stress, static and dynamic deformation condition the bracket undergoes under real time operating conditions and in selection of optimal structural members to maintain rigidity and avoid fatigue .

Be'RolleX design engineering team uses AutoCAD and Inventor Solid Edge modeling to design and verify suitability of conveyor components, produce manufacturing drawings and 3D models for integration into conveyor designs.



Idler Performance Test

At Be'RolleX, idlers are subjected to the following tests:

- ⇒ Over all dimensional check
- ⇒ TIR – Total Indicated Run out
- ⇒ MIS - Maximum Inclination of Slope
- ⇒ Sealing effectiveness test for the dust ingress
- ⇒ Sealing effectiveness test for the water ingress
- ⇒ Friction or Drag test
- ⇒ Assessment of breakaway mass
- ⇒ Noise and Vibration
- ⇒ Axial float
- ⇒ Balance test



Dust resistance test



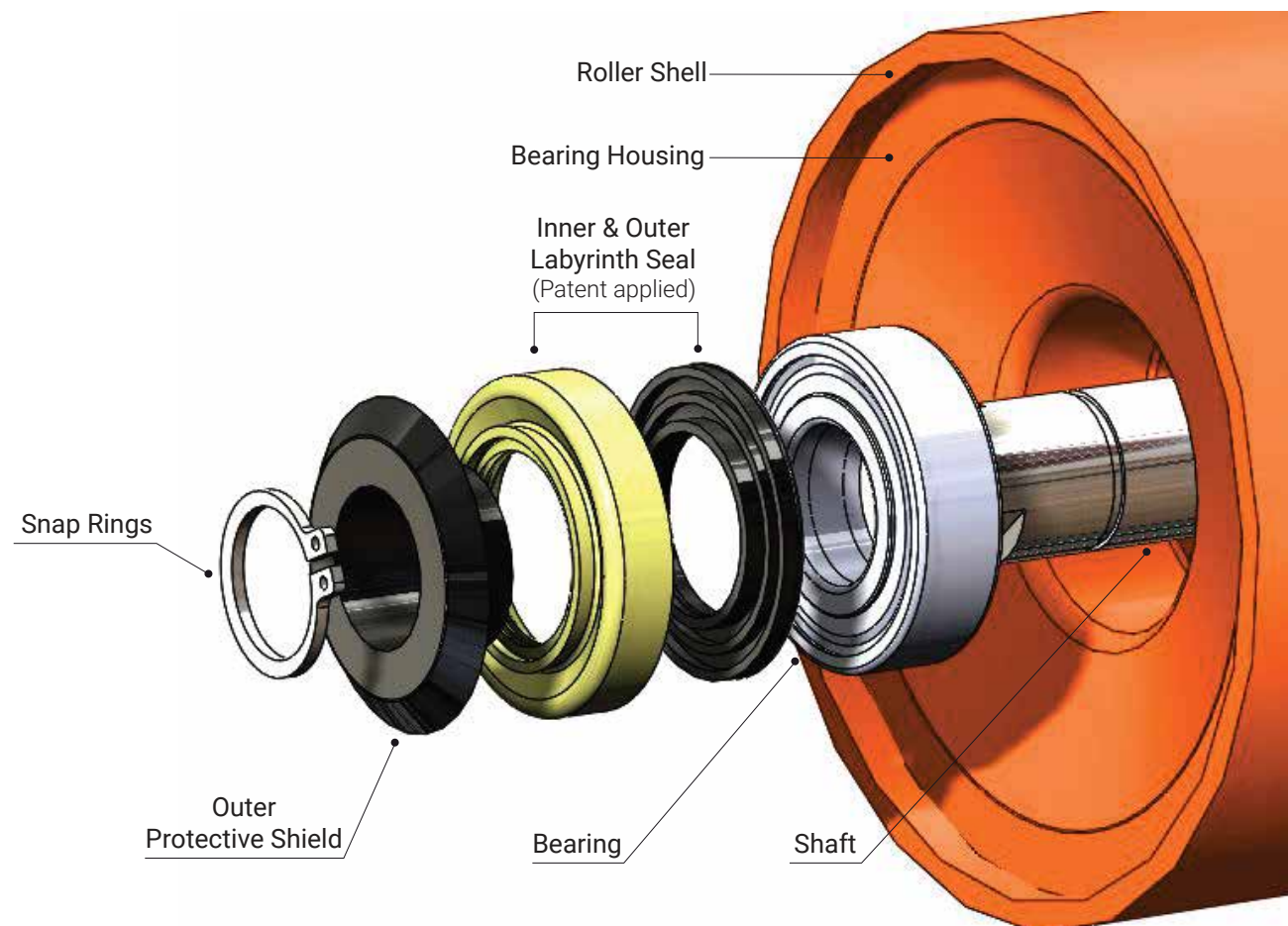
Water resistance test

State -of-the-art Manufacturing Unit

Be'RolleX manufacturing unit located at Sricity, Andhra Pradesh, India is provided with state-of-the-art manufacturing facility including robotics to ensure high quality reliable products repeatedly. Be'RolleX manufacturing unit with a covered area of over 10,000 Sq. Mtrs is self-sufficient with material handling equipment, paint booths, idler testing facilities and measurement tools.



