

Large-Scale Project: Economical Waste-Water Solution for the Kirchberg / Hunsrück Association of Municipalities



“Oberes Kyrbachtal” group sewage-treatment plant, ready for operation

The project at a glance

Kyrbachtal Project
The sub-projects 1) Frankfurt-Hahn Airport de-icer piping system 2) Oberes Kyrbachtal group sewage-treatment plant 3) Kyrbachtal connecting systems
Requirements Central solution to the waste-water problem in the Kirchberg Association of Municipalities
Clients Flughafen Frankfurt-Hahn GmbH, Kirchberg Association of Municipalities, Hahn Airport Special-Purpose Association
Prime contractors 1) Sonntag Group, Dörth; subcontractor BLK Bohrteam, Görschen 2) Bauunternehmung Klaus Rick GmbH & Co. KG, Burgbrohl 3) Sonntag Group, Dörth
Planning 1) Dillig Engineering Consultants, Simmern 2) Weis Engineering Consultants, Wackernheim 3) Weis Engineering Consultants, Wackernheim
Technical support SIMONA AG, Piping Systems Business Unit, Kirn
Products used <ul style="list-style-type: none">■ SIMONA® PE 100 pipes and fittings■ SIMONA® PE 80 CoEx pipes■ SIMONA® SPC pipes■ SIMONA® SIMOFUSE®
Project duration 2006 to 2009

Alongside sewage from 20 municipalities of the Kirchberg Association of Municipalities, the large sewage-treatment plant located in the Hunsrück region of Germany also processes the waste water and effluent containing de-icer from Frankfurt-Hahn Airport. The Kyrbachtal project not only created an important basis for water pollution control but, at the same time, utilised synergies and, thus, saved costs.

Sub-project 1: Frankfurt-Hahn Airport construction work



Project objectives

- Cleaning sewage produced by Frankfurt-Hahn Airport
- Cleaning waste water containing de-icer from air traffic operations

When it was founded on 1 January 2002, Hahn Airport Special-Purpose Association for public development of the entire airport facility – with the exception of the airport security area – also became obliged to dispose of the waste water and effluent produced by the site. This also includes decontamination of the sewage occurring there. However, connecting the waste water of the Airport to the existing Dill group sewage network, which is part of Kirchberg Association of Municipalities, was initially agreed only as a provisional measure as regards sewage treatment in the area. Eventually, this arrangement became inadequate in view of the major growth in employment and passenger figures.

Flughafen Frankfurt-Hahn GmbH, the body responsible for the traffic facilities in the airport's flight security area, is responsible for disposing of the waste water containing de-icer produced during the winter months as the result of aircraft and runway de-icing, since the officially permissible separating criterion for admission into bodies of water was exceeded.

01 Take off and landing runway, with terminal and apron area at Frankfurt-Hahn Airport



To date, all the waste water containing de-icer initially had to be transported by tanker and then transferred by a pipe to Dill sewage-treatment plant, so as to be able to decontaminate it there in a pipeline-bound system. However, only a part of the de-icing waste water was able to be accepted and decontaminated owing to the limited capacity, despite having boosted the efficiency of the existing sewage-treatment plant.

Construction work

The required pressure pipe for transporting the waste water containing de-icer was constructed by Sonntag Baugesellschaft mbH & Co. KG, Dörth, as the prime contractor. It involved laying around 10 km of SIMONA® SPC pipes, d 250 x 22.7 mm, in construction lengths of 20 m. A decision was taken to use SIMONA® SPC pressure sewage pipes, the aim being to protect the pipe from external damage during laying.

Manufactured by means of coextrusion, the SIMONA® SPC protective-jacket pipe is a multi-layer pipe that includes a protective layer. It consists of a polyethylene core pipe (PE 100) that is provided with an outer, abrasion-resistant and scratch-resistant protective casing comprising modified polypropylene (PP) (pipe structure in accordance with PAS 1075, Type 3).

