

DREES & SOMMER GROUP

ANNUAL REPORT 2016



**DREES &
SOMMER**

CONTENTS

GROUP OPERATING RESULT 2016

REPORT OF SUPERVISORY BOARD

REPORT OF EXECUTIVE BOARD

Partners und Associate Partners

IN FOCUS

Farewell to gridlock?

The future of urban mobility

COMPETENCE-SPECIALS
AND PROJECTS

OFFICES AND CONTACTS

GROUP OPERATING RESULT 2016

PROFIT & LOSS STATEMENT

	(in euros)	
1. Revenues	263,391,414	
2. Change in work in progress	65,991,558	
3. Other operating income	5,424,967	334,807,939
4. Expenditure for purchased services	53,556,079	
5. Personnel expenses	181,618,883	
a) Wages and salaries	161,387,575	
b) Social security costs and pension fund	20,231,308	
6. Depreciation	5,375,017	
7. Other operating expenses	55,285,465	295,835,444
8. Income from shareholdings	2,798,625	
9. Income from other securities and from long-term loans	418,314	
10. Interest and other expenses	448,513	2,768,425
11. Operating result		41,740,921
12. Taxes on income and earnings	14,465,867	
13. Other taxes	163,901	14,629,768
14. Net income		27,111,153
15. Shares held by other shareholders		616,723
16. Profit brought forward less dividends		-11,374,812
17. Changes in equity as the result of purchase or sale of own shares		721,814
18. Group balance sheet profit		17,074,878

PROFIT & LOSS STATEMENT

Group sales grew by 34.1 million euros to 334.8 million euros (prior year 300.7 million euros). In the year under review, expenses rose 32.3 million euros to 295.8 million euros (prior year 263.5 million euros). The operating result increased by 4.6 million euros to 41.7 million euros. Net income totaled 27.1 million euros.

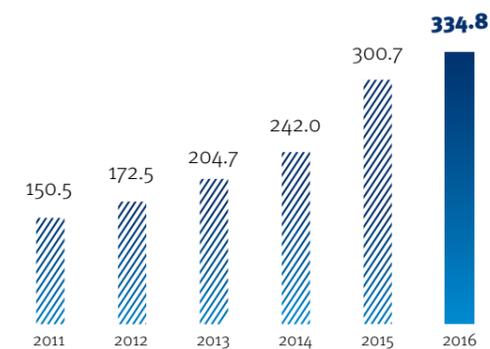
BALANCE SHEET

The transfer of the balance sheet profit of 17.1 million euros – together with subscribed capital, capital reserves and revenue reserves – results in equity of 49.7 million euros. The equity ratio is 28.9 percent.

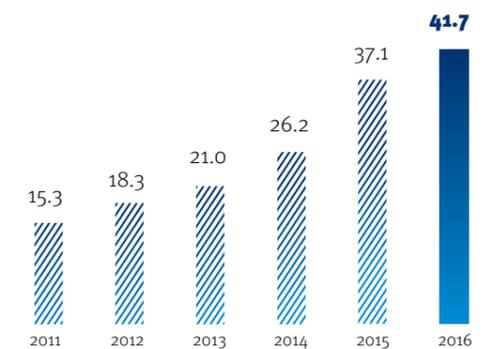
Accruals for pensions, taxes and variable remuneration rose by 13.6 million euros to 71.0 million euros. Liabilities such as trade payables to suppliers and subcontractors increased by 3.3 million euros to 23.6 million euros. Payments received on account of orders rose by 6.8 million euros to 27.7 million euros.

This results in a balance sheet total of 172.2 million euros for fiscal 2015 (prior year 147.3 million euros).

SALES IN MILLION EUROS



OPERATING RESULT IN MILLION EUROS



GROUP OPERATING RESULT 2016

BALANCE SHEET

ASSETS	(in euros)
A. Fixed assets	
I. Intangible assets	6,946,289
1. EDP software, licenses	1,624,824
2. Good will resulting from capital consolidation	5,321,465
II. Tangible assets	13,441,268
1. Land, rights equivalent to real property rights, and buildings	1,522,905
2. Other assets, operating equipment, fixtures and fittings	11,191,502
3. Payments on account and tangible assets under construction	726,862
III. Financial assets	5,461,577
1. Shareholdings	3,029,179
2. Other securities lending	2,432,398
B. Current assets	
I. Inventories	0
1. Work in progress	369,673,736
./. Advances received	-369,673,736
II. Receivables and other assets	69,145,067
1. Trade receivables	56,171,334
2. Receivables from shareholdings	136,953
3. Other assets	12,836,781
III. Securities	13,015,106
1. Other securities	13,015,106
IV. Checks, cash on hand, cash in banks	60,498,578
C. Deferred income (other)	1,538,056
D. Prepaid taxes	2,084,000
E. Positive difference from asset allocation	31,495
Balance sheet total	172,161,436