The Be'RolleX -TI (Triple Impact) series Idler is the result of extensive research and development by the Be'RolleX R&D team. Idler engineering and manufacturing contains several unique features that produce significant improvements over traditional rollers.



Roller Seal

Sealing design based on the application demands can be classified into two types:

NLS Series Idler Seals: Non-contact labyrinth type idlers for general purpose and low drag applications.

TI Series Idlers Seals: are fitted with three stage highly effective sealing arrangement.

- ➔ **Stage 1** - 'Revolutionary centrifugal effect seal' to create virtual barrier for entry of dust laden air into the seal by maintaining positive air pressure during high speed operation.
- ➔ **Stage 2** - 'Lip Seal' made out of special polymers to prevent ingress of contaminants and water vapor in to the bearing.
- ➔ **Stage 3** - Contact less, grease filled multi-labyrinth seal which prevents dust entry.

Be'RolleX - TI Seals are engineered for structural, thermal and computational fluid dynamics (CFD) analyzed in ANSYS and tested rigorously for Dust and water ingress. Its ability to effectively prevent the ingress of foreign particles into the bearing area and provide years of trouble free operation with low roller drag & friction factors.

Be'RolleX Seal components are manufactured from special polymers to ensure long life and resistance to corrosion and vagaries of weather.

The grease used is specially formulated to achieve the desired sealing properties. Range of special greases is also available for extreme hot and cold conditions.

Bearings

All conveyor idler roller bearings sizes are selected based on:

- ➔ Bearing life based on speed and load conditions of the Idler.
- ➔ Angular Deflection as per bearing standards.

Be'RolleX standard rollers are fitted with single row deep groove precision ball bearings. However if desired by customer, Be'RolleX can also manufacture idlers with other bearing types - Taper Roller bearing and Seize resistant bearing.

Bearing Housings

Bearing housings are manufactured from heavy gauge cold rolled closed annealed steel coil strips. The housings are produced via a series of extra deep drawn presswork operations, to provide a tight tolerance on concentricity, bore and overall dimensional stability.

For heavy duty and high speed applications bearing housings are made of steel castings precision machined in CNC machines and fitted to pipe with interference fit which totally avoids welding processes and maintains idler integrity, improves TIR values and enhances load bearing capacities .

Pipe

Selection of right quality pipe plays very critical role in overall performance of Idler. At Be'RolleX, the selection of pipes is done keeping end use in mind - critical parameters like speed, life expectancy, ovality, radial runout etc.

Diameter of the pipes to meet national and international standards such as IS, DIN, CEMA, SABS etc.

Shafts

At Be'RolleX idler shafts are designed to limit the angular deflection within the allowable limits of the bearing - excessive shaft deflection is a main cause of bearing failure. Shaft diameters are designed with FEA and selected for the idler assembly under full load operating conditions meeting life time expectancy of idler. The shafts are manufactured in CNC machines to maintain high accuracy tolerances at bearing zones while maintaining standards of surface finish requirements to ensure proper seating of bearings. The shaft end types are machined with slotted open end / slotted closed end / with hole for garland applications.

Snap Rings

Heavy duty easily replaceable circlips are provided at the end of the seal.

Finish

All the idlers are painted and dried at the environment friendly paint booth.

Finish of Idlers: Be'RolleX standard 'Primer - one coat and Final - one coat'

Alternate finishes as per customer specifications can also be provided.

Alternative Materials

Be'RolleX idlers are available in a variety of materials to suit arduous applications such as highly corrosive, non-magnetic areas using aluminum, polymers and stainless steel idlers.

At Be'RolleX, Idlers are manufactured to meet National & International standards apart from manufacturing to the specific customer application.

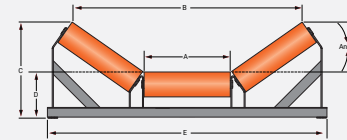
All Dimensions are in mm

IS 8598 STDS	Roller Dia ranging from	88.9, 114.3, 127, 139.7, 152.4, 168.3, 193.7, 219.1
SABS 1313	Roller Dia ranging from	101, 108, 127, 133, 152, 159, 165, 178, 219
DIN 22212	Roller Dia ranging from	88.9, 102, 114, 127, 133, 140, 152, 168, 194
IS, SABS, DIN	Belt Width ranging from	800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000

CEMA STANDARD 502-2004		
CLASS	ROLLER DIA	ROLLER DIA
B4	4"	18" to 48"
B5	5"	18" to 48"
C4	4"	18" to 60"
C5	5"	18" to 60"
C6	6"	24" to 60"
D5	5"	24" to 72"
D6	6"	24" to 72"
E6	6"	36" to 96"
E7	7"	36" to 96"
F6	6"	60" to 96"
F7	7"	60" to 96"
F8	8"	60" to 96"

