LIDERROLL

LIDERROLL Engineering Solutions, LLC.

FREE TURNING ROLLERS FOR PERMANENT PIPE SUPPORT

RPAP®

Liderroll Indústria & Comércio is a dynamic company that carries out industrial and commercial activities in today's market in the Mechanical, Aeronautical, Marine, Construction, and related fields, operating in various regions of Brazil.

Our company is young, but with time-proven and solid ideals in the preservation of quality, and stands at the forefront of technological creations and renovations, concentrating all efforts on the quest for and preservation of this vision.

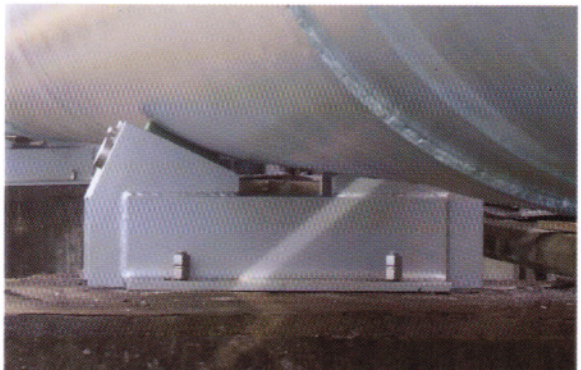
Liderroll's management is implemented by a high end-product quality and industrial safety policy, seeking at all times to avoid environmental damage and consistently develop and utilize the company's own manpower.

Our company is 100% Brazilian and counts on a specialized technical team with unquestionable operational reliability, capable of providing the following services:

- Small - and medium-sized boilermaking services.
- Design and manufacturing of tools.
- Manufacturing and recovery of machined parts for mechanical industries in general.
- Manufacturing and recovery of machined parts according to drawing and/or sample.
- Manufacturing of machinery and equipment.
- Design and manufacturing of devices used for permanent support of 4" to 54" pipelines.

Conventional support to be replaced

RPAP® rollers applied to 34" piping belonging to Petrobras



View of roller applied to pier

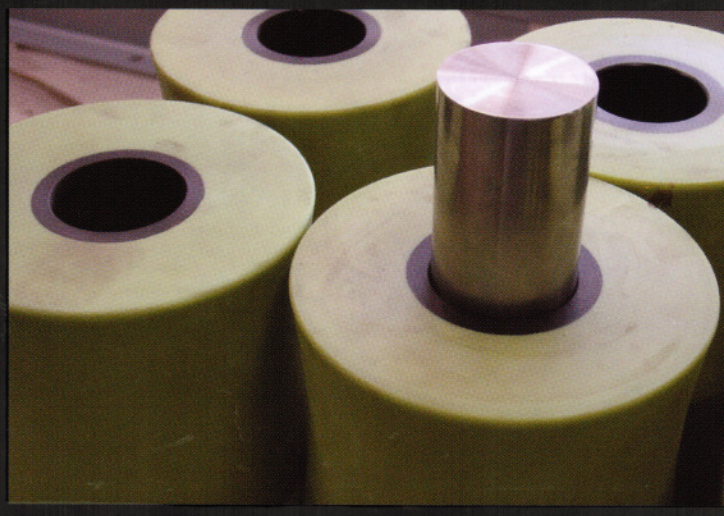
High performance plastic roller system - RPAP®

Permanent support devices for 4"to 54" piping

Based on its experience, **Liderroll** has detected in the pipeline and pipe segment the need to solve the chronic problem of permanent supports for pipes comprising the pipeline transportation system. Thus, it has developed the design and obtained a patent for the High Performance Plastic Roller System (RPAP).

In some industries, the devices used to support, guide or roll pipes during their installation or to **support them while in service** are comprised of steel rollers with bearings/bushings or supports welded to the side of the pipe, which have sliding bases made of Teflon/ Celeron®. Besides the need for constant maintenance, for cleaning surfaces (stainless steel plates), lubrication services (bearings), and corrosion treatment (painting), such devices require frequent replacement of defective bearings and Teflon or Celeron inserts due to deformation and wear. Such needs generate high direct costs in carrying out these services, as well as indirect costs in the shutdown of lines for replacement of components.