Additional measures

After many years of investigations, planning measures and negotiations between those involved and the water authorities, concepts for solving the waste-water problem in the Kirchberg Association of Municipalities ultimately resulted in the decision to construct a new group sewage-treatment plant in Kyrbachtal in the district of Sohrschied, as a joint solution which was both the most ecological and, at the same time, the most economical.

01_Laying pipelines by means of cutting

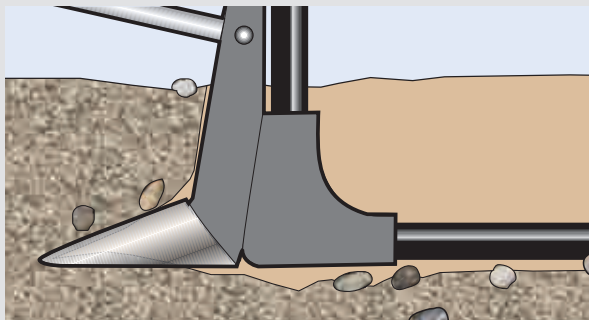
02_Laying the SIMONA® SPC pipe by ploughing

Interesting facts: laying methods



Static ploughing method

Ploughing is the fastest and what is probably the most economical technique for laying new plastic pipes. The method hardly disrupts the soil and is thus very gentle on the environment. A plough and a laying box are pulled in with the aid of a cable winch. The trench closes behind the plough after the pipe has been admitted into the soil through the laying box.



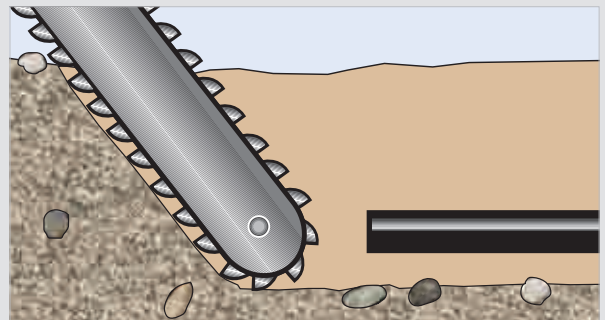
03_Ploughing method

04_Cutting method



Cutting method

The cutting method is used in the case of firm ground with open laying without a sand bed. SIMONA® SPC pipes are able to withstand the higher stresses and offer excellent resistance to slow crack growth and point loads. This guarantees increased protection during laying and during operation when exposed to loads which cannot be calculated easily.



Sub-project 2: New group sewage-treatment plant with non-pressure pipelines



Project objectives

- Closure of Kirchberg- West and Dill sewage-treatment plants
- Construction of the new Oberes Kyrbachtal sewage-treatment plant

As the body responsible for waste-water disposal, the Kirchberg Association of Municipalities was obliged, upon completion of the initial phase of equipment installation, to execute the so-called third decontamination stage for the existing Dill and Kirchberg-West municipal sewage-treatment plants in order to meet legal environmental requirements. The required waste-water treatment system would have required substantial constructional and technical input at two locations, involving significant investments costs.

However, due to the construction of a central group sewage-treatment plant with state-of-the-art technology, rehabilitation and extension of the three smaller sewage-treatment plants of the Kirchberg Association of Municipalities were no longer necessary. Moreover, the new installation guarantees an essential improvement in water quality owing to the better operational performance. This improvement in water quality is a key benefit for the entire region.

*01_Placement of the PE shaft structure (d 1,060 x 62.1 mm)
in front of the activation basin*

*02_Connecting shaft (d 2,000 mm) between activation basin
and final sedimentation basin*



Originally, construction planning of the group sewage-treatment plant was centred around a conventional concrete structure between the distributor structure and the activation basin. Owing to a proposal on the part of SIMONA, a decision was taken, however, in favour of a monolithic PE 100 shaft $d = 1,060 \times 62.1$ mm with an overall height of eight metres.

