

DESIGN, MACHINING & FABRICATION

Engineering services and bridge product manufacturing
Engineering tomorrow's bridges, today



LCL-BRIDGE

PRODUCTS TECHNOLOGY INC.



EXPANSION JOINTS SINGLE CELL - MODULAR - FINGER - BOLT DOWN - COMPRESSION SEAL - BOX SEAL



BEARINGS POT - SPHERICAL - ELASTOMERIC - ROCKER **SEISMIC DEVICES** LOCK UP DEVICES - DAMPERS



Canadian Welding Bureau
CSA W47.1
Division 2.1



ISO 9001:2008
Management System
Certificate # CA04/3161

PROFILE

Based in Quebec, Canada, LCL-Bridge specializes in the design, manufacture and production of new and retro-fit precision products for a broad range of structures, which include; bridges, viaducts, stadiums, dams, off-shore platforms and high rise buildings. LCL's product range consists of high quality cost effective bearings, expansion joints and seismic devices. Many years of intensive Research and Development has resulted in a range of innovative isolation products such as Shock Transmission Units (STU) and Shock Damping Units (SDU).

The Company operates some 82,000 sq. ft. of production floor space in two Montreal locations; Lachine (38,000 sq. ft.) and Laval (44,000 sq. ft.), this latter facility is operated jointly with Olympia. LCL's Management system has been assessed and certified as meeting the requirements of ISO9001 : 2008. The company operates specialist CNC machinery as well as MIG, TIG and aluminium welding fabrication equipment certified to CSA Standard W47.1 in division 2.1. Design and engineering support services are also provided to consultant firms and contractors. These services enable precise design solutions for each product in the context of each installation's requirements.

MANAGEMENT TEAM

LCL's management Team has more than 45 man-years experience in this industry and is fully committed to providing its customers with very high quality products tailored to meet client and end-user needs. In the operation of its business the Team is focused on maintaining its proven reputation for delivering products and services on-budget and on-time.

The Team that oversees all of LCL's technical and engineering capability includes industry specialists and professional managers, as well as design and production engineers, that oversee the quality processes which are applied at each stage of production.

RESEARCH & DEVELOPMENT

LCL bearings, expansion joints and seismic devices are designed to the very highest standards and in accordance with the latest Government codes of practice and specifications. The company has, for many years, been operating an aggressive Research and Development program in order to bring innovative structural bearing and isolation products to the market. The goal has always been to produce the highest quality, most cost effective, durable, easily installed and maintenance free products.

Depending on the specific application and each customer's National Standards, LCL's products can be designed and manufactured in accordance with different standards, such as: CSA S6-14 (Canada), AASHTO (United States), BS 5400 (United kingdom), EN 1337 (New European Code) or any other design tender specifications.



Champlain Bridge, Montreal
Quebec, Canada



Allowance Overpass, Medicine Hat
Alberta, Canada

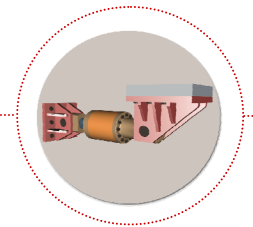


JFK Airport
New York, USA



Decarie Highway, Montreal
Quebec, Canada

SHOCK TRANSMISSION & SHOCK DAMPING UNITS (L STU & L SDU SERIES)



Earthquakes in California, USA and Kobe, Japan have recently demonstrated the potential for very large and unpredictable seismic events. The levels of disturbance experienced during these powerful earthquakes were far greater than structural designers, and their associated design codes, had forecast; the result was wide spread damage and destruction to highways and bridges as well as loss of life.

One important lesson that has been learned is that it is imperative that bridges, which connect major transportation routes, must continue to function after an earthquake or geological disturbance has occurred. New technologies and design efforts at LCL have resulted in a system of Shock Transmission and Damping Units, or STUs and SDUs for short, that can now contribute towards the ability for large structures to better withstand such large disturbances.

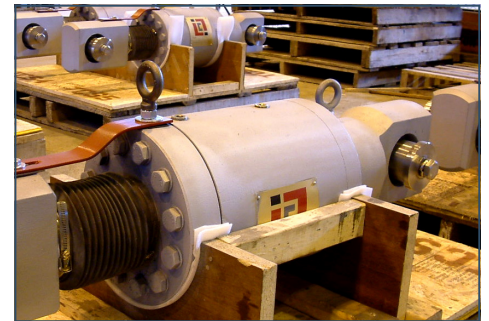
The advantage of LCL's STUs and SDUs is that they can be integrated with new and existing structures without interfering with that structure's normal load bearing and connecting systems. In so doing they can allow for slow moving structural deflections, such as expansion, contraction and rotation, due to thermal effects, creep, wind and traffic. During an earthquake, explosion or similar event, the combination of the rigid connection created by STU, and the damping effect of the SDU, allows the structure to withstand very high dynamic loads.

