

WAX 1991

Norway - Museum  
for History of  
Explosives

# Teknisk kulturminne

# Engene

Museum for The Industrial  
History Of Explosives



The technical Museum at Engene has been created through a comprehensive plan to preserve the historical material which has been inherited by the company following a series of mergers.

A historical archive has been established containing material from different factories and which covers the Norwegian explosives industry from the very beginning in 1865.

In cooperation with Norwegian archivists and through donations from the Norwegian Cultural Association, Dyno Industrier A.S has created a museum in its old explosives factory from 1876 covering the industrial history of explosives.

We would like to show how the new explosives which followed from Alfred Nobel's inventions and patents were produced. The museum was opened on 21 October 1983, the 150th anniversary of Alfred Nobel's birth.

It is our aim that a visit to the museum will give an insight into the manufacturing process as well as give a breath of the atmosphere in which generations have worked at Engene.

The production of dynamite is of crucial importance to the industrial development which occurred during the 19th century, especially in a mountainous country like Norway. We owe a great debt to our early predecessors who in a literal sense laid the foundations of this new explosives industry.



Alfred Nobel  
1833 - 1896

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**Det norske Nitroglycerin**  
Compagni

bekjendtgjør herved, at Fabrikation af **Nitroglycerin** er begyndt, samt at Bestillinger modtages og expederes fra Compagniets Contor, Østrogade No. 34, 2den Etage.

Our first advertisement  
"Morgenbladet" 18. august 1865

## The Foremans House

Here we depict the historical background for the museum.

Ascanio Sobrero invented nitroglycerine in 1847. Before that, the only explosive available was black powder. Another ancient method widely used in mining was firesetting.

The 'modern' explosives industry is based on three of Alfred Nobel's major inventions:

The industrial method for manufacturing nitroglycerine.

The introduction of the detonator.  
The invention of dynamite.



Alfred Nobel sold his Norwegian patent to two of his colleagues, who together with Norwegian businessmen, founded NITROGLYCERIN COMPAGNIET on 25 June 1865. The first factory was erected at Lysaker near Oslo and started production in August 1865.

**A**lfred Nobel provided the Norwegian factory with capable leaders. Fredrik Lamm became our first factory manager, Eric Anderson arrived from Vinterviken in Sweden to become our first foreman.

Nitroglycerine was originally distributed in tin cans. It had the appearance of a thick, oily fluid and was very sensitive. Its use led to many accidents and pushed Alfred Nobel to find a material which could absorb nitroglycerine and make it safer to handle.

Dynamite was invented in 1867. It consisted of nitroglycerine absorbed in diatom earth, giving the product a putty-like consistency.

The factory at Lysaker was in production for nine years. In April 1874 an explosion occurred that killed a man and brought an action against the company which ended further production at Lysaker.

Alarik Liedbeck, Alfred Nobel's chief engineer and a friend of Lamm, worked as a consultant for the company. Together they built the new factory at Engene which started up in October 1876. The layout was based on new principles, i.e. the buildings were spread out, interspaced by protective walls.



**Fredrik Lamm**  
1827 - 1887



**Alarik Liedbeck**  
1834 - 1912

## The A-house

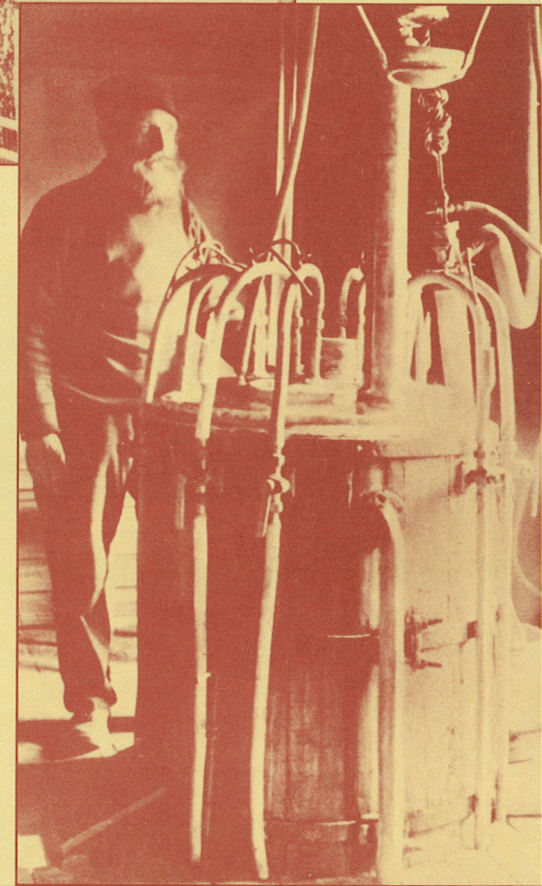
This is the building where nitroglycerine was produced.