LIABILITIES	(in euros)
A. Equity	
I. Subscribed capital	13,052,286
less nominal value of treasury shares	-109,294
II. Capital reserves	18,636,078
III. Revenue reserves	3,103,366
IV. Net income	17,074,878
V. Change in equity due to exchange rate difference	-933,923
VI. Minority interests	-1,103,515
	49,719,876
B. Accruals	
1. Accruals for pensions	3,412,133
2. Provisions for taxation	18,036,008
3. Other accruals	49,565,762
	71,013,903
C. Liabilities	
1. Liabilities to financial institutions	204,620
2. Payments received on account of orders	27,656,000
3. Trade payables	9,280,084
4. Liabilities to shareholdings	6,431
5. Other liabilities	14,162,143
	51,309,278
D. Deferred income (other)	118,379
Balance sheet total	172,161,436

334.8

Sales in million euros

41.7

Operating result in million euros

28.9%

Equity ratio

Approx.

2,400

employees

41

International locations

REPORT OF THE SUPERVISORY BOARD



Due to the continued strong economy, especially in the DACH region of Europe, both sales and earnings increased significantly over the prior year. This is all the more remarkable because preparations for the conversion of Drees & Sommer AG into a Societas Europaea (SE) were started in the 2nd half of 2016, which meant an additional burden for many employees, especially for the Executive Board and management. The step has been taken to further promote our growing internationalization, particularly in Europe.

On behalf of the Supervisory Board, I would like to thank all employees of Drees & Sommer – in particular the members of the Executive Board, the Partners, and all managers – for their engagement.

Continuous dialog with the Executive Board

We fulfilled the Supervisory Board tasks in full compliance with statutory requirements, the Articles of Association and rules of procedure in fiscal 2016. At each meeting, we discussed the Executive Board reports, the development of the company, and strategic issues. We also reviewed general economic conditions and their impact on the Drees & Sommer Group's business model, and requested reports on any major individual risks. No risks that might threaten the continued existence of the company were identified.

Supervisory Board

Prof. Dr. Hans Sommer
Chairman

Dr. Johannes Fritz
Deputy Chairman

Eva Dietl-Lenzner

Dr. Bernd Gaiser

Prof. Holger Hagge

Volker Mack

In the meeting of *February 29, 2016*, we first discussed further strategy with regard to the situation of the company in Russia as a result of the embargo. The Supervisory Board concurred with the Executive Board's proposal that we use all possible options to maintain our presence in Russia. The updated Business Plan for 2016 was also approved, as was the implementation of agreed mergers. Note was taken of the proposed digitization strategy.

Finally, a resolution was passed that the Executive Board, in coordination with the Supervisory Board, should examine all benefits, requirements and consequences of conversion of the AG into an SE.

The meeting on *May 10, 2016* focused on the annual and consolidated financial statements 2015 and our proposed resolutions for the 2016 Annual General Meeting. During this meeting, the Supervisory Board satisfied itself of the required independence of the Auditor. The Auditor declared to the Audit Committee that there were no grounds to assume bias on its part. With the participation of the Auditor, the Supervisory Board discussed the annual and consolidated financial statements for 2015, including the auditor's reports, the proposal for the appropriation of net income, and the risk report, and prepared the appropriate resolutions for the Annual General Meeting. Moreover, the Supervisory Board made a recommendation to the Annual General Meeting regarding the appointment of the Auditor for 2016.

In its meeting of *October 13, 2016*, following detailed discussion, the Supervisory Board recognized and expressed its approval of the Executive Board's proposal for the conversion of Drees & Sommer AG into Drees & Sommer SE. The approach and proposed timeline were also discussed and approved. The subject of internationalization was discussed and it was decided that the members of the Supervisory Board should draw up their own statements on the subject, on the basis of which the Executive Board should prepare the further strategy.

The projections and business plan for the year 2017, as well as the 3-year plan, were the focus of our meeting on *December 12, 2016*. This mainly concerned future investments and further mergers to be undertaken in 2017.

Annual and consolidated financial statements 2016, audit of annual accounts

The annual financial statements and the consolidated financial statements of Drees & Sommer AG were prepared by the Executive Board in accordance with the provisions of the German Commercial Code (HGB). Baker Tilly Roelfs – appointed by the Annual General Meeting as Auditor – has audited the 2016 annual financial statements and the consolidated financial statements, including the management reports. Baker Tilly Roelfs performed

»» The company is equipped to meet the future challenges of the market. ««

the audit in accordance with article 317 HGB (German Commercial Code) and in compliance with the auditing principles issued by the German Institute of Public Accountants (IDW). The annual and consolidated financial statements were approved without reservation. The annual financial statement and management report, the consolidated financial statement and group management report, the Auditor's reports, and the Executive Board's proposal for the appropriation of net income of Drees & Sommer AG were made available to all members of the Supervisory Board in a timely manner. We examined these documents and discussed them at our meeting on *May 12, 2017*, in the presence of the Auditor. We duly approved the Auditor's reports.