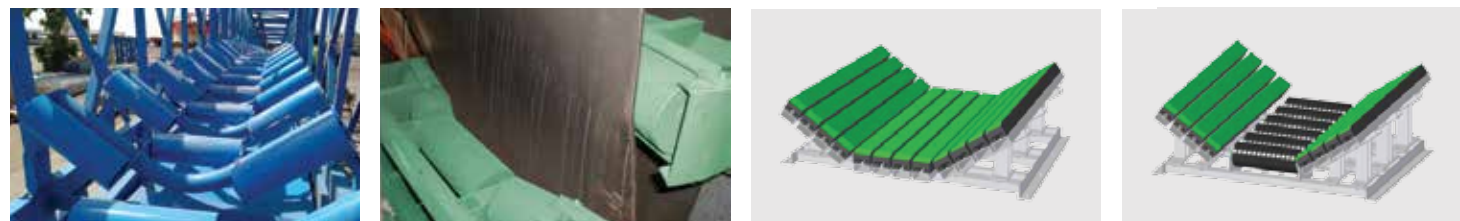
- Idler Mounting Brackets** : Idler brackets are fabricated from standard steel sections, pipe structure or made out of cold roll form sections.
- Troughing Angle** : Idlers and frames are available for troughing angles varying from flat to 45 degree.
- Bearings** : Idlers are fitted with seize resistant, deep groove, taper roller ball bearings based on the application demand.
- Finish of Idlers** : Be'RolleX standard 'Primer - One Coat and Final - One Coat'. Alternate finishes as per customer specifications can also be provided.
- Finish of Brackets** : Be'RolleX standard 'Primer - One Coat and Final - One Coat'. Alternate finishes as per customer specifications can also be provided.

Note : 1. All the above idlers are for general applications within the guidelines of stipulated standards. However, when there is a requirement of special applications like heavy duty, high speed, low friction, low noise, low concentricity and low MIS value, Be'RolleX application engineering team is available all the time to support and select right idlers.



2. Along with the technical offer, detailed dimensional drawing of roller and mounting bracket shall be submitted.

Customized Applications



SELECTION DATA	
Material Handled	
Bulk density (Kg/m ³)	
Lump size (mm)	
Surcharge Angle (°deg)	
Ambient Temperature Design (Max) (°C)	
Belt Width (mm)	
Belt Speed (m/s)	
Belt Type (Nylon or Steel Cord)	
Belt Weight (kg/m)	
Capacity Rated/ Design (TPH)	
No. of Hours of Operation (8 / 16 / 24 Hrs)	
Pipe Standard (IS 9295 / DIN 15207 / SANS 657 / CEMA 502)	
Pipe Material (Carbon Steel / Stainless Steel)	
Bearing (B10) Life (Hrs)	
Free Fall height (m)	
Idler Spacing	
Carrying (mm)	
Return (mm)	
Impact (mm)	

IDLER AND BRACKET DATA					
Description	Trough Angle (°deg)	No. Of Rolls (1R/2R/3R/5R)	Pipe Dia X Thk X Length	Bearing ϕ	Quantity
Carrying Idler					
Transition Idler	(5°)				
Transition Idler	(10°)				
Transition Idler	(15°)				
Impact Idler					
Self Align Carrying Idler					
Self Align Return Idler					
Brackets (Standard / Cold Form / Pipe Struc.)					
Surface Prepration (Mechanical Cleaning / Sand or Shot Blasting)					

IDLER PERFORMACE DATA	
TIR (Total Indicated Reading) (mm)	
Maximum allowable friction factor at shop test	
Maximum running frictional force (N)	
Axial float (mm)	
Balancing quality	
Roller noise level (db)	
Lubrication details	

Idler Brackets / Frames is a backbone to the idler's successful performance.

At Be'RolleX idler bracket / idler engineering and manufacturing is done with utmost perfection adopting latest in-house developed design software and manufacturing process technology.

➔ **IBSAT (Idler Bracket Structural Analysis Tool)**: to determine stress and deformation static and dynamic condition bracket undergoes under real time operating conditions and helps in selection of right structural members to maintain rigidity and avoid fatigue.

Brackets / Idlers are manufactured in semi / automatic production line and as well as use of automatic welding machines for frame welding which eliminates human errors and able to produce mass production with consistency in quality at every level.