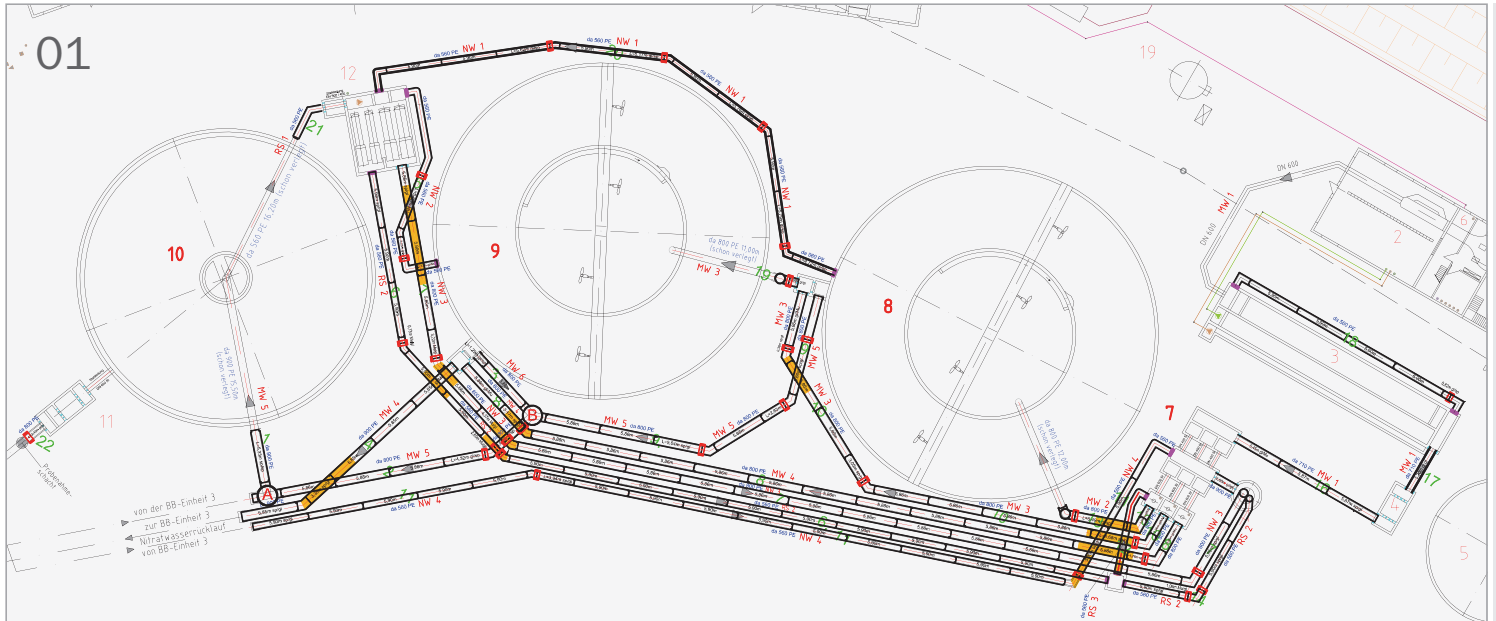
All 1,200 m of $d 560$ to $d 900$ mm, SDR 17.6 pipes laid at the sewage-treatment plant included SIMONA® SIMOFUSE® integral electrofusion joints.

SIMONA® SIMOFUSE®

The SIMONA® SIMOFUSE® product range provides an advanced joining method for plastic pipes. The electrofusion coil which is fully integrated and concealed in the polyethylene guarantees a homogeneous, high-strength joint which is permanently tight – in line with DVS Guidelines. SIMOFUSE® offers increased efficiency when installing pipe systems and guarantees absolute tightness and total protection against ingrowing roots. This provides the basis for faster laying without complex welding preparations, such as scalping the ends of the pipes for instance.