At our meeting on *May 12, 2017*, we also approved the annual financial statement, the consolidated financial statement, and the management reports prepared by the Executive Board. We discussed and approved the Executive Board's proposal that the net income of Drees & Sommer AG be used to pay a dividend of €2.00 per share, and that the balance – and the amount allocatable to own shares held by the company at the time of the Annual General Meeting – be carried forward to new account. The financial and earnings position of the company, medium-term financial and investment planning, and the interests of shareholders were taken into account in making this decision. We also passed proposed resolutions for the Annual General Meeting.

Changes to the Supervisory Board and Executive Board

There were no changes to the makeup of the Supervisory Board or the Executive Board during the year under report.

Stuttgart, May 12, 2017

Hans Sommer

REPORT OF THE EXECUTIVE BOARD



Executive Board and Partners
(from left)

Peter Tzeschlock
Chairman of the Executive Board
Dierk Mutschler
Steffen Szeidl

In 2016, we completed many successful projects in collaboration with our clients and got new projects under way. Many thanks to our clients for entrusting us with these projects, and to our employees for their exceptional commitment in realizing them.

The 2016 financial year

Group sales rose by 11.3 percent from € 300.7 million in the previous year to nearly € 335 million including subcontractor services. Operating profit increased by 12.4 percent from € 37.1 million to € 41.7 million.

In addition to organic growth, mergers with a focus on workplace consulting, technical construction management and complementary acquisitions in Switzerland, Austria and Dubai contributed to this development.

Strategic approaches to collaboration with customers

Our central strategies – key account management (KAM) and industry specialization – are systematically improving our knowledge of our customers' needs and the strategies in their respective industries. All key account managers are clearly assigned to an industry and work within that defined area. Networking between Drees & Sommer offices within each industry is extremely useful both for us and our customers, and

supports successful cooperation. Developments in digitization also result in a lively exchange on methods and approaches between industries. To this end, we have developed a new demonstration center called the 'Smart Commercial Building' at RWTH Aachen University, in which the impact of digitization is tested live and presented visually.

Mergers and cooperation projects

In July, Jürgensen & Baumgartner, a technical engineering office for planning and construction management, joined the Drees & Sommer Group and was integrated into Gassmann + Grossmann Baumanagement GmbH. This allowed us to further strengthen our Integrated Construction Management service, which links all trades and disciplines. We have long had excellent relations with SIDE International in Dubai. Since 2010, the company has established itself in the United Arab Emirates (UAE) with project management and real estate consulting services and is supporting numerous successful projects in the UAE, Oman, and Qatar. In January 2016, Drees & Sommer integrated SIDE, thus further expanding its hub in the Middle East.

For over 40 years, bulwiengesa has stood for strategic consulting based on structured data. bulwiengesa uses this competency to support customers with real estate issues, the key ones being location and market analysis in Germany and Europe. The combination with the Drees & Sommer 'Consulting, Planning, Construction, and Operation' range of services offers numerous benefits for our mutual customers. It is against this background that we agreed on a strategic cooperation in 2016.

We have been observing the market in and around the United Kingdom for a considerable time, and have also undertaken in-depth analysis of the market and gathered extensive experience on the ground. Following such successful projects as the London Underground (Lean Management), FORD Daventry College (Construction Management) and Jaguar LandRover (Project Management), we decided – uninfluenced by Brexit – to agree a strategic cooperation with Procore in the UK, and to develop the market, in particular in London.

Innovation leadership and future projects

In parallel with our current projects, we are vigorously pursuing digitization, modularization, BIM, LEAN, and industrialized construction. We are successfully putting these methods into practice in projects such as Roche in Basel and Experimenta in Heilbronn. Here, our long-term investment in intensive General Construction Management training for a large number of employees is paying off.

Outlook 2017

A key milestone will be the conversion of Drees & Sommer AG to a European Company in the form of Drees & Sommer SE in 2017. This is intended to promote the international orientation of our company and its continued dynamic growth.

It is particularly noteworthy that – in contrast to what is often the case – the conversion is going ahead with the unanimous approval of our employees. The special negotiating body representing employees – as required by law for such a conversion – unanimously approved the move. In this way, the special spirit of the company – based in particular on direct and constructive cooperation between the company and employees – will be maintained in the future. The tried and tested structure of Drees & Sommer AG – with the Partners, Annual General Meeting, Supervisory Board, and Executive Board – is to be retained. Employees will be granted additional cross-border participation rights, such as a European Employee Forum and the election of employee representatives to the Supervisory Board.

We are also optimistic of a successful business outcome in 2017, and expect a further increase in sales and earnings despite the very high baseline numbers.