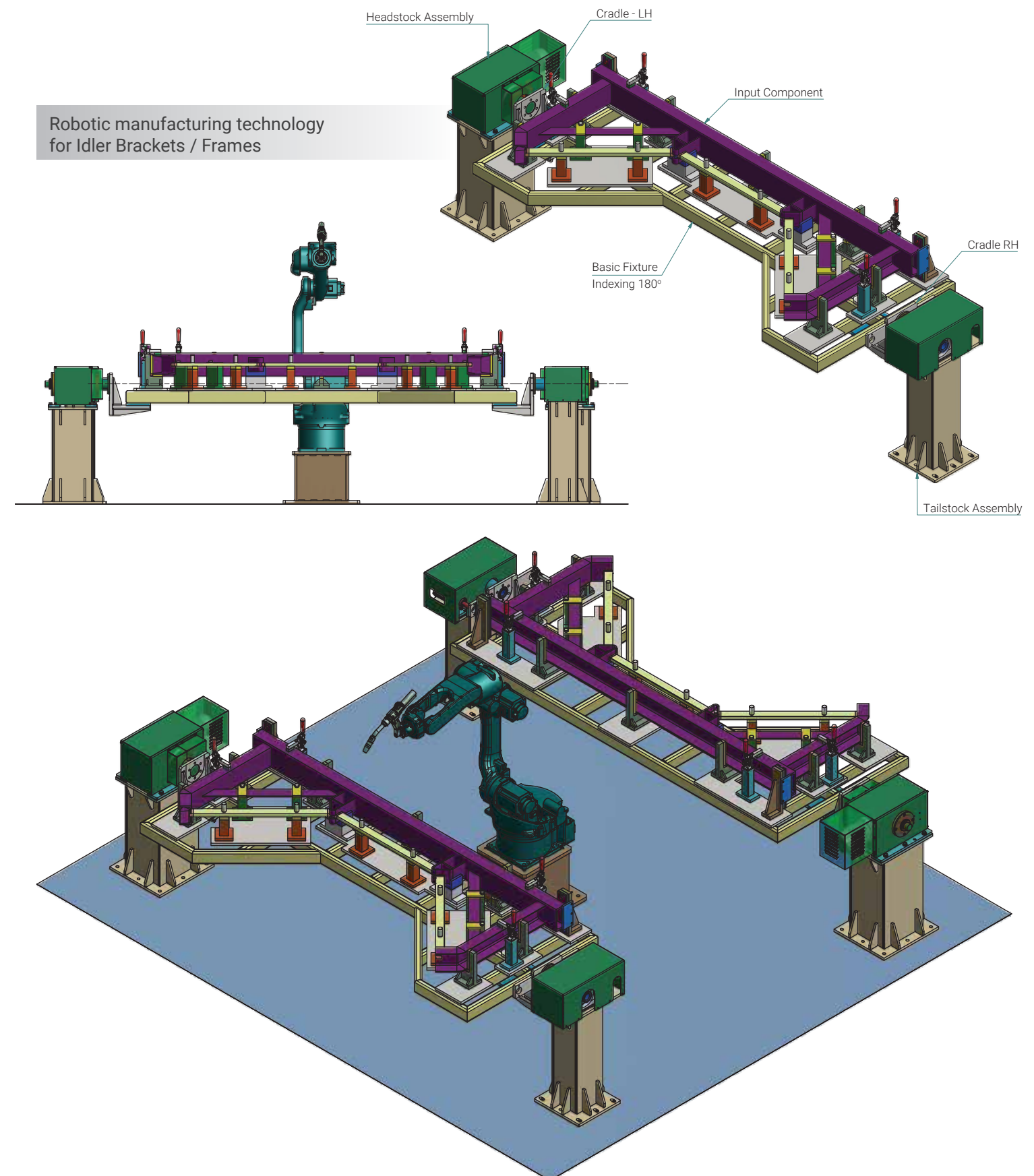
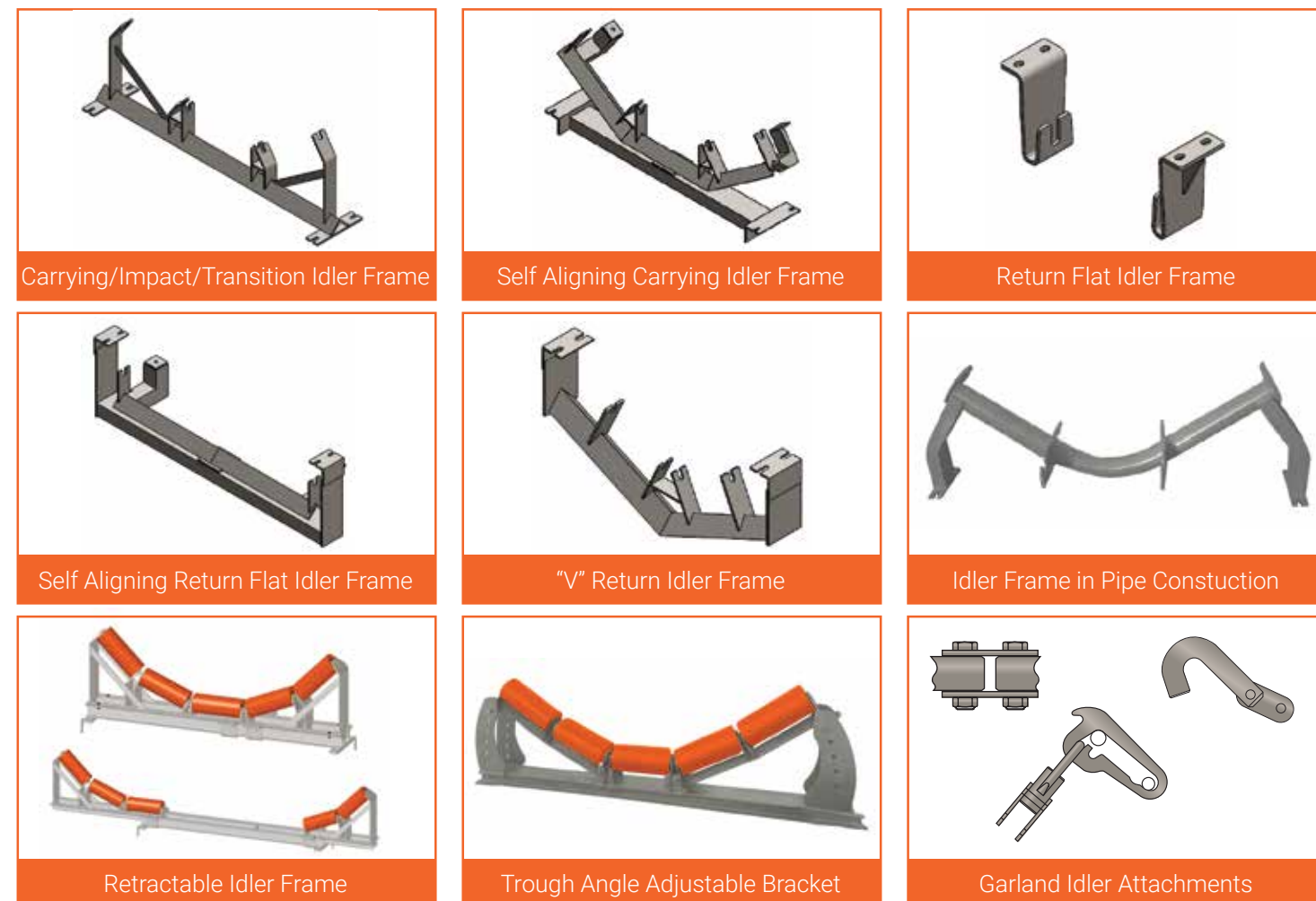
Sailent Features of Idler Brackets / Frames:

