THE SCIENCE OF

SYCSA'S IMPRESSIVE R & D CENTER HAS A COMPLETE SMALL-SCALE PLANT TO TEST MATERIALS AND DEVELOP CUSTOMIZED FLOW TECHNOLOGY, INCLUDING BINS, HOPPERS WITH SENSORS TO DETECT WALL FORCE, CONVEYANCE SYSTEMS, VALVES, AIR PRESSURE AND VACUUM TECHNOLOGY, FILLING, MIXING, AND BATCHING EQUIPMENT, AND SILOS MOUNTED ON RICE LAKE RL9000 LOAD CELLS. IT IS PROBABLY THE FIRST AND ONLY DEVELOPMENT CENTER OF THIS CALIBER IN LATIN AMERICA.

Simply put, a silo is a structure for storing bulk material. Silo systems, though, can be anything but simple. The complicated part is to move the material stored in the silo in a smooth and controlled flow.

Silos y Camioness (SYCSA), Pachuca, Mexico, has been building silos for 44 years. They began by fabricating small silos for transporting cement by truck, and tower silos for storing cement and additives for batching plants. In time, the need for transporting and storing larger quantities of cement grew. Customers also needed silos equipped with electronic weighing systems, digital displays, and printers to keep a more accurate inventory weight. In addition, SYCSA was finding new customers with different materials, including dry chemicals to add color to plastics; foods such as flour, corn, and sugar; and recycled materials such as shredded plastic and crushed glass.

As processes changed and customers began to demand greater ease of operation, SYCSA's expertise evolved to more sophisticated material handling, such as dosing in small quantities and formulating and processing material particles of different sizes, shapes, and characteristics that tend to segregate or stick together.

In 1993, automation brought new tools and skills, and SYCSA began designing and manufacturing complete silo systems including components, piping, valves, air pressure, and vacuum technology to move materials from silos, bins, and hoppers through the entire batching and processing sequence. SYCSA's

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SILOS

The RL9000TWM is a stainless steel, low profile, all-in-one weigh module that is very easy to install, and its robust design ensures many years of trouble-free service.

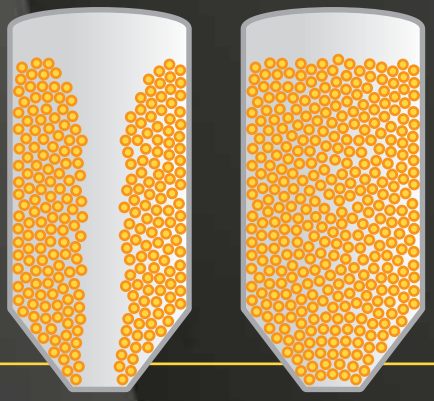
The RL35023 is an alloy steel single-ended shear beam load cell design that allows it to be used in many applications from floor scales to bins, silos, and hoppers.

Ratholes and bridges

Two of the most common flow problems in silos are no-flow and erratic flow. No-flow can be caused by ratholing and bridging. Ratholing occurs when the material moves through the central part of the silo to the outlet while the remaining material sticks to the walls. If the material being handled has a sufficient cohesive strength, the stagnant material outside the channel will not flow through it. Once the rathole is emptied, there is no flow from the silo.

Erratic flow occurs when the material in the silo flows intermittently and forms a bridge over the opening. The bridge collapses when the material above reaches a critical stress level and falls within the silo. Flow then continues until the next bridge forms.

The potential for ratholing and bridging depends on several factors, including humidity, temperature, storage time, and the size, shape, and weight of the material, whether flakes, granules, or pellets. Caked material can often be dislodged by vibrating the silo or using an air cannon. If those methods are not successful, removing material adhering to the walls of a large silo is expensive.



Rathole **Bridge**

At first glance, the narrow hall appears to be a well-stocked pantry of freshly canned goods. Read the labels and shake the jars and you find varying weights of pellets, flakes, powders, pieces of glass, plastic, metal, seeds, and pasta. This is the SYCSA research and development center inventory of dry materials intended to flow out of a customer's silo and into their processing system.

Each ingredient has unique characteristics (weight, fall rate, granule size, repose angle, density) that affect the discharge of material into silos, piping, valves, and auxiliary equipment. At SYCSA's R & D center, team members custom design and manufacture silos and systems for storing and processing hundreds of raw materials and teach customers how to control their process.

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experience grew as they worked with each type of material, culminating in a research and development center where the work team of SYCSA's bulk material laboratory believes all flow problems can be solved through improvements in design. The laboratory manager observes, "It is very expensive to correct flow problems at the site. At the research and development center we can attack the problem much more cheaply."

SYCSA's impressive R & D center has a complete small-scale plant to test materials and develop customized flow technology, including bins, hoppers with sensors to detect wall force, conveyance systems, valves, air pressure and vacuum technology, filling, mixing and batching equipment, and silos mounted on Rice Lake RL9000TWM load cells. It is probably the first and only development center of this caliber in Latin America.

SYCSA uses its laboratory and teaching center to design, build, and test automated equipment, studying specific material and flow characteristics. SYCSA customers and end users also attend training seminars there to learn how their specific material can be handled.

Some of SYCSA's technology is designed expressly for the plastics industry. Mills transport scrap plastic to storage silos and then to pelletizing machines to be returned to production. The flow of the material is very difficult to control and maintain inside the silo and in pneumatic conveyance systems because it self-organizes into "frames." The SYCSA development center resolves these and other unique challenges that arise along the way, ensuring that each silo system provides the best solutions in material storing and handling. ■

The flow of some material, like shredded plastic shown above, is very difficult to control and maintain inside the silo and in pneumatic conveyance systems because it self-organizes into "frames."

The SYCSA development center resolves these and other unique challenges that arise while designing each silo system.