Stuttgart, May 12, 2017

Peter Tzeschlock Dierk Mutschler Steffen Szeidl

» The conversion into a European Company will strategically accelerate our internationalization, thus ensuring continued growth. «



» Independent
intrapreneurs united
for success. «

The Drees & Sommer Partners

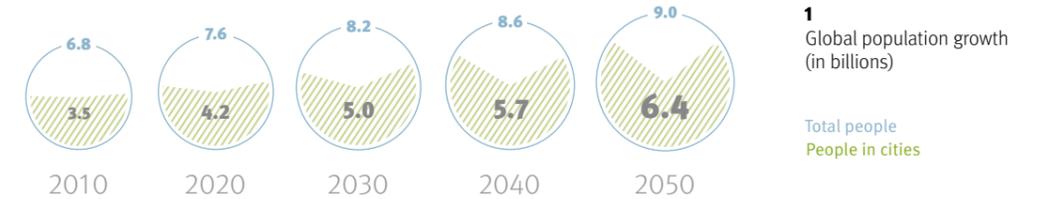


From left: Peter Tzeschlock | Mirco Beutelspacher | Marc Schömbbs | Jörg Ewald-Lincke | Rino Woyczyk | Andreas Schele | Dr. Peter Mööle | Dierk Mutschler | Matthias Schulle | Markus Weigold | Thomas Hofbauer | Dr. Jürgen Laukemper | Norbert Otten | Gabriele Walker-Rudolf | Prof. Dr. Michael Bauer | Thomas Häusser | Martin Becker | Daniel Kluck | Ralph Scheer | Martin Lutz | Prof. Phillip W. Goltermann | Veit Thurm | Steffen Szeidl | Jörg Wohlfarth | Prof. Dr. Hans Sommer | Steffen Sendler | Bernhard Unseld | Patrick Theis | Frank Reuther | Thomas Jaißle | Stefan Heselschwerdt | Sascha Hempel | Christopher Vagn Philipsen | Sascha Kilb | Roland Huber | Prof. Jürgen M. Volm | Not in the photo: Claus Bürkle, Dr. Thomas Harlfinger, Björn Jesse

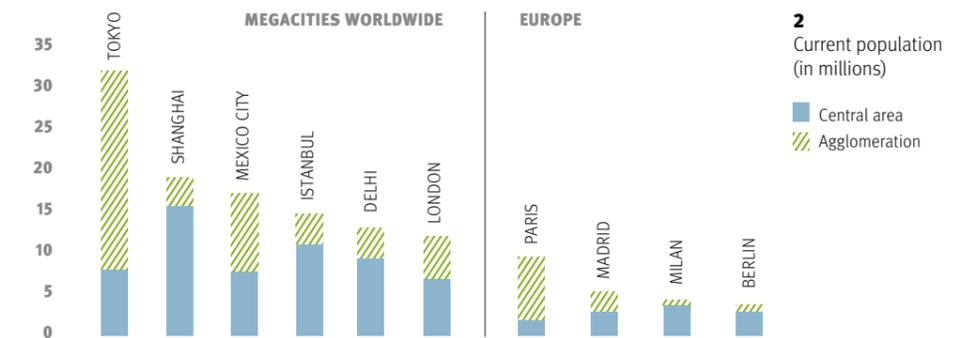
Associate Partners (not in the photo): Niklaus Arn | Maximilien Ast | Oliver Beck | Thomas Berner | Andre Boers | Jürgen Brandstetter | Heiko Butter | Tim Comaia | Klaus Dederichs | Michel de Haan | Stephan Degenhart | Marko Grünberg | Heinz Heger | Klaus Hirt | Marc Guido Höhne | Frank Kamping | Ulrich Kaufmann | Alexander Kittel | Mustafa Kösebay | Josef Linder | Boris Maticic | Ralf Molter | Dr. Helge Plath | Rainer Preissshofen | Heiko Rihm | Andreas Rost | Daniel Seibert | Holger Seidel | Philipp Späth | Matthias Stolz | Hermine Szegedi | Heike Titze | Dr. Markus Treiber | Mirko Weiss | Dietmar Zwipp

FAREWELL TO GRIDLOCK? THE FUTURE OF URBAN MOBILITY

In these times of growing traffic volume, new forms of mobility and sustainable drive technologies, the interplay between real estate, urban planning and urban mobility is becoming ever greater. Digitization also influences this interrelationship. It is time to take stock – and to look at what lies ahead.



The future of humanity lies in the cities. In 2010, some 3.5 billion people – 51 percent of the world population – lived in cities. According to forecasts, in 2050 some 70 percent of the world population, approximately 6.4 billion people, will live in cities (Figure 1). Experts expect this to lead to a three-fold increase in urban mobility in terms of passenger-kilometers by the middle of the century. Unless mobility solutions undergo fundamental change, urban mobility systems will collapse long before 2050. It must however be borne in mind that a large part of this growth will take place outside Europe, namely in Africa, Asia (India, Pakistan, China) and South America (Figure 2). Many of the world’s so-called megacities – that is, cities with more than 10 million inhabitants in a single conurbation – can be found in these regions.