- ➔ Self-cleaning inverted angle cross member prevents material build-up
- ➔ Pipe constructed brackets are used to prevent material accumulation & portable conveying applications
- ➔ Contoured profile end brackets to prevent material wedging
- ➔ Close tolerances to control trough angle and support of idlers
- ➔ Precision die-formed center and end brackets
- ➔ Jig-welded frames using MIG process

All the brackets / frames are painted and dried at the environment friendly paint booth.

Finish of Brackets / Frames: Be'RolleX standard 'Primer - one coat and Final - one coat'.

Alternate finishes as per customer specifications can also be provided.



Pulleys

Pulley Design

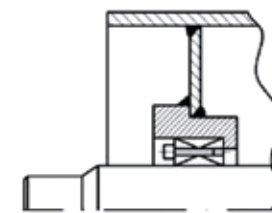
Be'RolleX specializes in design manufacture and supply of various types of pulleys suitable for belt conveyors, specialty conveyors - steep angle conveyor, sandwich belt high angle conveyor, pipe conveyors and also for bucket elevators.

Be'RolleX offers varied size ranges of Pulleys starting from 219mm diameter pulleys up to and over 2500mm diameter with suitable shafts up to and over 300mm diameters and belt width from 500mm to 2400mm.

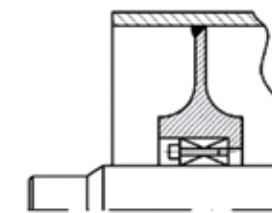
Depending on the application, the pulleys are designed with various types of side discs:

- ⇒ Welded hub disc with key or with taper lock bushings
- ⇒ Turbine disc with locking assemblies
- ⇒ T-Bottom type disc with locking assemblies
- ⇒ Other custom designs

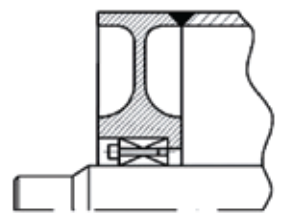
These designs have been developed to reduce the stress and tension areas produced during the welding process.



Welded hub disc



Turbine hub disc



T-Bottom type disc

Shaft & Hubs Assemblies

Be'RolleX pulley manufacturing follows the practice of assembling shaft with both, key & key less arrangement.

Key less assemblies called as locking assembly such as weldon hubs or taper lock bushes are easier to install, reduce axial movement, reduce end disc stress and facilitate quicker assembly & removal.

Shaft

- ⇒ Engineering, design and manufacture of custom shaft
- ⇒ 1045 & 4140 steel standard
- ⇒ Stainless steel upon request
- ⇒ Cold rolled, hot rolled and forged
- ⇒ Ultrasonic and magnetic particle testing available
- ⇒ Custom keyways, taper lock keys

Bearing Assemblies

Bearing housings of the pulleys are supplied with effective seal arrangements of Lip seal or labyrinth type. The bearing housings are of either cast steel or cast iron with two or four bolt constructions. The bearings are installed by factory trained Be'RolleX personnel. The pulley can be installed with plumber blocks and bearings fitted, so that it can be readily bolted to the conveyor frame.

Pulley Assemblies

Complete assembly of conveyor pulley, bushings, shaft, bearings and couplings are part of Be'RolleX value addition to the customer.

Pulley Design Engineering

Be'RolleX specializes in supply of conveyor pulleys to meet critical requirements of bulk material handling industry, based on internally developed design softwares, Be'RolleX leverages technology to optimize cost and performance in real time application.

PDaAT (Pulley Design and Analysis Tool): which helps in right selection of pulleys for the application and analysis of various aspects of pulley operating conditions in real time application.