LCL's STU and SDU systems lead the industry because of the ease in which existing structures can be upgraded in the most cost effective way; for example road traffic does not need to be stopped during bridge installations and the time to install is very short. Furthermore LCL's devices are designed to have a usable life of 100 years and are maintenance free, easily inspected and extremely easy to be replaced.

Independent Laboratory testing has certified LCL's STU and SDU devices for a wide range of static and dynamic loads and displacements, as well as operating temperatures down to -35° Centigrade.



Independent Laboratory Testing
École Polytechnique of Montreal



STUs & SDUs ready for delivery
Lachine Plant



Site Installation
Bolt Torquing



Final Inspection
LCL's Engineering Inspection Team

POT BEARINGS (L P SERIES)

LCL's Pot Bearings have been designed to be easily installed, maintenance-free and cost-effective. The product has been successfully used in a broad range of applications which include: bridges, viaducts, high rise buildings, stadiums and dams.

LCL's Pot Bearings are designed to accommodate very high vertical, horizontal and lateral loads and rotational structural displacements. The bearings are grouped into three categories: fixed bearing (restriction of all movement in planar axis); guided bearing (restriction of movement in one direction in planar axis); multi-directional bearing (allows movement in all planes and axes). All three types can be designed to accommodate uplift loads, often required during construction or the life of the structure. The bearings are designed to be quickly and easily replaced due to the structural fastening and attachment strategy LCL deploys.

A high quality elastomeric disc is tightly confined between a cylindrical machined plate, called the pot plate, and a piston plate. Under high pressure the elastomeric disc turns into its liquid state and acts like a hydraulic fluid which allows rotational movement around any horizontal axis. LCL's design enables very high compression forces to be imparted to the elastomeric disc which results in a physically smaller bearing; an advantage in many bridge design applications. A neoprene seal is inserted between the pot and piston plates to prevent dust and debris from entering the assembly. Bridge movement is accommodated through the combination of a mirror finished stainless steel plate and a moulded Teflon (PTFE) sheet which result in sliding surfaces that have a very low coefficient of friction. LCL's design approach is to machine the pot and piston plates to accommodate the PTFE sheet and in this way the sheet is mechanically recessed and confined, resulting in superior mechanical binding. Compared to the traditional method of surface bonding the PTFE sheet, LCL's design approach guarantees the integrity of the sliding surface components during the life-time of the bearing. In addition this strategy also enables the bearing to accommodate significantly higher loads for its size.

All of LCL-Bridge Pot designs, materials & fabrication processes can be adapted to client required manufacturing specifications or codes of practice; for any Country. The bearing is designed to be maintenance free for the duration of its design life and operate down to extremely low temperatures as low as - 40° Centigrade.

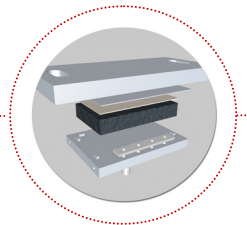
ELASTOMERIC BEARINGS (L E SERIES)

LCL's Elastomeric Bearings are designed to be easily installed, maintenance-free and cost-effective. The product has been successfully used in a broad range of applications, which include: bridges, viaducts, high rise buildings, stadiums and dams.

The use of natural rubber, or neoprene, in elastomeric bearings has enabled them to dominated the bridge Industry because of the material's flexibility over a broad range of applications. Such applications include anti-vibration mounts for machinery, dampers for bridges and buildings, and noise insulation for buildings. In regions of the world which are prone to earthquakes or significant seismic events, LCL's Elastomeric Bearings are designed to act as dampers which help prevent structural failure. The bearings are also commonly used to inhibit the transmission of vibration through large structures, such as road ways in close proximity with, or connected to, sensitive structures. Natural rubber is used where applications require its superior physical and mechanical characteristics in cold weather climates and its very high damping coefficient in zones of



26,000 kN Pot Bearing Capacity
Jacksonville & Syracuse Tower
U.S.A.



Bridge on Hwy 54 over Hwy 2
Alberta, Canada

ELASTOMERIC BEARINGS (L E SERIES) (CONTINUE...)

high seismic activity. Neoprene is used in applications where oil and ozone resistance is required. The Elastomeric Bearing is manufactured through the process of interleaving, and then hot vulcanizing, steel shims with rubber layers. The resultant laminated Elastomeric Bearing pad accommodates linear structural movements through its ability to sustain shear deformation, and rotational movements due to the bearing's ability to sustain compression deformation. In applications where there are large linear movements the most cost effective solution is to deploy a two part bearing assembly. This assembly features, on the bottom, an Elastomeric laminated Bearing which has a Teflon (PTFE) sheet moulded to its top surface, and on the top, a mirror-finished stainless steel plate.