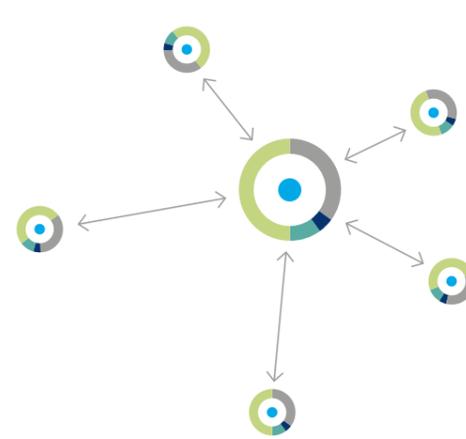


Visions of the future of non-European megacities know virtually no barriers: Road space is supplemented by mobility axes at higher levels. State-of-the-art high-rise buildings line the roads, which are shared by private vehicles and local public transport services. Special lanes are reserved for autonomous vehicles, ensuring traffic flow. A high-speed rail link connects inner cities with transport hubs such as airports and train stations. Pedestrians stroll along dedicated paths. And there are automatically controlled cabin vehicles for short- and medium-haul urban travel.

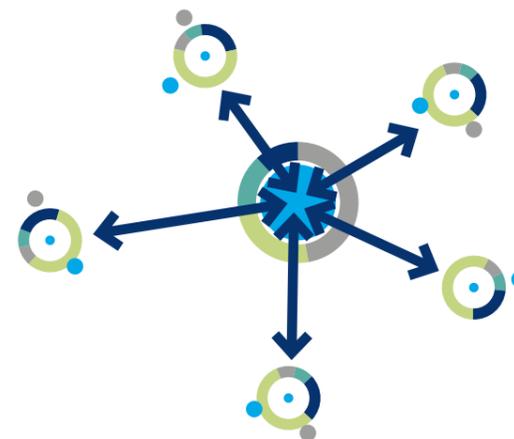


3
Development of cities over time

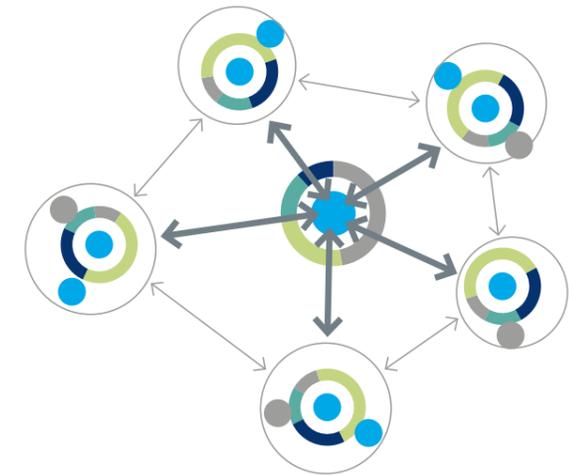
- Shopping, food & beverage, culture
- Residential
- Working
- Education
- Recreation



3.1 The medieval city



3.2 The city of today



3.3 The decentralized city of tomorrow?

EUROPEAN CITIES ARE STUCK IN THE MOBILITY TRAP

Despite all the differences in detail, cities all over the world face the same fundamental problems:

- > Too many private vehicles traveling to and from and within cities
- > Inadequate local public transport services with a lack of area-wide coverage

The combination of these two factors alone costs people a lot of time each day. In addition to which, their individual behavior places a massive burden on the urban environment. In visions of the future, mobility is therefore often seen as completely different to today, whereas living, working and recreation are only expected to undergo limited change.

But in general, future mobility must be seen as holistic and networked: Every solution impacts multiple parameters, such as social issues, technical infrastructure and energy supply, our climate, the possibilities of digitization, and last but not least, questions of finance. In the following, we look at proposed solution strategies and the promise they hold for the future. Because no city can function without mobility – but the ‘wrong’ kind of mobility destroys our cities.

Living and working used to be together

An essential prerequisite to understanding today’s mobility (and the development of future forms of mobility) is an awareness of the history of urban planning. In the medieval city (Figure 3.1), for example, today’s transport problems were unknown.

Back then, cities were compact and heterogeneous. But more importantly, they were much smaller than they are today, and living, working, trading and administration were inextricably

linked. Often, there was a mix of users under one roof in small, identical buildings. This led to a tight urban footprint. The principle of living and working at the same place applied in the city, but also in the surrounding market villages.

Industrialization:

The city and surrounding area grow together

Technical inventions, particularly in the course of the 19th century, created new industrial jobs in the space of just a few decades. Soon, the demand for labor could no longer be met from the local pool. Many workers were attracted from the countryside to cities by new work opportunities. As a result, industrial growth led to a rapid increase in urban population. The metropolitan areas became more compact, and the rapid rise of industrialization soon led to the spatial expansion. But the steady growth – associated with rising land prices – resulted in an increasing number of smaller businesses, and above all workers, settling in the surrounding communities. These developed their own infrastructure. The so-called affluent suburbs – relatively prosperous communities in the surrounding area – were thus formed.

But as large numbers of the people from the surrounding communities still worked in the metropolitan area, the volume of traffic between the city and the surrounding area continued to grow – and was only partially absorbed by a poorly developed local public transport network. It seemed unnecessary to force expansion of public transport, as more and more households could afford a car, which – at the beginning of this process – allowed people to travel quickly and comfortably to their workplace and back. This, however, required radical upgrading of the road network.