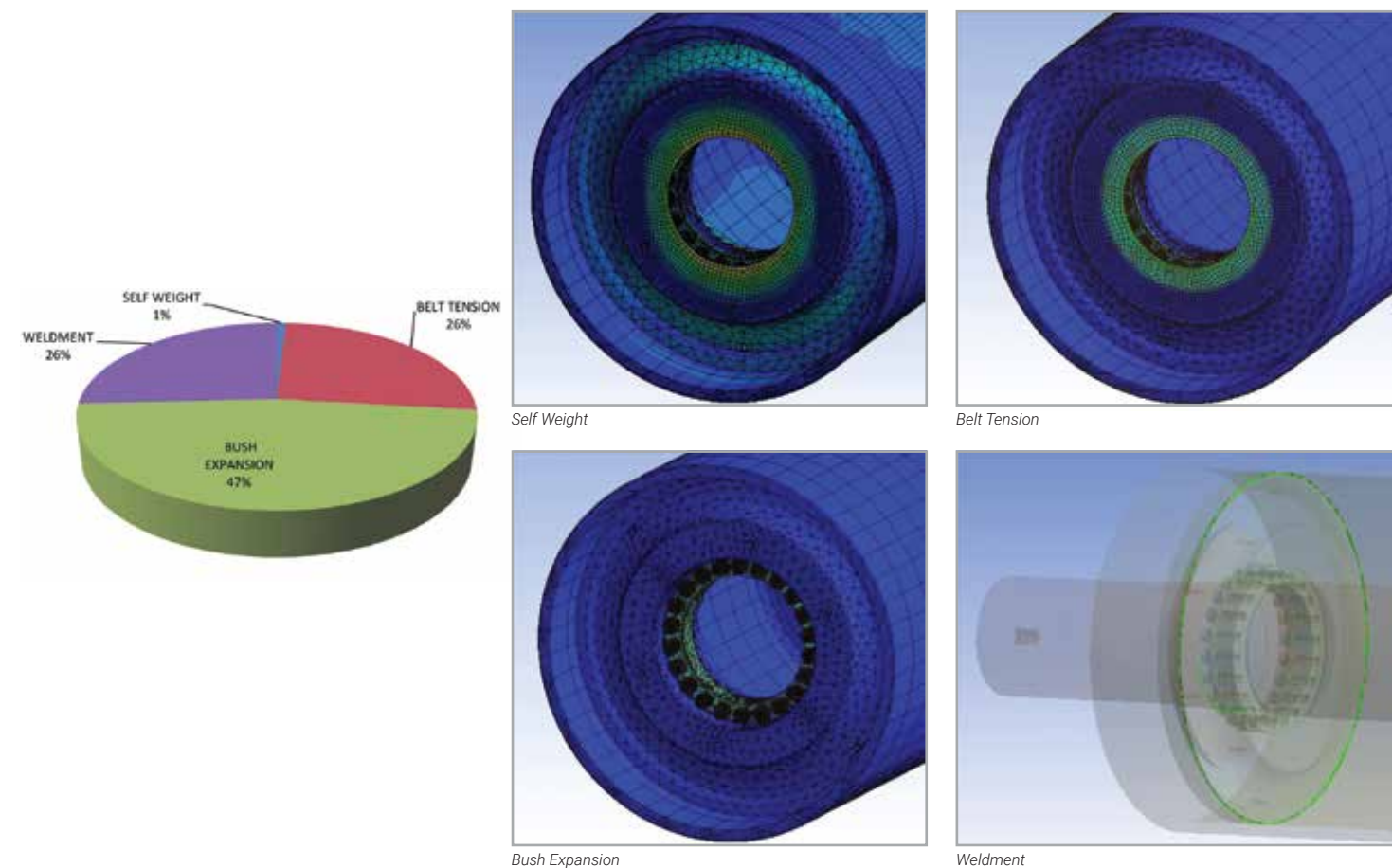
Be'RolleX design engineering team uses CAD modeling to design and verify conveyor components suitability. Using software such as Inventor Solid Edge and AutoCAD, necessary drawings are produced for manufacture and models constructed for integration into conveyor designs.

Be'RolleX design engineering services are always available for right selection of pulleys for all critical applications. Be'RolleX specialists use design tools like **Finite Element Analysis (FEA)**, for accurate prediction of individual pulley parts as well as the complete integrated unit.

- ⇒ Structural Analysis (Stress, deformation static & dynamic analysis)
- ⇒ Thermal Analysis (Temperature distribution, stress, deformation)
- ⇒ Thermo Structural Analysis (Thermal induced structure analysis)
- ⇒ fatigue analysis to predict the life-cycle accurately
- ⇒ Fourier analysis for determining the displacements and stresses in the structure due to harmonics