The combination of using highest quality elastomer coupled with the know-how and expertise for moulding techniques make LCL's Elastomeric Bearings very durable and reliable.

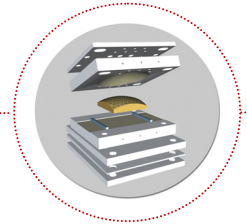
SPHERICAL BEARINGS (L S SERIES)

LCL's Spherical Bearings have been designed to be easily installed, maintenance-free and cost-effective. The product has been successfully used in a broad range of applications, which include; vehicle bridges, railway bridges and stadiums.

LCL's Spherical Bearings are designed to accommodate very high vertical, horizontal and lateral loads and large rotational structural displacements. The bearings are grouped into three categories: fixed bearing (restriction of all movement in planar axis); guided bearing (restriction of movement in one direction in planar axis); multi-directional bearing (allows movement in all planes and axes). All three types can be designed to accommodate uplift loads, often required during construction or during the life of the structure. The bearings are designed to be quickly and easily replaced because of the structural fastening and attachment strategy LCL deploys. Structural rotation is accommodated by a system of convex and concave plates which are, in turn, mounted onto a flat sliding surface which allows horizontal displacements, whilst the curved bearings rotate about their center of radius. In addition the bearings have the capability to rotate in any direction (constraint-free rotation) around both horizontal and vertical planes by the sliding action of the curved spherical surfaces. The spherical bearings are capable of large tilting angles with very low tilting resistance. LCL offers two spherical bearing products which differ mainly in accordance with the strategy used at the sliding surface interface.

The most popular product is designed primarily for use in railway bridges and consists of a convex bronze or stainless steel base plate which is self lubricating through the incorporation of trepanned recessed reservoirs containing solid lubricants whose primary constituent is molybdenum. The concave smooth finished steel top plate slides over the base plate which allows the large rotational displacements. However, by adopting advanced materials in its design, LCL also offers Spherical Bearings which consist of a convex aluminium, or stainless steel, base plate but where the steel top plate is machined to accommodate a dimpled Teflon (PTFE) sheet. In this way the PTFE sheet is mechanically recessed and confined, resulting in superior mechanical binding. Compared to the traditional method of surface bonding the sheet, LCL's design approach guarantees the integrity of the sliding surface components during the life time of the bearing.

All of LCL-Bridge's Spherical Bearing designs, materials & fabrication processes can be adapted to client required manufacturing specifications or codes of practice for any Country. The bearing is designed to be maintenance free for the duration of its design life and can operate down to extremely low temperatures; as low as - 40° Centigrade.



10,000 kN Spherical Bearing Capacity
Manitoba, Canada

SINGLE CELL EXPANSION JOINTS (L JS SERIES)

Expansion joints are integrated with bridge decks in order to accommodate the relative movement between the structure's segments, as well as the movement between the superstructure itself and support abutments. Such movements are the result of thermal expansion and contraction, creep and shrinkage of the concrete, substructure settlement, live dynamic loads and other causes.

As a result of further advanced research and development, LCL's single cell joints are manufactured using extruded steel rails that ensure a watertight interlocking mechanism by using a neoprene seal. What makes LCL's Single Cell Expansion Joint so unique is the additional protection it provides to underlying structures, such as abutments. This is achieved through the incorporation of a collector reservoir which runs along the bottom of the steel rail joint and which collects and drains away water, de-icing chemicals in cold climates and debris. This unique feature further adds protection against corrosion and extends the useful life of the concrete and steel in each structure.

Furthermore, the thickness of the rail is optimized to increase the joint's resistance to fatigue, therefore ensuring that the joint has significantly increased durability throughout its service life. The interlocking design of the extruded rails enables easy installation of the neoprene seal during production and in the field.

LCL's strip seal expansion joints have been extensively tested by independent organizations to ensure their water tightness and resistance to fatigue. LCL has also thoroughly, and independently, tested the movement capacity of its joints for skewed, curved and straight bridge decks.

All of LCL's expansion joints have been extensively tested by independent organizations to ensure their water tightness.