The car dominates the cities after the war

After the Second World War, the model for a car-friendly city center was created from the ruins of West German cities. All planning was based on unhindered flow of automotive traffic. Measures included multi-lane through-roads and bypasses (city rings), pedestrian zones, underpasses for pedestrians and cyclists, parking garages and parking guidance systems for city centers. The result, nearly everywhere, is the modern city (Figure 3.2) with a huge volumes of commuter traffic on the road and an inadequately developed public transport systems. In the meantime, thinking has changed. Now, those responsible are trying to drive cars back out of the inner cities, while at the same time not only maintaining but boosting spending through expanding retail areas and enhancing their attractiveness. This in turn leads to the decline of the centers in satellite communities, which are then no longer attractive for residents. They prefer to go ‘downtown’, even on the weekend, thus generating even more traffic.

Can the city and region become a unit?

In Germany, decentralized concentration is enshrined as a guiding principle of urban and regional planning in the Federal Regional Planning Act and in ‘Visions and Strategies for Regional Development in Germany’ (2016). This is intended to relieve the pressure on growth regions. So-called relief centers are meant to take over the central functions of the (overstretched) major cities. Within urban regions, functions are to be mutually complementary and thus lead to shorter traffic flows, that are also tangential rather than radial (Figure 3.3). This would reduce traffic flow to the city centers and protect open spaces between city centers from development. An efficient local public transport service should connect the individual centers, supplementing the road network.

It is a good idea in principle. But relieving the burden on city centers in the long term requires abandoning the current parish-pump politics. In other words, the entire metropolitan area would need to act in concert and optimize its overall structure. In addition, the current financing model for local public transport obstructs such an approach. Tangential routes are often ‘only’ economical in the long term, as settlement policy and people’s behavior only gradually adapt to the infrastructure. So it usually takes several years for development effects to show clearly.

The standardized assessment, which requires the macroeconomic cost benefit analysis of local public transport to be ‘>1’, is usually ‘<1’ at this early stage, as the benefit only accrues well after the cost. Most routes therefore have a low number of users when they are introduced, as transport links normally only result in long-term changes in settlement and population structure. So, for the time being, the decentralized city will probably remain a vision, but which should nevertheless be aspired to despite the current conditions (competition situation with separate budgets, different trade tax rates, etc.).

LIVABLE CITIES THROUGH URBAN REDEVELOPMENT AND NETWORKED MOBILITY

The key to livable cities in 2050 is that people have a feeling of well-being, but are also mobile. This means that people need to be able to travel from A to B in a reasonable time and at reasonably cost, without, for example, polluting the air with emissions.

This requirement is supported by increasing digitization. This allows a smartphone to find the fastest connection from A to B with the required form of transport in a fraction of a second – and to make a booking. At the same time the urban environment must be designed to give at least the look and feel of earlier city centers at various points. This applies to the metropolitan area as well as the towns in the region. Urban planning must play a key role, for example in the design of mobility routes and hubs, and urban plazas. It is clear that, ultimately, the entire public space of the city has to be rethought.

The idea of mobility hubs

The inner-city mobility concept will only become a meaningful whole when local public transport systems (regional transport, urban rapid transit, trams, subways, and buses) are intelligently expanded and linked to low-emissions motorized private transport (MPT), whether taxis, car-sharing, autonomous vehicles or bicycles. To promote environmentally and city-friendly intermodal transport behavior, the individual components of the mobility concept have to be merged to form so-called mobility hubs.

These mobility hubs can normally be located at suitable start, end and transfer points of local rail-based transport networks (Figure 4).



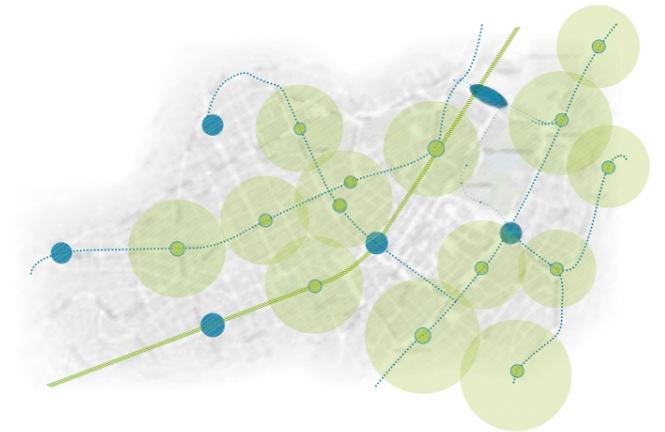
4 The intersections between different means of transport (mobility hubs) play a key role



5 „switch point“ at the Berliner Tor in Hamburg Offers urban rapid transit, car sharing, bike sharing and parking, and a service point, all at a single location © Hamburger Hochbahn AG



6 Primary mobility hubs serve a radius of some 1,400 meters



7 Secondary mobility hubs serve a radius of some 600 meters

The ‘switchh points’ currently planned for the Hamburg elevated railway (Figure 5) are outstanding examples of this. The goal is to have people associate these points with a ‘mobility guarantee’. This would decrease their willingness to use environmentally harmful MPT options. Each hub contributes to a publicly perceived enhancement of the district. When combined with quality public spaces and additional amenities (such as a kiosk or a bakery and stand-up café), the large volumes of traffic at mobility hubs make them an attractive urban feature. But above all, urban networking – in addition to the use of new technologies – is a key element of future-oriented mobility. Urban networking represents great progress to the residents and commuters, but also to the companies operating in the district, whether service providers, retailers, food & beverage outlets, or hotels. Networking upgrades these areas despite the fact that they are not prime locations.