Pulley Stress Analysis Diagrams

The following diagrams indicate location of stress by each contributing source

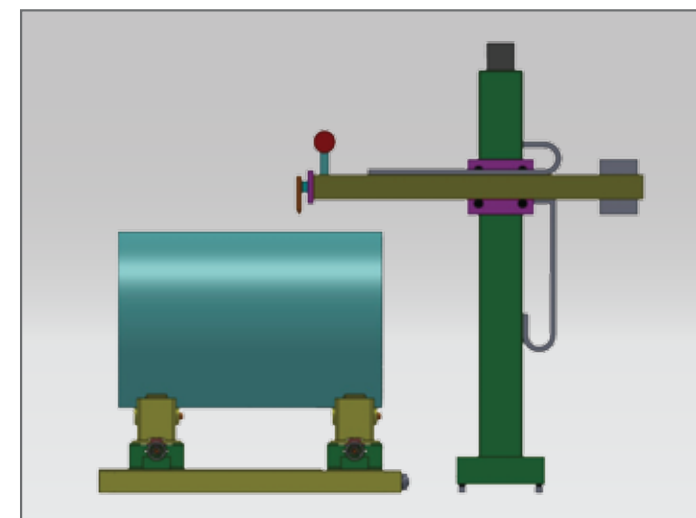


Pulley Manufacturing Technology

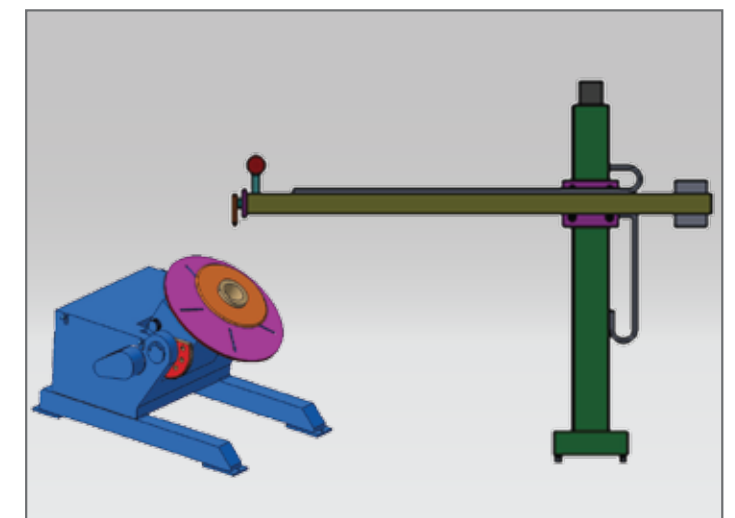
- ⇒ Welding is the most crucial manufacturing process which defines the reliability of pulleys. Be'RolleX employs High strength Submerged Arc welding technologies. Automatic welding equipment eliminates weld beads, defects and undercuts; minimizing human intervention to deliver product of repeatable quality.
- ⇒ Shaft, a vital part of the total Pulley assembly, is fully machined on CNC machines to meet desired tolerance limits and surface finishes.
- ⇒ Rolling of the shell is done on suitable machines to maintain required TIR values.
- ⇒ Pulleys are assembled in specially made jigs, fixtures and hydraulic presses in an integrated manner to avoid misalignment of components to deliver optimal performance.
- ⇒ Thermal stress relieving of the pulleys are carried out based on application demands.
- ⇒ Static and dynamic balancing of pulleys are carried out based on application demands.
- ⇒ Rubber lagging by cold and hot process can be carried out.
- ⇒ Stainless steel construction for non-magnetic pulley.

Pulley Welding System

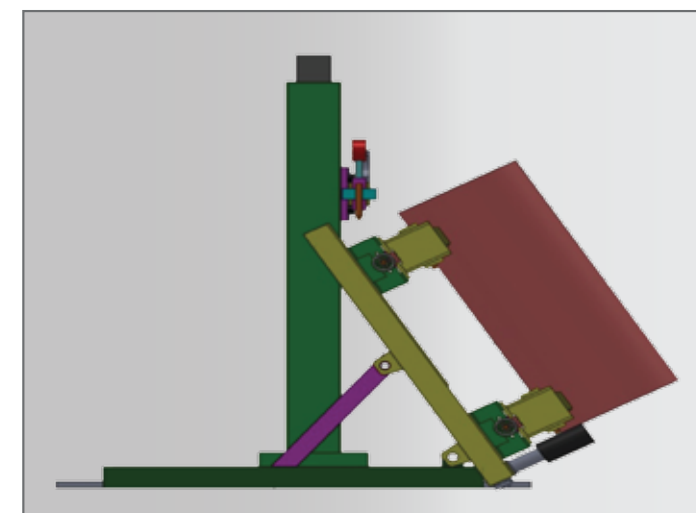
At Be'RolleX Pulley Welding System is carried out by certified welding procedures and welders for **Submerged Arc Welding | MIG | TIG**



Shell Long Seam Welding System



Central Plate Welding to Boss



Disc Welding with the shell from both sides

Quality Management

- ⇒ Quality management standards are strictly followed by quality assurance team from raw material stage to finished product delivery. Performance tests like TIR, Concentricity, and Static balance test are carried out for pulleys as per agreed Quality Assurance Plan approved by customers.
- ⇒ Certified inspection procedures of ultrasonic, radiography, dye penetrate are carried out based on application demand.
- ⇒ Material test certification of all raw materials.
- ⇒ All exposed metals covered with anti-rust coating.