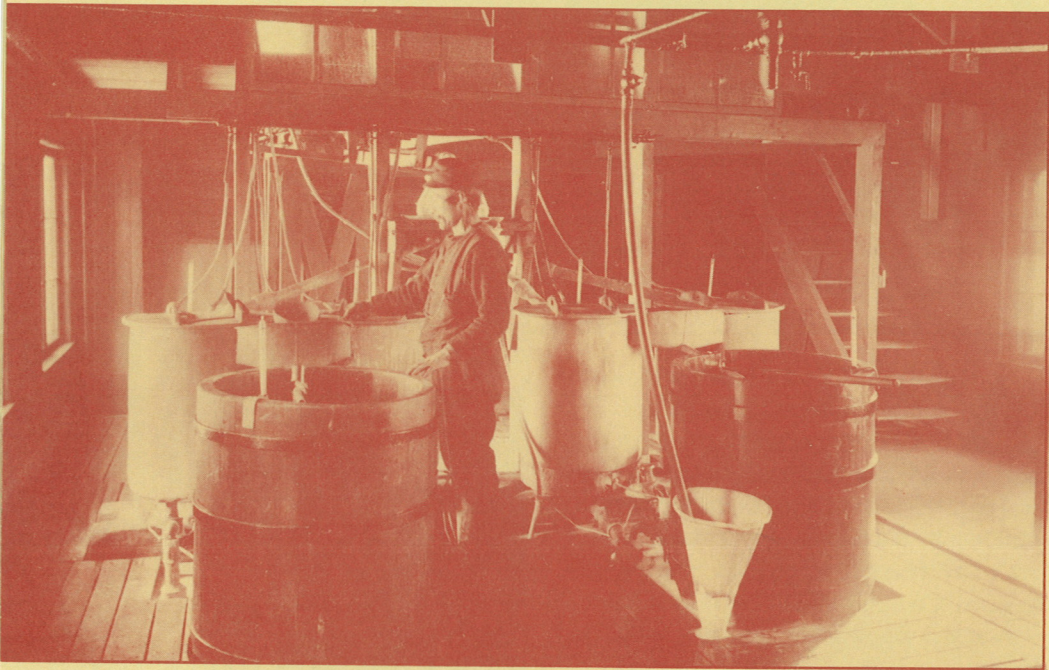
**A** photo of August Anderson shows the equipment used 100 years ago.

A mixture of sulphuric and nitric acid was filled in the apparatus from a lead wagon, which was pulled to the top of the building by pulley. The glycerine was added by means of a pneumatic injection system. Cooling was achieved by using icewater in the summer, seawater in the winter.

Today's apparatus, in stainless steel, was built in the 1950s, with three times the capacity. Acid and cooling liquid were supplied by pipeline from a little building next to the A-house. In a big water-filled safety tank placed in the cellar, the batch could be 'drowned' should the process get out of control. Originally a safety exit was at hand, a bridge between the A-house and a safety bunker behind the protective wall.



Downstairs in the A-house we find two separators in stainless steel, where nitroglycerine was separated from the spent acid. Originally open lead separators were placed here. A photo shows how the nitroglycerine floating on top of the spent acid was skimmed off by hand using a lead ladle. The nitroglycerine was washed in a tank prior to being transported by a rubber pipe along the angled corridor to the B-house.



## The B-house

In the B-house the nitroglycerine was washed in large vats using a caustic soda solution and finally filtered through salt.

The finished product was stored in two containers from which it could be tapped for transport to the production houses.