It is worth noting, since this a fact (see photo), that within a short time and due to their high degree of corrosion, steel rollers end up gripping at their shaft and on the constructive structure of their base and thus stop rolling, thereby losing their main function, which is to allow longitudinal movement of the piping, and becoming mere support trestles. As a result, extremely high punctual loads are induced on the side of the piping systems and all axial stresses from the expansion of the piping are transferred to the pier. Since such loads are not foreseen and calculated in its foundations (piling), they jeopardize the civil structures of the terminals or points to which they are secured.



All High Performance Plastic Roller (RPAP®) supports are designed and manufactured to match the particular characteristics of each line or piping. In addition, such supports may be applied to various facilities ranging from maneuvering, receiving, and export piers to compression stations, pipeways, etc. All of this according to the stability and flexibility behavior of each configuration.

Another point worth noting, besides possible contamination of the environment (arising during the maintenance process) by preservation by paint jobs and lubrication of bearings and/or bushings, is the reduced likelihood of accidents with life-threatening risks, since access to those supports is very difficult. In addition, since our devices are externally protected by a spray metallization process using zinc with constant electrode melting and have self-lubricated OMOP polymer slide bearings, they do not require any type of painting and lubrication maintenance, thus eliminating the need for those services and, consequently, the likelihood of accidents.

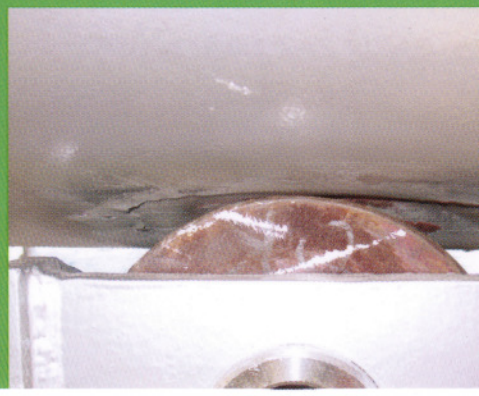
Our structural and behavioral evaluation is based on the finite element method (ANSYS standard), following the safety parameters and limits of the facilities.

Technical Differential

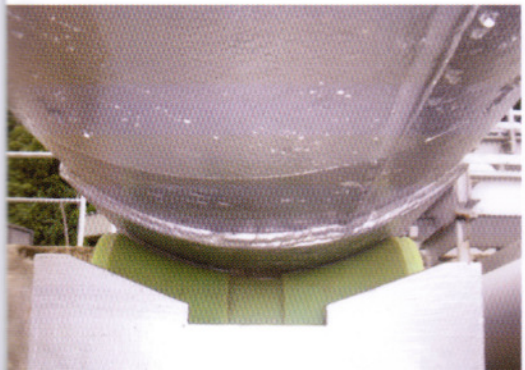
- Bearings of any constructive type may be eliminated, since rollers slide on bushings made of special polymers.
- Since the rollers are made of high performance plastic, they do not sustain any type of oxidation so, in the Pipe-to-Roller contact, no type of corrosion is induced on the system (see photos).
- Devices are externally protected against corrosion by the spray metallization process using zinc by constant electrode melting and have self-lubricated RPAP® slide bearings.
- No need for lubrication and paint treatment.
- Since the devices do not need to be painted and lubricated, they do not contaminate the environment as a result of leakage of oils, greases or paints, especially in offshore applications.
- Working within its elastic limit, plastic does not sustain fatigue and accommodates lateral movements of the line or piping, without causing pipe dents (see photos of steel rollers).
- Devices are extremely resistant to surface abrasion caused by contact and friction.
- Since the roller slides extremely easily (low friction), it does not offer high resistance to axial expansion of the piping and, as a result, allows the construction of pillars with a smaller number of pile driving operations, thereby reducing foundations costs.
- Our rollers are easy to install and rearrange, since they are attached by 04 anchor bolts onto the concrete structure with direct support of the side of the pipe on TSACET VD rollers. Other supports, on the other hand, need to be 100% welded in a strictly vertical manner, painted, with the installation of grouted plates, welding of lateral guides, bonding and attachment of packing (Teflon or Celeron), requiring permanent system alignment inspections.
- Devices may operate partly or fully immersed in a liquid medium.
- They have complete freedom of design, and can take any geometric shape, size, and diameter.
- They may be manufactured in various colors, since dyes may be added, thereby facilitating the identification of each assembly line of the productive process.
- 75% lighter than the steel roller with bearing, thus facilitating transportation to the construction site (offshore).
- Excellent electrical insulating materials.
- Inert to attack by hydrocarbons.
- They have ultraviolet ray protection and do not deteriorate when exposed to sunlight when applied outdoors.
- Since the devices absorb vibrations, they ensure a low operating noise level and low vibration in the system in which they are installed, thereby reducing fatigue and extending the service life of the structures in which they are installed, besides being able to be sacrificed while protecting the piping system.