SELECTION DATA

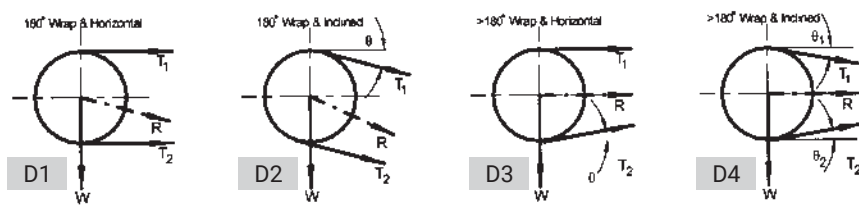
Material Handled	
Bulk density (Kg/m ³)	
Lump size (mm)	
Surcharge Angle (°deg)	
Ambient Temperature Design (Max) (°C)	
Belt Width (mm)	
Face Width (mm)	
Belt Speed (m/s)	
Belt Type (Nylon or Steel Cord)	
Belt Weight (kg/m)	
Capacity Rated/ Design (TPH)	
No. of Hours of Operation (8 / 16 / 24 Hrs)	
Design of Pulley (IS 8531 / CEMA 5 th Ed / DIN 22101 / SANS 1313)	
Shell Material (Carbon Steel / Stainless Steel)	
Allowable Bending Stress for Plate (N/mm ²)	
Allowable Shear Stress for Plate (N/mm ²)	
Shaft Material (EN8 / Forged)	
Allowable Bending Stress for Shaft (N/mm ²)	
Allowable Shear Stress for Shaft (N/mm ²)	
Bearing (B10) Life (Hrs)	
Pulley Locking Arrangement (Key Way / Ring Feeder(Equiv.))	

PULLEY DATA

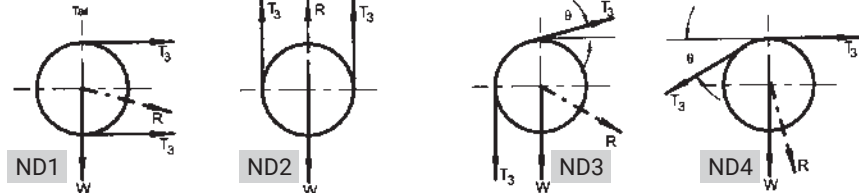
Description	Pulley Dia X Shell Thk (mm)	Tension T1 & T2(N)	Power (kW)	Specify PA*& (θ or θ1 and θ2) (°deg)	Shaft @ Bearing Φ & Total Shaft Length(mm)	Bearing C/C (mm)	Quantity
Head Pulley							
Tail Pulley							
Take-up Pulley							
Snub Pulley							
Bend Pulley							

*Pulley Arrangements (PA)

Typical Drive Pulley Arrangements



Typical Non-Drive Pulley Arrangements



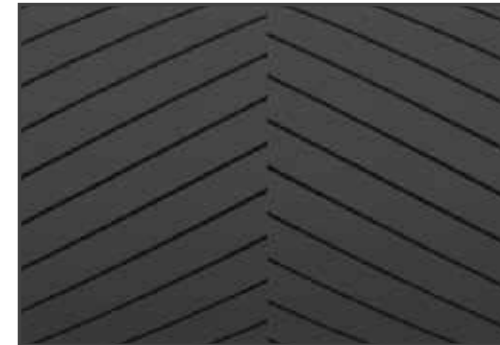
TESTING & QUALITY REQUIREMENTS

Ultrasonic Testing (Indicate % of total quantity)	
Radiography Testing (Indicate % of total quantity or not req.)	
Total Indicated Reading(TIR) for Shell (mm)	
Stress Relieving (Yes / No)	
Surface Prepration (Mechanical Cleaning / Sand Blasting)	
Balancing of Pulley (Allowable weight % w.r.t. pulley weight)	

Lagging for Conveyor Drum Pulleys

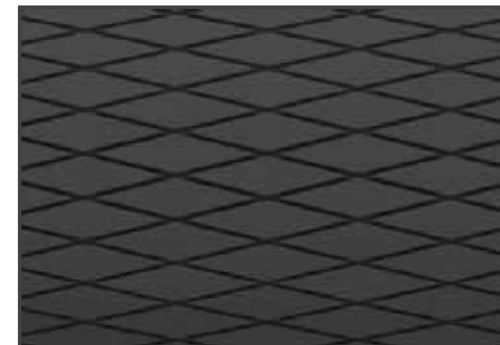
lagging is primarily used to improve traction capacity, resist abrasive conditions and extend pulley and belt life. The style of lagging required is usually influenced by operating conditions.

Be'RolleX has complete cold or hot vulcanized pulley lagging capabilities. Herringbone, Diamond and Ceramic lagging can be provided with various thicknesses as per the requirement of client. Every step of the pulley lagging process is monitored, to ensure quality and reliability.



Herringbone Groove Lagging (HBG)

This style of lagging is usually influenced by operating conditions. The grooving point do not meet in the middle. This is normally used in drive pulleys with the 'V' pointing in the direction of rotation.



Diamond Groove Lagging (DGL)

Diamond or double HBG or double chevron is primarily used for reversing conveyor drive pulleys. Pattern of this lagging makes pulley installation independent of direction of rotation.



Impregnated Ceramic Lagging

Ceramic lagging is ceramic tiles molded into a rubber compound. This provides excellent traction, reducing slippage and offering excellent abrasion resistance.