## The Gelatine Mixing house

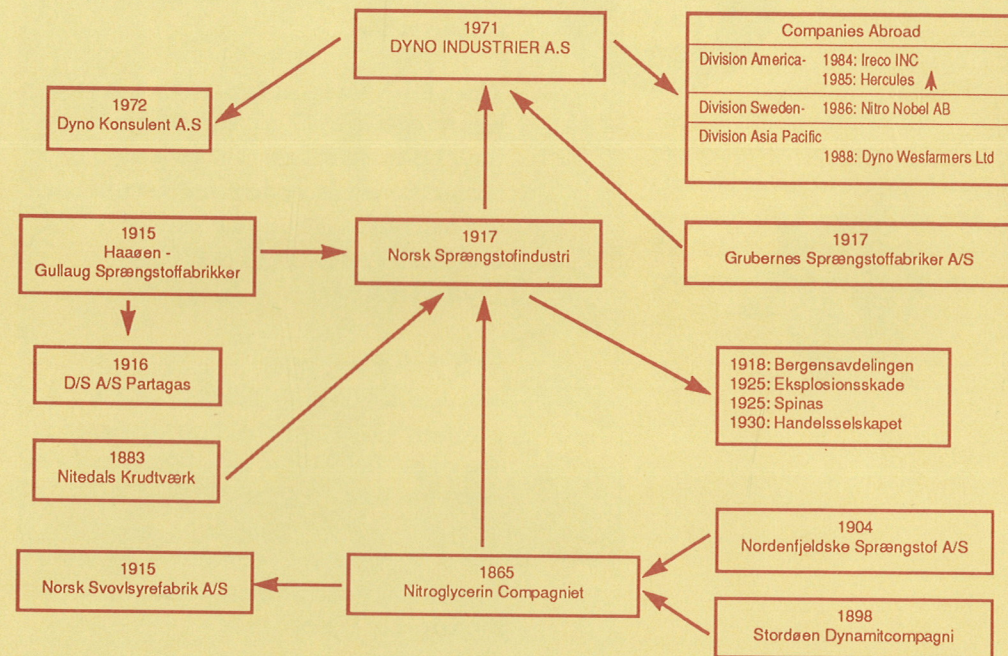
Nitroglycerine was mixed with nitro-cotton to form gelatin dynamite.

By adding certain other ingredients it became rubber dynamite. This development took place in the 1880s, and the recipe is still in use. The old equipment is preserved or shown in pictures.

The production of nitro-cotton started at Engene in 1879.



Depicted on the wall is a display showing the Norwegian factories which have produced commercial explosives in Norway. Together with Dyno's foreign companies this gives us a complete record of explosives production during 125 years.



# History of the commercial explosives Industry in Norway



**Nordenfjeldske Sprængstof A/S** was established in 1904. The factory was situated at Sundal, Åsenfjorden. **Nitroglycerin Compagniet** took over in 1906 and production was maintained until 1918.

**A/S Haaøen Fabriker** started in 1915, was founded to supply Russia with explosives. It was closed in 1917 - 18.

**Norsk Svovlsyrefabrik** was established in 1915 to meet the company's demand for sulphuric acid. The factory closed in 1968.

**The Gullaug explosives factories** situated by Drammensfjorden, were completed in 1918. Production of fuses started in 1924 and in 1925 a factory for production of TNT was built. The factories at Gullaug are today the sole Norwegian producer of explosives based on nitroglycerine.

When the Norwegian Explosives Industry was formed in 1917, a competitor at Ski (near Oslo) started up. The company became known under the name '**Grubernes**' and remained a competitor until the companies merged in 1971 to form **Dyno Industrier A.S.**

**D/S A/S Partagas** was established in 1916 to take care of the company's fleet. All the ships are shown in drawings. In 1968 the last of the company's boats was sold.

The Anderson family tree shows five generations of descendants who have been employed at Dyno.

## The Bakery

**This is the building where dynamite gelatine was mixed with other ingredients to become dynamite dough.**

In the entrance hall we present a survey of the old Nobel factories and the benefits that Nitroglycerin Compagniet gained through the cooperation between them.

A beautiful little model of the old Lysaker factory is shown together with a description of how production was accomplished. In the main room the apparatuses for mixing and cartridgeing are shown in pictures, drawings and original specimens.

## The mixing process

Our first mixing machine dates back to 1874. It was further developed by Liedbeck and the Scotsman, McRoberts, under whose name it appeared on the market. A refurbished specimen is shown. Another early mixer was the Werner Pfleiderer. It is a forerunner of the Talley mixer, still in use. The one shown here dates back to the 1920s.



