

**Mansfield Minera S.A.**



## Lindero EPCM Services to Mansfield Minera S.A. Progress Report

SAXUM's Engineering teams working on the Lindero EPCM Project has, during the last few months, mostly completed electrical, mechanical and civil engineering of the project. Also, SAXUM is currently responding to RFI Engineering as well as providing support to the activities developed in the project. SAXUM has completed the General Arrangements of the mechanical area of Piping and is working on the related isometrics drawings; in addition, the electrical infrastructure design of the process areas has been concluded and the electrical studies have been developed.

SAXUM is finalizing the last purchase orders and is providing support to the contracts administration area as well as solving the imminent needs from the site. The overall project is rigorously controlled based on a master schedule developed by the project and cost management team and detailed monitoring is performed with the progress curves by discipline and by contract. Also, the continuous monitoring and control of all project control activities carried out on site as well as at headquarters, is reported. For example, the availability of on-site personnel in the camps is programmed with the master histogram of the project revision 3 with the updated baseline, which allows to measure the real progress of the Project and to show the pattern to closely follow scope, time and costs.

The challenging Logistics of the project



demanding an activity with international operations of 280 containers from 70 maritime shipments from different countries such as the USA, Canada, South Africa, and Italy.

The ground mobilizations are continuously recorded with more than 1300 transfers between semi-heavy and heavy transports, including the mobilization of a crushing plant from Chile, the in-country provisions and those that have arrived at ports in Buenos Aires and Zarate. The geographical location of Lindero demanded analysis and transport strategies with different types of complexities, which were sorted with different special procedures,

taking into account oversized and extra heavy loads. In parallel to the bulk provisions which were used for the actual project construction, the freight train to Tolar Grande, the county near Lindero's site, was also utilized.

At this time, SAXUM has successfully positioned, assembled and completed 5 of the 6 camp modules, including the kitchen and dining rooms water, gas and electricity services.

In the Primary Crushing area, the HPGR equipment is in assembly process; likewise, the civil work of Tower #3 has already been completed. In the truck-shop area, the concrete structure of the civil works is concluded and has began to assembly of the metallic structure.

**Glencore**



## Feasibility study for AGUA RICA in Catamarca, Argentina for Glencore

For this project, SAXUM's scope of work included the development of the CapEx to define the quantities of piping materials (compressed air, potable water, industrial water, lubricants, grease and diesel), the equipment (pumps, extractor fans, lubricant dialysis equipment, compressors, etc.) as well as the structural and lightweight concrete, heavy and lightweight metal structure for the

following areas:

- Truck shop: consisting of a building for six completely closed CAT mining trucks with access doors for trucks and an area for storage of lubricants and shipping.
- Warehouse for storage of spare parts of mining trucks and offices for truck shop personnel.
- Trucks parking area.

- Welding and repair area of overturning boxes.
- Fuel storage area.
- Fire department building & medical post.
- Rest area and change-room for truck operating personnel.
- Camp area including dormitories, recreation buildings, dining laundry, among others.

**Capitol Aggregates**

## Civil/Structural Engineering for the Upgrade of Capitol Aggregates Cement Plant in San Antonio, Texas, USA.

Capitol Aggregates owns the cement plant located in San Antonio, Texas, USA. Capitol is a Texas based company founded in 1957, with expertise in aggregates and cement. In 2018 Capitol started the development of an expansion of one of its first cement plants which had originally gone online on 1965.

For this project, Capitol required the specialized technical assistance for structural engineering designs. The EP expansion project of this cement plant was awarded to FLSmith (FLS), who in turn awarded SAXUM the civil and structural design of the Cement Mill and its attached buildings, the Cement Mill Feed and Transport and some other minor adjacent structures.

FLS also required the technical assistance from SAXUM for the evaluation of the dynamical features of subsoils in the Capitol cement plant. The areas involved were the new vertical raw mill (VRM) and process fans. Based on these mechanical features, FLS through SAXUM was able to perform the dynamical analysis for the design of the foundations of the new VRM and process fans to avoid resonance effects and mitigate vibrations during their operations.