Despite the provision of digital information via mobile devices, it is important to have a user-friendly information and booking terminal at the hub. The combination of overview maps, information, registration and booking terminals for taxis, etc. stands for the urban presence of a new mobility culture.

Primary hubs: Main start, end and transfer points

Primary mobility hubs serve a radius area of some 800 to 1,400 meters and are mainly intended to act as an interchange for the majority of trips (Figure 6). They therefore pose the biggest urban challenge for a mobility concept. In addition to extensive parking facilities for bikes and rental vehicles, the hubs will offer a wide range of information and services covering all aspects of personal mobility. In our example, we assume that this type of hub will be located at key urban rapid transit, subway and railway stations. These large mobility hubs offer a kind of mobility marketplace for all means of transport, ensuring fast and largely individualized transport to the passenger’s destination. These include buses, minibuses, car-sharing offerings, and possibly taxis and bike sharing, as well as bike parking and Kiss & Ride management with smartphone.

Secondary hubs: Other start, end and transfer points

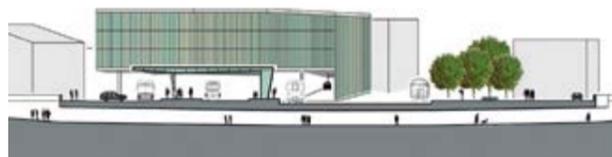
These hubs serve a radius of some 600 meters at secondary local public transport stops and stations, and are primarily intended to provide transport in the local area (Figure 7). As such, they are smaller and have basic facilities including bike rental and parking, car sharing services, and an information terminal.

Implementing mobility hubs

Mobility hubs are built on public land for which special rights of use apply, and planning permission is required. The key criteria for siting are good connections to road-based and, more importantly, rail-based local public transport, and sufficient space in a densely built-up area. The latter criterion is particularly problematic in many major cities. In most cases, repurposing of land is required. From the urban planning perspective, this means that local authorities must reserve or create sufficient space at key local transport stops and stations.

A high standard of design is required to ensure that the facility is integrated esthetically into the urban environment. Mobility hubs are intended to promote mobility, but also to offer amenity and be a place of communication (Figures 8 + 9).

This goal can best be achieved through integrated competitions involving mobility consultants, architects and engineers. The concept should look far into the future, even if it is not currently possible to implement everything.



8 + 9
Architectural competition for a mobility hub conducted by the City of Elmshorn
Competition winner:
SCHALTRAUM ARCHITEKTEN

© Schaltraum Dahle-Dirumdam-Heise,
Partnerschaft von Architekten MBB, Hamburg



10
Park & Ride parking garages entice drivers away from their cars before they enter city center

Park & Ride: Reducing the influx of cars

In addition to the networked mobility concept for the inner city, it is also important to reduce the number of cars from the region entering and leaving the city in order to reduce noise and air pollution. This applies particularly to rush hours.

One concept to achieve this reduction of pollution is the Park & Ride system. The majority of MPT commuters should be attracted away from their cars by the provision of multistorey car parks either at urban rapid transit stations near residential areas or on major access roads upstream of congestion zones (Figure 10). Studies in the Netherlands have shown that Park & Ride systems in the vicinity of residential areas are most effective, leading to a much greater reduction in MPT traffic – particularly in metropolitan areas.

Well-functioning mobility hubs create a great incentive to use one of the Park & Ride options. But only if it means a time saving and the price is right. For this reason, the parking fee must be integrated into a ticket or card system, thus combining the cost of using local public transport and one trip with the inner-city MPT offering.

GPS can help, too!

Digitization offers another approach to the problem. For example, the acquisition of the 'Waze' navigation app should lead to a further improvement of GoogleMaps. Waze collects anonymized data on location and speed of users and passes this information on to other users via a database. In addition to the standard navigation system functions, users can record and process not only routes, house numbers and locations, but also report traffic incidents and congestion to the Waze server, thus providing this information to other users in near real-time.

So in future, navigation systems will not only calculate journey time, but also use sensors to indicate the nearest free parking space to the destination or the average time required to find a parking space as well as the expected cost of parking.

When traveling into the inner city from outside the city, the navigation device examines various parameters such as travel time, congestion forecast, time required to find a parking space, cost of parking, alternative fuel consumption, local public transport delays etc., in near real time, and makes a recommendation based on this data. The exact indication of the possible time and money saving should provide many drivers with the incentive to park their cars and travel by local public transport (Figure 11).



