

Tire curing with nitrogen.



Nitrogen-operated, hydraulic tire press (courtesy of ThyssenKrupp Elastomertechnik)

General

Curing is the chemical cross-linking of rubber and vulcanizing agents, resulting in an elastomer. The outcome of this reaction depends primarily on the amount and purity of the raw materials. Temperatures of up to 200 °C, pressures exceeding 30 bar and long cycles ranging from a few minutes to several hours help to create the unique properties of the final product rubber.

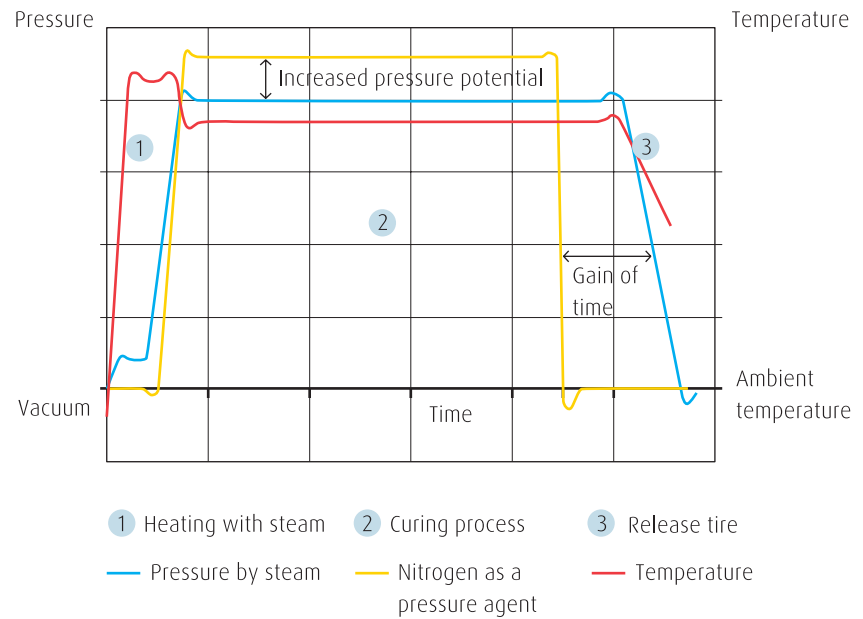
The state of the art so far

The heat and pressure needed for curing is often added to the process in the form of steam. This procedure, however, has a number of disadvantages: steam energy has a high price and the steam itself is difficult to handle. The maintenance effort for the steam production may also lead to long downtimes. And not all process parameters for steam application can be adjusted independently from one another. Additional antioxidants are needed to protect the bladder from premature deterioration. Moreover, condensing steam can lead to local overheating at the tire and have a negative effect on quality.

Nitrogen as a pressure agent

In order to minimize the disadvantages of the conventional process, nitrogen can be used as a flexible and inert pressure agent. After the steam-induced preheating, nitrogen takes over the part of keeping the system's pressure at the desired level. The ideal system pressure and curing temperature can be selected independently from each other. The rubber cannot overheat any more because of excessive steam supply and less steam can condense in subsequent stages of the curing process.

Curing principle



Special advantages

Curing with nitrogen offers significant advantages:

- Improved pressure stability and independent pressure level
- Maximum availability and reliability
- Cycle time reduction of up to 18 %
- Up to 100 % longer bladder life time
- Possible reduction of more than 80 % of the steam costs compared to a steam-water-system
- Higher process flexibility and quality due to individually controllable pressure and curing temperature
- Reduction of production and maintenance costs
- Improved quality leads to minor tire scrap
- Higher availability of the presses
- Reduced pipeline corrosion
- High purity guaranteed

Step by step

Trials are normally necessary in order to define specific parameters and to achieve optimal production safety. With testing devices and know-how, we are able to support in-house trials. Our application engineers will assist our customers with efficiency evaluations and analyses of specific requirements.

Safety

Whether you choose tank supply or on-site supply: with gases from Linde, you always get maximum production and supply safety.

Service and know-how

With decades of experience in gas supply and related process technologies, we facilitate an efficient and individual project development. Our extensive know-how in these application areas ensures a safe and reliable system operation as well as the economical application of the technical gases.

Subject to change

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