SAXUM performed the so-called Multi-



channel Analysis of Soil Waves (MASW) tests on different locations of the Capitol cement plant to accurately evaluate the dynamic properties of the soils. This method is based on the analysis of geometrical dispersion of the surface waves, from the evaluation of the vertical distribution of the dynamic shear modulus of soils. As final result it provides the Shear Wave Velocity profile along the subsoils affected by the wave propagation. SAXUM has extended experience

in evaluation procedures to determine soils dynamical features of the soils and particularly on SASW and MASW tests which are based on the Rayleigh waves propagation analysis. These waves propagate in cylindrical form and present the lowest attenuation ratio and they also transmit the largest amount of energy which is one of the most important advantage in comparison to other seismic methods. ■

**THE COMPANY**

## SAXUM participated in the PDAC 2019, the world's premier Mineral Exploration & Mining Convention.

SAXUM has participated in the PDAC 2019, the world's premier Mineral Exploration & Mining Convention, from 1st to 4th of March in Toronto, Canada. This is the leading convention for people, companies and organizations in, or connected with, mineral exploration. In addition to meeting over 1,000 exhibitors, 3,500 investors and 25,600 attendees from 135 countries, you can also attend technical sessions, short courses and networking events. The four-day annual convention held in Toronto, Canada, has grown in size, stature and influence since it began in 1932 and today is the event of choice for the world's mineral industry. ■

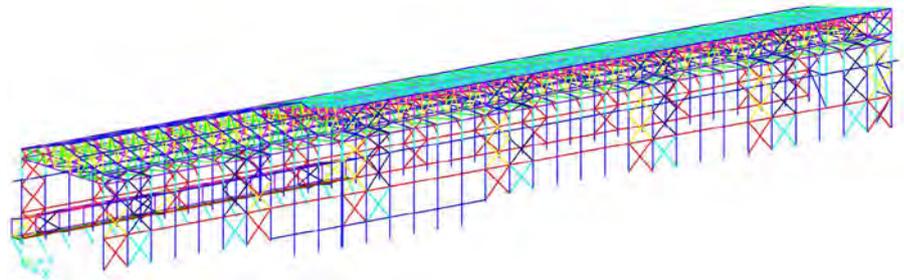
*Ph: Our General Manager from North America with our PC/CM Director at the PDAC 2019.*





# Structural Pathology Analysis for BUZZI UNICEM Pryor Cement Plant, Oklahoma, USA.

SAXUM was awarded by BUZZI UNICEM to perform a review analysis on the overall structural integrity of a storage hall with an overhead crane in its cement plant in Pryor, Oklahoma. The indicated structure had structural issues, which limited the operation of the crane and, therefore, of the overall plant. SAXUM specializes in structural pathologies evaluations and on the identification of the optimal design solutions. Our extensive experience is several critical cases of the cement industry in North and South America support our capabilities and know-how in this field. For the case of the BUZZY UNICEM storage hall in Pryor, SAXUM performed firstly a field evaluation and a structural study to determine the diagnostic of the causes behind the observed pathologies in the structural system. In the second phase, SAXUM professionals focused on the evaluation of the most effective solutions to restore the structural capacity and the full use of the storage building and crane



operation. Based on the field evaluations by our expert professionals, realistic and accurate boundary conditions were implemented in the 3D mathematical model of the structure and its foundation. These included not only the supporting conditions but, moreover, the existing dead loads and the overall operational conditions of the different supports. The included figure shows the superstructure portion of the mathematical model developed by SAXUM which considers all structural components and non-linear evaluations of their response behavior.

From the evaluations and analyses by SAXUM it was able to determine with high accuracy the causes of the structural issues and, moreover, the degradation of the safety conditions of the supporting structures in terms of the recommendations of current codes in the USA. Based on these relevant results, SAXUM designed then the optimal reinforcements and modifications needed to be implemented in the structural system of the storage hall to restore the needed safety factors. The deliverables by SAXUM included all detail documents of the reinforcements. ■

## THE COMPANY



## SAXUM new Engineering Manager: Mr. Isaias Villegas.

Isaias is based in SAXUM's headquarters in the city of San Miguel de Tucumán, Argentina and has extensive and relevant experience in the cement, mining and rail industry.

He graduated as an Industrial Engineer and specialized in Project Management. During his career, he performed management and supervision activities participating directly in various areas such as Engineering, Planning, HR, Costs, Production, Safety and Environment. On the other hand, among his first important projects, he managed the Design, Installation and Commissioning of the multiple assembly lines of manufacturing of rail wagons and platforms for the Metal-Mechanical workshop of Military Fabrications of Rio Tercero. This participation involved the elaboration of tender documents

for the development of process engineering, the acquisition of equipment, direct supervision of a team of 18 engineers as well as the negotiations with stakeholders of the project.

Once incorporated into SAXUM's staff, Isaias actively participated as the central coordinator for the elaboration of the CapEx for the Lindero mine project, currently under construction. During the development of the Lindero EPCM by SAXUM, he was assigned as Project Cost Manager. The tasks included budget control, updating redetermination formulas, verifying contractor claims, preparing monthly reports, among others.

Isaias currently works as Engineering Manager at SAXUM and is in charge of coordinating the interaction between the different Structural, Mechanical and Electrical Engineering groups. Also



he participates in numerous projects in Argentina, USA and Brazil holding an essential role during the execution of them to ensure their quality and development, simultaneously supporting a philosophy of continuous improvement on the processes of the company. ■

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