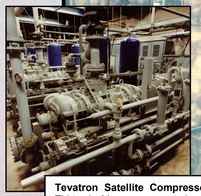
Cryogenics Helped Get to the Bottom of the Top

Tevatron Accelerator: The Tevatron is a four mile circumference superconducting accelerator. It was commissioned in 1983 as the world's highest energy accelerator, and retains that title today. A hybrid cryogenic system, consisting of a large helium liquefier (CHL) and 24 satellite refrigerators, cools the Tevatron. Liquid helium and nitrogen are distributed from the CHL to the satellite refrigerators through a 4½ mile transfer line. When completed, the Tevatron cryogenic system was the world's largest helium refrigeration system.

Tevatron Cryogenic System Award: The American Society of Mechanical Engineers designated the Tevatron Cryogenic System as an International Historic Mechanical Engineering Landmark in 1993.



Tevatron Satellite Compressors: Thirty-six Mycom compound screw compressors are used in the Satellite refrigeration system.

Tevatron Central Helium Liquefier (CHL): The CHL is still the world's largest helium liquefier, with a capacity of 6,400 liters/hour. A second CHL was constructed as a backup.

Tevatron Satellite Refrigerator: Twenty-four satellite refrigerators, each with a capacity of 1kW at 4.5K, are spaced around the four mile accelerator. Two reciprocating expanders are shown.

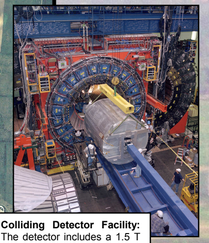
Tevatron Transfer Line Installation: A helicopter was used to distribute 300 sections of 80 foot prefabricated transfer line onto the berm.

Tevatron Satellite Refrigerator Heat Exchanger: Each satellite refrigerator incorporates a horizontal spiral wound, finned tube heat exchanger. The Central Helium Liquefier can be seen in the background.

Tevatron Transfer Line Award: The Tevatron transfer line was presented an IR-100 Award as one of the 100 most significant new technical products of 1983. From left to right, Bob Ferry, Fred Walters, Claus Rode, and Jay Theilacker toast the occasion at a ceremony at the Museum of Science and Industry.

Antiproton: Helium cryogenics are used within the Antiproton Debuncher ring for electrical noise reduction.

Tevatron Quench Relief Replacement: Ken Olesen (left) and Jay Theilacker replacing a relief valve on a Tevatron dipole at 20 K.

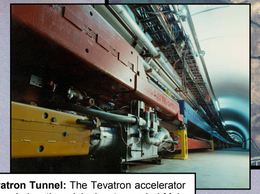


Colliding Detector Facility: The detector includes a 1.5 T superconducting solenoid with a 2.8 m bore and 5 m length.

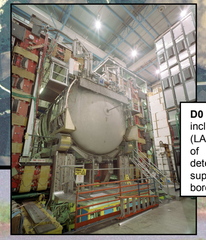
Central Helium Liquefier: This photo shows the CHL facility and the fifteen 30,000 gallon Tevatron helium gas storage tanks.

Accelerator Division Cryogenic Department: Personnel in 1993, at the time of the ASME award.

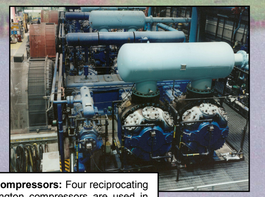
Hans Kautzky: Inventor of the Kautzky relief valve used on the Tevatron.



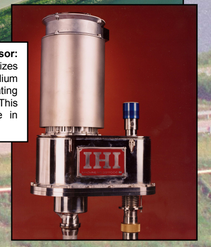
Tevatron Tunnel: The Tevatron accelerator shown below the original water cooled Main Ring accelerator.



D0 Colliding Detector: The detector includes three large liquid argon (LAr) calorimeters containing a total of 12,000 gallons of LAr. The detector was upgraded with a 2 T superconducting solenoid, with a 1 m bore and 2.7 m length.



CHL Compressors: Four reciprocating Worthington compressors are used in the CHL facility. Each has six dual acting cylinders. Two compressors are configured in three stages and two are configured in four stages.



Tevatron Cold Compressor: Each satellite refrigerator utilizes an IHI centrifugal cold helium compressor to lower the operating temperature of the magnets. This allowed for a 10% increase in Tevatron operating energy.

Tevatron Satellite Refrigerator and Transfer Line