

Grontmij, your partner in rail transport



Together with other forms of transportation, rail transport contributes to solving the growing mobility problem. A thorough approach to the management and maintenance of existing rail infrastructure is a necessity for the continued reliability and safety of rail transport. The renewal of existing rail systems also leads to the improvement of rail transport.

Grontmij focuses on both the improvement and expansion of existing rail infrastructures. Our innovative and sustainable research methods make this possible.

Railway construction



Today, the Dutch rail network is under great pressure in terms of availability and reliability. The number of passengers transported by rail increased from 188 million in 1970 to 314 million in 2003. This means that more and longer trains are running (from 4,500 to around 5,000 movements per day). Furthermore, around 350 goods trains carrying 95,000 tons of goods also use the tracks every day. The Dutch rail network has become one of the busiest rail networks in the world. The number of passengers is also expected to increase by 65% by 2010. The transport of goods is expected to increase by 200% to 300%.



New rail lines

There is a bright future for rail lines. New concepts are being studied regarding improvements to the existing rail network, freight train lines, high-speed trains and tram and light-rail lines. Grontmij can carry out studies into the possibilities offered by new infrastructure and draw up (preliminary) designs and specifications. We are also involved in D&C contracts. Much attention is also given to low-maintenance construction. Architectural aspects as well as fitting in with the landscape can also be part of our work.

Renewal of superstructure

The rail network is being used more and more intensively. At the same time, stricter safety and environmental standards must be met. In view of the current state of maintenance of the rails and the increased use of the rail infrastructure, a comprehensive approach to maintenance is required. We can provide the designs for the renewal of superstructure. The special attention we give to the renewal and modification of tracks and points is aimed at reducing disruption of rail traffic.

Stockyards

Various activities take place at stockyards such as marshalling, shunting, (de)coupling, washing and maintenance work. Grontmij carries out studies into the (necessity of) modifications to stockyards from the perspective of logistics, operations and environmental issues (such as noise, soil and light). In particular, noise pollution issues lead to suggestions for measures such as the reduction of rail movements, the elimination in gaps in rails and switches and the lubrication of rails.

Stations

Construction of new stations

Urban developments such as new suburbs can lead to expansion of the number of stations and stops. The facilities present at the stations and stops depend on the number of travellers expected. Grontmij can carry out feasibility studies for the expansion of the rail network and draw up (preliminary) designs and specifications for stations. Integration with other local facilities and functions, for example the forecourt, is of great importance in the design. Sustainability and durability are always parts of our design process.

Modification

Changes in the number of passengers, as well as the desire to upgrade facilities to meet current standards lead to the modification of existing stations. A good example of this is the Public Transport Terminal at the central station in The Hague. According to European guidelines, public transport must be accessible to people with a functional disability (visual, aural or motoric) by 2030. This also means that modifications are often necessary.

Station environment

Stations are often centrally located in urban centres with the potential for dynamic development. Concepts for disused stockyards are often integrated into concepts for forecourt development. Of course, a town and landscape planning philosophy also applies. Consultation with local parties (municipalities, companies, local residents, etc.) is naturally also part of this.



Stations are hubs connecting various forms of transport. Passengers arrive in various ways: rail, light rail, buses, taxis, cars and bicycles. The station's location should make transferring between different forms of transport as easy as possible. Facilities such as passenger information systems, waiting rooms and luggage lockers, shop and office space, parking facilities, sanitary facilities, etc. are often also present at these hubs. Good access is an important requirement for this kind of infrastructural building. Often, the station's appearance plays a key architectural role within an urban environment. The integration of all these aspects is a key objective in all our designs.



Electrical engineering

An integral approach to projects through all project stages and technical fields is one of our specialisations. We have experience with integrated approaches to small-scale, medium-scale and large-scale projects. In addition to the combination of fields of railway construction and structural works, our project managers and specialists also stand for the comprehensive application and integration of technologies such as safety systems, energy supplies and overhead power lines in complete railway projects. This also applies to other electrical systems such as passenger information systems, high-quality power supplies (UPS systems), earthing and EMC. We always place great value on the sustainability principle.



Safety systems

The products for safety on the basis of vehicle detection, interlocking and signals cover all work from Rail Traffic Technical Design (RTTD) to the taking into operation of the systems. Primary and secondary collation is part of this package. In addition to safety systems for heavy rail, there is a growing demand for safety systems for light rail and trams. We have expertise in the field of the newest safety systems and safety cases that comply with European standards.