Here at Engene the 'Bille' mixing machine was constructed in the 1940s, four of which are shown. This was the last equipment in use when production ended in the 1960s.

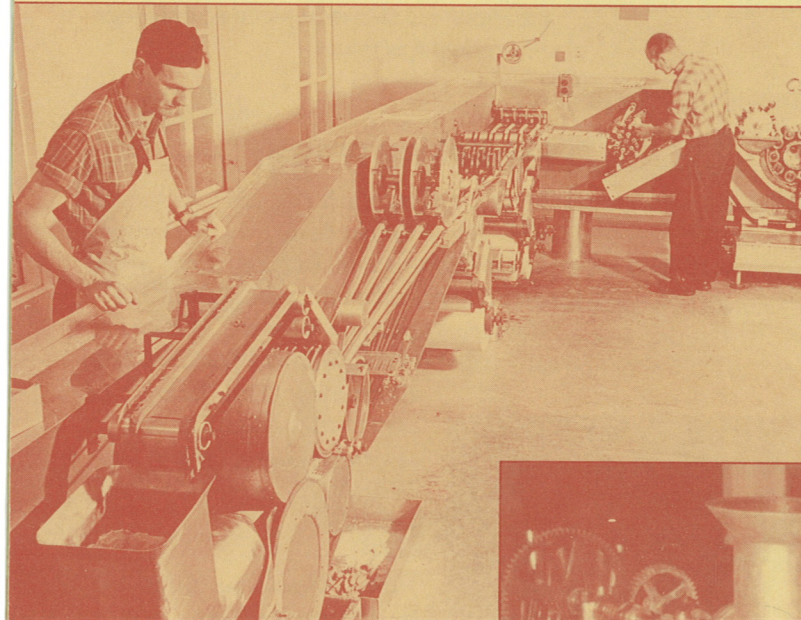
## The cartridgeing process

An original 'rolling pin' technique from 1879 describes how cartridges were formed by hand.

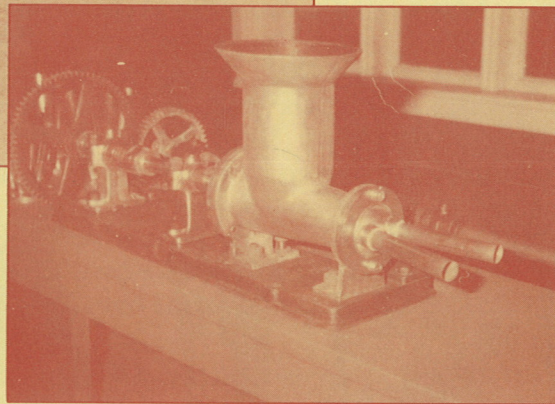
Various versions of McRoberts' Hand Presses were in use from the 1880s. Connecting the press to the water system led to the development of the hydraulic press. A specimen from the 1920s is shown.

In 1935 the Works Manager, Mr. Østern, designed a mill press. His concept was further developed and was popularly known as the Engene machine. The machine was in use in our factories up to the 1950s.

With the introduction of automatic cartridgeing, the Wrapping Girls' job of packaging by hand came to an end.