Steel rollers displaying a high degree of corrosion

Pipe dent caused by a steel roller



Petrobras – High Performance Plastic Rollers (RPAP®) installed on piers



Executed and applied design

Petrobras Maritime Terminals TEBIG/RJ and TEBAR/SP

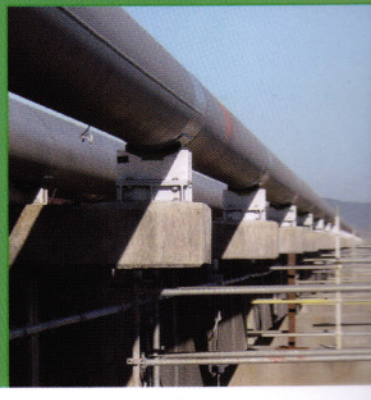
Permanent support devices for piping and pipelines 4" to 54" in diameter

20" rollers - TEBIG

8", 10", and 12" rollers - TEBAR

42" rollers - TEBIG

34" rollers - TEBAR

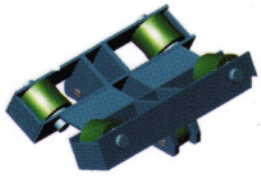


ATTENTION

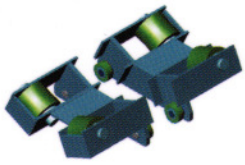
The technology used for polymers in manufacturing any type of roller and sliding system without bearings and on bushings is protected by patent No.: MU-8600496-4.

SPECIAL PARTS UPON CONSULTATION

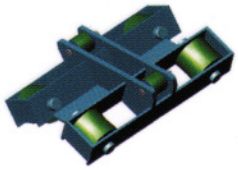
Bidirectional Roller Line



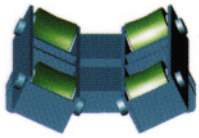
Isometric view



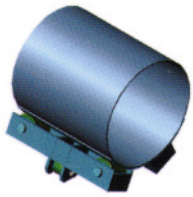
Split



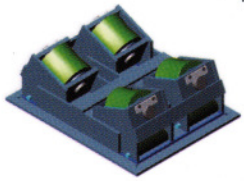
Bottom view



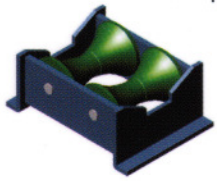
Middle front view



Representation view

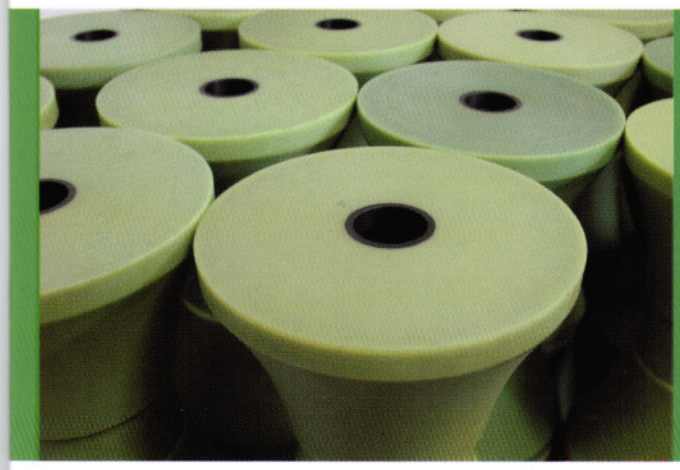


Double roller



Double concave roller

AC Vidaurre | Fernanda de Abreu



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