03_Shaft installation by SIMOFUSE® pipe connection

04_SIMONA® SIMOFUSE® pipe modules



Mode of operation of the sewage-treatment plant

Waste water containing de-icer from Frankfurt-Hahn Airport and untreated waste water are metered into the activation basins (8, 9) via the distributor structure (7). The share of effluent containing de-icer is around 200,000 cubic metres annually. The waste water is admitted into the activation basin via the PE shaft structure, which performs a metering and monitoring function. The height difference between inlet and outlet of the activation basin is 6.50 m. When metering, the system operates on the basis of the principle of communicating pipes, i.e. the height level in the shaft corresponds to that in the activation basin. The waste water in the activation basin is kept circulating by means of agitators.

The biological degradation processes are initiated by means of air injection and the supply of oxygen. The waste water which is decontaminated in this way then flows through a final sedimentation basin (10). Only then can it be supplied to the receiving water body.

The Kirchberg Association of Municipalities, Hahn Airport Special-Purpose Association, Flughafen Frankfurt-Hahn GmbH and the environment have benefited greatly from the new, jointly used sewage-treatment plant.

The new sewage-treatment plant which was planned in accordance with the state of the art has a far better decontamination capacity compared to old sewage-treatment plants, as a result of which it is able to contribute more extensively towards water pollution control.

01_ Final sedimentation and activation basin: the SIMOFUSE® waste-water system (d 560 to d 900 mm) is marked in colour

Sub-project 3: Kyrbachtal connecting systems



Project objectives

- Integration of feeding connection drains operating under gravity
- Decommissioning of the Kirchberg-West and Dill municipal sewage-treatment plants and Dillendorf waste-water draw works

The Kirchberg Association of Municipalities commissioned the construction of the transport system for municipal waste water and the installation of a pressure pipe for waste water containing de-icer done in three construction lots. Lot 1 involved constructing the pipeline route of the Dill sewage-treatment plant which was to be shut down through to the new Kyrbachtal group sewage-treatment plant. This involved laying 2,200 m of SIMONA® PE 100 pressure pipes (d 250 x 22.7 mm), 2,040 m of PE 80 CoEx SIMOFUSE® (d 500 x 28.4 mm) and 180 m of PE CoEx SIMOFUSE® (d 630 x 35.7 mm) pipes. Lots 2 and 3 involved connecting Kirchberg-West sewage-treatment plant and Dillendorf pumping works to the new sewage-treatment plant using a total of 4,200 m of PE 80 CoEx SIMOFUSE® (d 400 x 22.7 mm) pipes.

Result

A central solution to ensure the protection of water quality with outstanding environmental benefits and maximum eco-efficiency.

01_ Introduction of the SIMOFUSE® pipe modules into the trench (PE 80 CoEx d 630 x 35.7 mm)

02_ Overall view of the connecting systems

Summary



As the newly constructed plant processes the effluent from Hahn Airport Special-Purpose Association and the waste water containing de-icer from air traffic of Flughafen Frankfurt-Hahn GmbH as well as the municipal waste water from the Dill and Kirchberg-West sewage-treatment plants of the Association of Municipalities which were decommissioned, the first expansion stage – covering a population equivalent of 28,000 – made it the largest sewage-treatment plant in the Hunsrück region. Both investment costs and operating expenses associated with the new plant are calculated precisely on the basis of specific allocation formulae, so that all those involved and, thus, also the citizens of the Kirchberg Association of Municipalities only have to pay for the share attributable to their use. The plant is designed in such a manner that it can be extended in a second expansion stage to cover a total population equivalent of 41,000.

Consequently, not only the SIMONA® pipes with their excellent chemical resistance to effluent containing de-icer but also the entire pressure pipe system, matched specifically to the local topography, proved their worth when implementing this major project. The firmly bonded, tight connection with SIMONA® SIMOFUSE® also offered many advantages when installing pipes in the groundwater along the Kyrbach waterway.

With the products used, SIMONA delivered a comprehensive plastics-based solution for the Kyrbachtal group sewage-treatment plant.

01_ Oberes Kyrbachtal group sewage-treatment plant in December 2009

Put your trust in quality and expertise



We have channelled considerable resources into the area of product application and would be delighted to share our know-how with you. We offer global consulting services, headed by highly qualified staff at our Technical Sales Support unit and within our field sales organisation – from project planning and product selection to on-site assistance tailored to your applications.