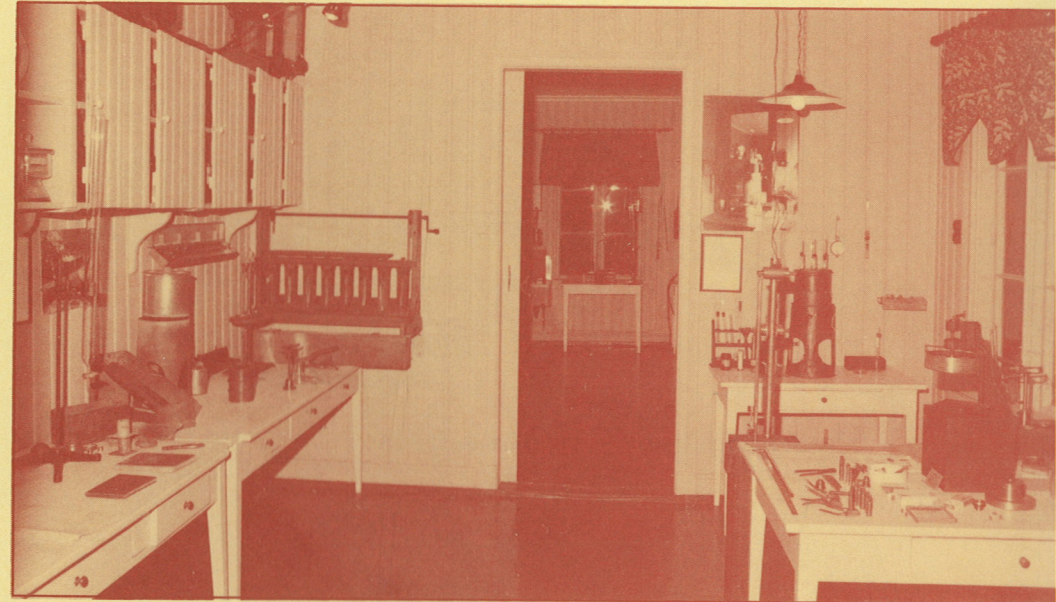
The "Engene machine" Was our first cartridge automat.



McRoberts cartridge machine, the "Mincer". Dynamite dough was pressed through pipes of a diameter corresponding to the cartridge dimensions.

## The Cronograph

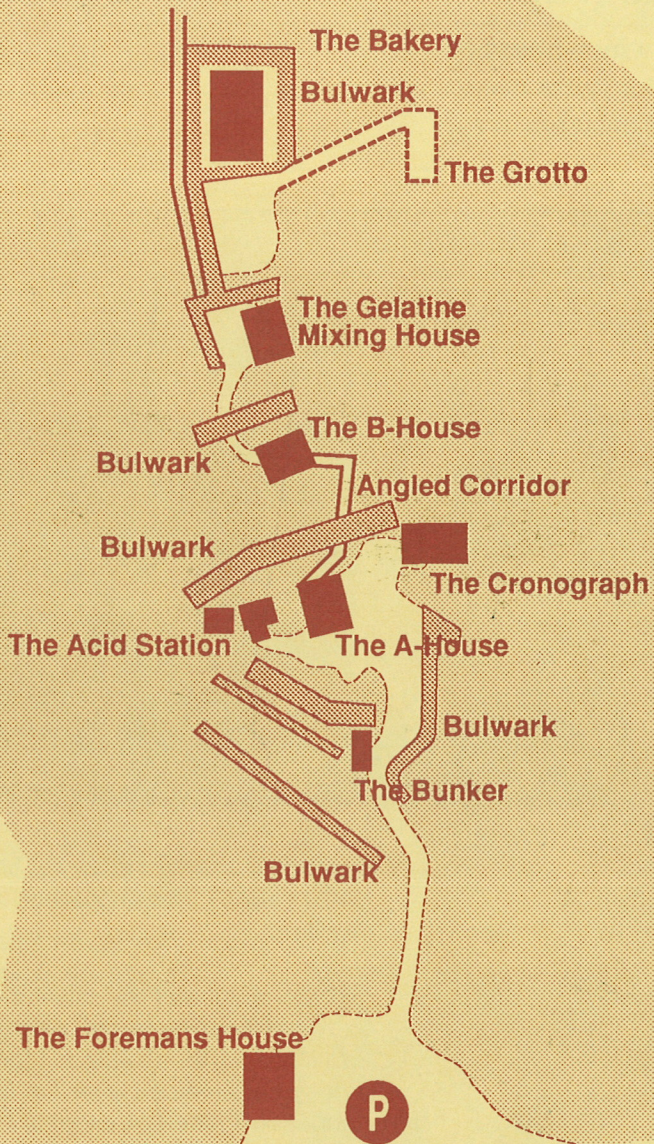
This building, which houses our old laboratory, has been moved into the museum area.



In the inner room the history of black powder and ballistite production is displayed.

Nitedals Krudtværk was established in 1883 and was taken over by our company in 1917. Black powder for whaling and for the fuse factory was produced as well as shot cartridges. Production ended in 1976.

Production of ballistite, smokeless powder, started at Engene in 1890. It was another of Alfred Nobel's ingenious inventions. At Engene powder for the armaments industry was produced. Photographs of old presses, the patent history, and samples of the equipment are shown.



**Map  
Museum Area**