Power supplies and catenaries

The field of power supplies and overhead power lines covers the whole scope of traction power supplies from the high-voltage connection via transformers to distribution at 1500 V and/or 25 kV level. For tram and light rail, we are familiar with the 600 V and 750 V systems.

We have experience with all project phases, including simulations and analyses. For overhead power lines, we have expertise in both simpler systems for tram and light rail as well as heavy rail systems.



Other electrical systems

Today, the provision of information to passengers is very important. This regards overview displays, displays at stops and PA systems. With regard to direct-current systems we are familiar with return current issues, especially in relation to cathodic protection and stray currents. We design return circuits to guarantee functionality and personal safety. We also have experience with the engineering of high-quality power supplies for critical installations such as safety systems and traffic control.

Structural works

Railway bridges

Large railway bridges often become landmarks for long periods. The building of these bridges requires close cooperation between architect and builder. New contract forms – in which the contractor often plays a leading role in the design phase – incorporate construction aspects at an early stage. The service provided by the engineering firm has been adjusted to this situation – the role of advisor has become more important. Grontmij has specialised know-how related to the construction of railway structures in many different fields. Construction-related expertise is still necessary for performing verifications and design reviews and for advising design teams.



Viaducts

Viaducts that cross rail lines, or that carry rail lines, take many forms. Often, the problem of limiting disruption of rail and road traffic plays an important role in the choice of a particular solution. Specific design aspects include reducing noise and vibration, the forces involved in braking and starting again and the absorption of stress when rail traffic passes over the viaduct.



Tunnels

Tunnels are often built to allow railways to pass under waterways. Today, tunnels are often used in urban areas to allow the limited space available to be used for multiple purposes. Construction constraints dictate the design to a large extent. The impact of the construction project on the surrounding environment is an important factor. Damage to existing buildings must be avoided through preventive measures and the monitoring of effects. Aspects such as fire and explosion resistance, changing water courses, vibration and noise pollution must be given attention in addition to the usual issues related to the construction itself.



Structures make up the structural links that connect the more open rail structures used for rail transport. Natural and artificial obstacles are figuratively and sometimes literally bridged by various structural works. Building these structures entails relatively large investments, partly because they must meet strict requirements in terms of safety, reliability and durability. In principle, the structures must function without any problems for at least 100 years. The necessity for non-level crossings in new transport concepts (HSL, Betuwe line, light rail) and the increasingly dense infrastructure in urban areas mean that the number of structural works will increase in the future.



Innovation



Grontmij is a proponent of long-lasting improvement of the railway infrastructure through a comprehensive approach to maintenance that will also be cost effective in the long term. In broad lines, this approach consists of finding, studying and monitoring problematic spots in the current rail network. We can carry this out in a way that has little or no impact on rail traffic. If necessary, we can make changes to these spots to allow the frequency of maintenance to be reduced and/or prevent accidents from occurring. Grontmij has developed several investigation methods to facilitate this approach.

GeoRadar

One of the new investigative methods regards ground-penetrating GeoRadar. This technology allows the quality of the rail structure including the rail body to be inspected at speeds of more than 160 km/h and even up to speeds of 300 km/h. This technique relies on the fact that electromagnetic radiation is partially reflected by the interface between layers with different insulating properties. This reflected energy is detected by the antenna of a receiver. The information gathered in this way is processed by computer to produce a clear picture of the quality of the ground below and the various underground layers. There is no need to interrupt normal rail traffic.

Rail Stress Test

This test allows non-destructive measurement of undesired stresses and tensions in the rail structure. These measures allow the risk of breaking of the rail and buckling of the track to be identified at an early stage. By subsequently applying preventive and corrective measures, the risks can even be reduced to zero. In the end, this improves safety and the utilisation of the rail infrastructure.



Grontmij is a leading sustainable design and management consultancy active in the growth markets of water, energy, transportation and sustainable planning and design. At the core of our business is the principle of sustainability by design which is a leading value proposition for our customers. Our value chain of services stretches from major renewable water and energy infrastructure through designing efficient and environmentally-sensitive mobility and transportation networks to shaping our urban and green living spaces.



Grontmij
De Holle Bilt 22
3732 HM De Bilt
The Netherlands
T +31 30 220 79 11
F +31 30 220 45 59
info.rail@grontmij.nl
www.grontmij.com