Project planning

We advise project planners and contractors on the selection of suitable materials and products as well as on the most efficient methods of installation. It would be a great pleasure for us to assist you in addressing all technical issues related to your specific project, e.g. pipe-laying methods, structural calculations or joining technology.

ADVICE

+49 (0) 67 52 14-315
pipingsystems@simona.de

SIMONA worldwide

SIMONA AG

Teichweg 16
D-55606 Kirn
Germany
Phone +49(0)67 52 14-0
Fax +49(0)67 52 14-211
mail@simona.de
www.simona.de

PRODUCTION SITES

Plant I/II
Teichweg 16
D-55606 Kirn
Germany
Phone +49(0)67 52 14-0
Fax +49(0)67 52 14-211

Plant III
Gewerbstraße 1-2
D-77975 Ringsheim
Germany
Phone +49(0)78 22 436-0
Fax +49(0)78 22 436-124

SIMONA Plast-Technik s.r.o.
U Autodílen 23
CZ-43603 Litvínov-Chudeřín
Czech Republic

SIMONA AMERICA Inc.
64 N. Conahan Drive
Hazleton, PA 18201
USA

SIMONA ENGINEERING
PLASTICS (Guangdong) Co. Ltd.
No. 368 Jinou Road
High & New Technology Industrial
Development Zone
Jiangmen, Guangdong
China 529000

SALES OFFICES

SIMONA S.A. Paris
Z.I. 1, rue du Plant Loger
F-95335 Domont Cedex
Phone +33(0)1 39 35 4949
Fax +33(0)1 39 91 05 58
domont@simona-fr.com

SIMONA UK LIMITED
Telford Drive
Brookmead Industrial Park
GB-Stafford ST16 3ST
Phone +44(0)1785 222444
Fax +44(0)1785 222080
mail@simona-uk.com

SIMONA AG SCHWEIZ
Industriezone
Bäumlimattstraße 16
CH-4313 Möhlin
Phone +41(0)61 855 9070
Fax +41(0)61 855 9075
mail@simona-ch.com

SIMONA S.r.l. ITALIA
Via Padana Superiore 19/B
I-20090 Vimodrone (MI)
Phone +39 02 25 08 51
Fax +39 02 25 08 520
mail@simona-it.com

SIMONA IBERICA
SEMIELABORADOS S.L.
Doctor Josep Castells, 26-30
Polígono Industrial Fonollar
E-08830 Sant Boi de Llobregat
Phone +34 93 635 41 03
Fax +34 93 630 88 90
mail@simona-es.com
www.simona-es.com

SIMONA-PLASTICS CZ, s.r.o.
Zděbradská ul. 70
CZ-25101 Říčany-Jažlovice
Phone +420 323 63 78 3-7/-8/-9
Fax +420 323 63 78 48
mail@simona-cz.com
www.simona-cz.com

SIMONA POLSKA Sp. z o.o.
ul. H. Kamieńskiego 201-219
PL-51-126 Wrocław
Phone +48(0)71 352 80 20
Fax +48(0)71 352 81 40
biuro@simona.pl
www.simona.pl

SIMONA FAR EAST LIMITED
Room 501, 5/F
CCT Telecom Building
11 Wo Shing Street
Fo Tan
Hongkong
Phone +852 29 47 01 93
Fax +852 29 47 01 98
sales@simona.com.hk

SIMONA ENGINEERING PLASTICS
TRADING (Shanghai) Co. Ltd.
Room C, 19/F, Block A
Jia Fa Mansion
129 Da Tian Road, Jing An District
Shanghai
China 200041
Phone +86 21 6267 0881
Fax +86 21 6267 0885
shanghai@simona.com.cn

SIMONA AMERICA Inc.
64 N. Conahan Drive
Hazleton, PA 18201
USA
Phone +1 866 501 2992
Fax +1 800 522 4857
mail@simona-america.com
www.simona-america.com