



# AMBEV SILO IMPLOSION DESIGN

Rio de Janeiro, Brazil

## Demolition & Wind Analysis

This article details the results of demolition modeling and analysis of the AMBEV silo structures in Rio de Janeiro. The demolition scenario involves initial weakening followed by demolition by explosives. The demolition method is proposed by Fabio Bruno Construções (FBC). Based on this proposed demolition method, ASI was requested to do the analysis and the modeling and suggest any necessary modifications. The nonlinear dynamic analysis performed by ASI was done under the effect of own weight and under the effect of the wind load.

The structure consisted of two groups of silos, nine small silos and ten large silos as shown in Figure 1. The silos structure was modeled in the ELS. The structure was modeled based on one structural drawing and data collected by a site visit. The proposed demolition scenario for both the small and

large silos involved a V cut on one side of the silos. The dimensions of this V-cut was determined based on the ELS analysis. The reinforcement bars in the V cut area was to be left until demolition day, once cut it was followed by blasting connectors and columns supporting the silos. The implosion scenario was implemented in ELS by suddenly removing the specified connectors and columns at the specified times.



Fig. 1 Silo Structures

Figure 3 shows 3D views of the large and small silos models. All material properties for the model were assumed based on the site visit and inspection of the structural status.

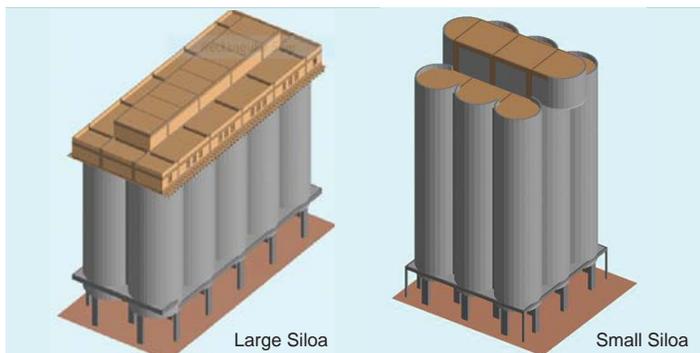


Fig. 3 Large and Small 3D Silo Models

Figure 4 shows the analytical results of both the large and small silos did not show significant debris field resulting from demolition.

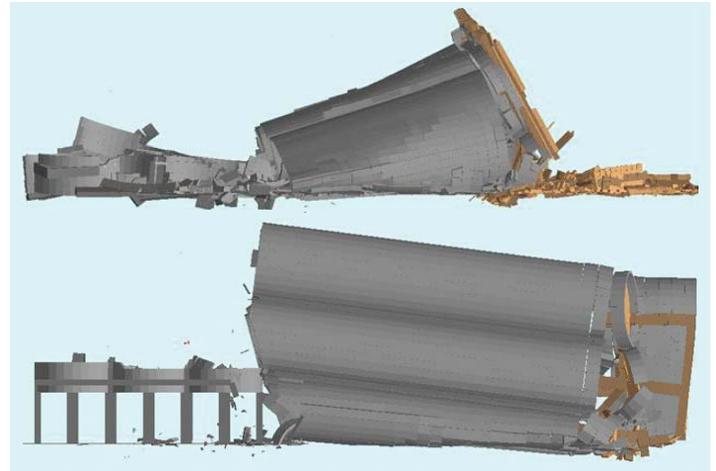


Fig. 4 Large and Small Silo Debris Field

In addition to the design of the controlled collapse demolition it was requested that ASI also study the behavior of the weakened structure under pressure resulting from wind loading after the initial demolition preparation weakening was implemented. Wind loads were calculated based on ASCE7 code. The maximum wind pressure was calculated as 20 psf. Two analyses were performed to study the effects of wind on the weakened structure. The first on (case 1) in which the wind direction is from east to west while the second analysis (case2) the wind direction was from west to east. Analysis results showed that the structure can resist the wind pressure safely.

The final analysis results of the controlled collapse and wind pressure were presented to the client by FBC and proved the soundness and safety of the proposed demolition scenario. The weakening scenario was safe under the effect of the gravity loads. The elements removed by explosives were sufficient to cause the structure to fail in the desired direction. The study of wind loading showed that the proposed weakening scenario is safe for the case of wind load.

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