

Silo Technology 26th + 27th of October 2026

A practice-orientated overview of the basics of silo technology with many practical examples.

Date / Location

from: 26.10.2026, 10:30 am – 17:00 pm
to: 27.10.2026, 8:30 am – 16:30 pm

MADISON HOTEL
Schaarsteinweg 4 - 20459 Hamburg

Referent

Dipl.-Ing. Mario Dikty, Schwedes + Schulze Schüttguttechnik GmbH
Dr.-Ing. Martin Kaldenhoff, Gesellschaft Beratender Ingenieure mbH
Prof.Dr.-Ing. Dietmar Schulze, Dr. Dietmar Schulze Schüttgutmesstechnik GmbH

Participants

The seminar is aimed at anyone who plans, builds or operates silos. We will provide in-depth insights into the correct silo design, discharge devices and problem elimination.

Content

The extensive field of silo technology is primarily concerned with the storage and flow of powders and granulates in silos. The field of application ranges from small dosing bins to storage silos with several tens of thousands of cubic metres. Silos, feed hoppers and other bulk material containers are often not the main focus when planning a system, as they generally contribute little to value creation through the refinement or production of a product. On the other hand, they can have a negative impact on plant throughput or product quality if they are not designed properly. Nevertheless, many bulk solids silos are built without taking into account the behaviour of the bulk solids to be stored. This leads to the well-known effects, e.g. flow problems, which can often be recognised by the traces of hammer blows on the hopper. In this seminar, the basics of the flow behaviours of bulk solids in silos are presented, the calculation approaches for determining arch spans or hopper inclination angles for achieving mass flow are explained, based on the measurement results of the so-called flow function, time flow function and wall friction. Many practical and real-life examples will be shown. Together we will carry out and analyse shear tests to determine the stresses in the bulk material. The stresses (pressures) in the silo will be shown depending on the filling and emptying situation and the typical silo problems, such as funnel flow, dead zones, segregation, shooting, silo dents etc. will be discussed and the measures to avoid these will be presented. The discharge devices following the silo, such as the belt conveyor, rotary valve, orbiting screw, vibrating hopper, vibrating floor, oscillating bar discharger and many more are presented in relation to the optimum silo design for achieving mass flow and avoiding arching. Finally, we will take a look into the EN 1991-4. This standard is used to calculate the strength of the silo body. We will work out which pitfalls the designer (without knowledge of EN 1991-4) can/should avoid in order to achieve an economical silo concept.

Day 1 – Monday, 26th of October 2026

10:30 Registration

11:00 Welcome

11:15 Flow properties of bulk solids Part 1

- ③ Horizontal stress ratio
- ③ Yield locus, flow function, bulk solids strength, uniaxial compression test
- ③ Mohr's stress circle
- ③ Time consolidation
- ③ Definition of flowability and its dependence on the consolidation stress

12:30 Lunch

13:15 Flow properties of bulk solids Part 2

14:00 Stresses in silos

- ③ Active and passive stress state, Janssen equation, stress curves
- ③ Vertical stresses in the hopper and at the silo outlet as a function of the hopper geometry
- ③ Stress peaks due to funnel flow or eccentric discharge

14:45 Coffee break

15:15 Silo problems

- ③ Why do silo problems arise: funnel flow, segregation, arching, shooting, piping, silo quake, excentric flow, buckling?
- ③ How can they be solved?

15:45 Silo design acc. to Jenike's approach Part 1

- ③ Mass flow
- ③ Arching
- ③ Piping

17:00 End Day 1

18:00 Hamburg Harbour tour

Day 2 - Tuesday, 27th of October 2026

8:30 Silo design acc. to Jenike's approach Part 2

9:00 Measurement of flow properties

- ③ Live measurement of flow properties with the Schulze ring shear tester
- ③ Performance of a uniaxial compression test to explain time consolidation

9:30 Silo hopper geometries and wall linings

- ③ Which silo hopper geometries are common and how do they influence the flow profile?
- ③ Which hopper wall linings can improve the flow behaviour?

9:45 Designing silo discharge correctly Part 1

- ③ Discharge capacities
- ③ Silo discharge devices and their limits of use (rotary valve, screw conveyor, belt conveyor, trough chain conveyor, vibrating hopper, rotary plough, multiple screw feeder, fluidising elements, compressed air cannons, knockers, vibrators)

10:00 Coffee break

10:30 Designing silo discharge correctly Part 2

12:00 Lunch

13:00 EN 1991-4 Part 1

14:45 Coffee break

15:15 EN 1991-4 Part 2

16:30 End of Seminar