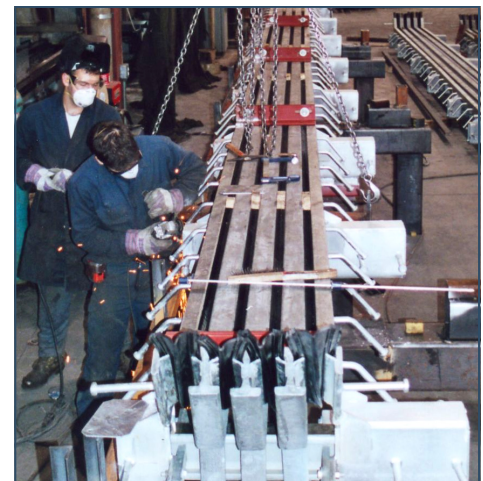
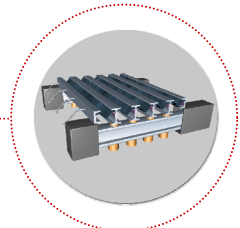
Macleod Trail / Shawnessy
Calgary, Alberta, Canada

MODULAR EXPANSION JOINTS (L JM SERIES)

Modular expansion joints have been widely used throughout the construction industry for well over 40 years. The primary design goal for this joint system is focused upon its long term ability to resist damage that results from sustained fatigue loads. Modular Joints, although very complex in nature, must be water tight and must accommodate very large thermal movement without transmitting potentially damaging tensile or compressive forces to any given structure.

LCL's Modular Joints are designed as multiple or single support bar joint systems depending on the required range of movement and the intended application. They are designed to accommodate structural movements through an arrangement of adjacent connecting seals that have a self regulating gap system designed to ensure that all seals open equally. The joints are made up of an arrangement of extruded edge and center beams that run perpendicular to the bridge's longitudinal axis and are interspersed with neoprene seals. The center beams in turn slide on support beams that are arranged to move along one or both edges. The support beams are designed to allow rotational and sliding movements.

LCL's modular joints significantly reduce road surface traffic noise and vibration to a minimum and the design approach also results in a continuous water tight connection at both minimum and maximum opening apertures, very durable fatigue free connections and maintenance free components.

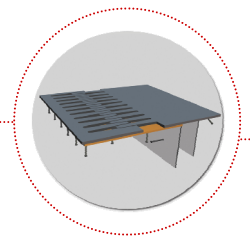


4-Cell Modular Expansion Joint
Tou-Chen, Taiwan

FINGER EXPANSION JOINTS (LJF)

Large movement finger expansion joints represent one of the best solutions to accommodate bridge expansion and contraction whilst reducing road noise emission to a minimum. Its main elements consist of cantilevered, or sliding, steel plates connected to each side of the road surface's gap. Designed with a "finger-like" shape, the steel plates easily move within each other; where the primary movement is along the axis of the fingers themselves. Since there are no moving parts attached to the joint, cantilever moments reduce the stress induced to the structure. There is a large replaceable gutter below the joint which is made of reinforced neoprene and provides an efficient drainage system into the bridge's ducts. The gutter also limits the build up of standing water to reduce the possibility of vehicles aquaplaning.

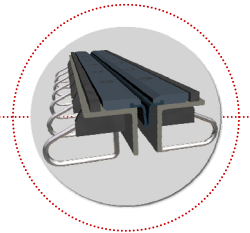
LCL's finger joints exhibit very low levels of noise emission and therefore offer a high level of driving comfort for fast or heavy traffic. The joints can be designed to reach their full horizontal expansion at, or around, 600 mm. In applications where effective maintenance practices are carried out then LCL's finger joints will last for a very long time and as such they offer a very cost-effective and durable solution for most bridge applications. Every LCL finger joint is custom designed and fabricated to individual specifications.



58 Feet Long Finger Expansion Joint
Highway 4 Over North Saskatchewan River
Saskatchewan, Canada

COMPRESSION SEALS (LJC) & BOLT DOWN JOINTS (LJB)

Both Compression Seal and Bolt Down joints are used to withstand thermal expansion from highways, bridges, spillways, dams, parking structures, stadium ramps and pedestrian over-passes. These versatile joint sealing systems offer a cost-effective solution depending on project requirements. Additional seal types and custom designs are available upon request.



Ste-Anne Hospital Approach Bridge
Quebec, Canada

OTHER FABRICATED PRODUCTS

LCL provide cost-effective custom-made high technology numerical machining and fabrication. Contracts range from small scale consumer production to larger projects for Government and Military agencies. LCL also manufactures moulded rubber and neoprene products.



ROCH & PEGARD TYPE MACHINE
CNC-Control



ANODES
FOR STEEL PLATING



GENERATOR
Denmark



LCL-BRIDGE PRODUCTS TECHNOLOGY INC.

1 Provost street
Lachine (Qc)
Canada
H8S 4H2

Tel : + 1 (514) 634-3777

Fax : + 1 (514) 634-3760

Sales : karim.ladicani@lcl-bridge.com

Engineering : rafi.loulou@lcl-bridge.com

www.lcl-bridge.com