11
The navigation app reliably informs you about the fastest route to your selected destination

NEW HARDWARE FOR LOCAL TRANSPORT: UP, UP, AND AWAY!

All mobility concepts are based on a massive increase on local transport services. But in most cities, additional rail lines could only be installed underground, if at all, and at huge expense. Another reason why the city of 2050 needs to be rethought. Utopians dream of 'getting airborne'! But is it really just a pipe dream?

Mid 2015 saw the successful maiden flight of the prototype of an electrically powered air taxi that travels at up to 300 km/h. It was developed by the Lilium company, which is based near Munich. The jet takes off and lands vertically and does not use any more power per km than a Tesla. A taxi flight from JFK to Manhattan is predicted to cost less than the taxi fare (roughly 65 dollars) – and takes just 5 minutes instead of 55.

True or not, there is increasing support for proposals seeking additional mobility solutions above ground level. Cable cars and elevated railways are designed to ease the burden on road and rail both above and below ground. While there is still stiff opposition in European cities, practical expansion of local public transport systems cannot be achieved without additional mobility levels. The future cannot be regulated with driving bans. Rather, one has to be open to future-oriented solution strategies. But unfortunately, politicians seem to find that difficult.

12
Lilium air taxi
© Lilium GmbH, Munich



Here you can find the video of the successful maiden flight of the Lilium air taxi

Cable cars are becoming more popular
For many years cable cars have proved how practical they are in daily operation, for example gliding across rivers and entire districts in Koblenz (Figure 13), London and Singapore. In South America, they are often the local public transport system. Cable cars can be built relatively quickly, are much cheaper than subway tunnels, and require little space. And their emissions are minimal – or even zero, if powered by renewable energy. Cable cars are not competition for cars, buses and railways, but a practical additional means of transport. Often, train, bus and subway services operate separately – a cable car could link them efficiently, from one mobility hub to the next.

Modern cable cars can move about 3,500 people per hour in each direction at speeds of 20 to 25 km/h. Gondolas are not suitable for long-distance transport – their practical range is up to about six kilometers. Because their routes are more direct, however, they are still faster than other means of transport over difficult terrain.

13
Cable car in Koblenz



Photo: Björn Wylezich – fotolia.com



14.1
Ultra Personal Rapid Transit
© Ultra Global PRT

14.2
SkyTran – Smart Transportation for Smart Cities
© skyTran, Inc., www.skytran.com

Renaissance of elevated railways and suspension railways

Modern technology allows significant increases in the speed and capacity of suspension railways. US electric car pioneer Elon Musk recently caused quite a stir with his plans for a vacuum-tube train called 'Hyperloop'. At speeds well in excess of 1,000 km/h, it would cut travel time from Los Angeles to San Francisco to just half an hour. The magnetic levitation (mag-lev) 'SkyTran' is more suited to transport within cities. In Tel Aviv, the first trial section is already in operation (Figure 14.2).

But not all experts are convinced of the value of such projects. 'There's simply not enough money' is the argument often put forward by skeptics. But they do not doubt the feasibility.

More realistic in the medium term is the British start-up ULTra Personal Rapid Transit (PRT) in which computer-controlled electrically powered cabins travel through the city on a two-meter-wide track (Figure 14.1). The 'Peplemover', is an example of an already standardized product in this category. Many travelers have already used this Passenger Transport System (PTS) at airports.

Autonomous driving in local public transport

Researchers at the Swiss Federal Institute of Technology in Lausanne (EPFL) want to integrate driverless shuttle buses into the local public transport system of Sitten, a town with 33,000 inhabitants. Test vehicles have been rolling in the canton of Valais since spring 2016 (Figure 15).

Autonomous vehicles are to play a key role in urban mobility in the future. It is less about every family having its own self-driving vehicle and using it like a conventional car, and more about public transport, car sharing and taxis. Because this is exactly how autonomous driving delivers the greatest benefit.

15
Autonomous shuttle buses are currently being tested on our roads
Photo: picture alliance RM / Friso Gentsch



16

Straddling bus caption



Photo: picture alliance RM / skajiyama



Photo: picture alliance RM / myoshida

A further option is the straddling bus promoted by the Chinese government (Figure 16). On August 2, 2016, the electrically powered prototype made its first trip through the city of Qinhuangdao near Beijing. The first Transit Elevated Bus is 22 meters long and can carry 300 passengers. It is 7.80 meters wide and has a height of 4.80 meters.¹ It drives on rails and straddles two car lanes. Its underside is more than 2.10 meters above the ground, allowing vehicles to drive under it. The rails are located next to the car lanes. This approach allows one traffic area to be used by two means of transport at once.

An ingenious option for the 'third level' is a direct connection from high-rise to high-rise, in other words, 'top to top' (Figure 17). Such a cable car or elevated railway link would open up new uses and marketing opportunities for such buildings. The new third level would act as a direct supply level. This would mean that such buildings would no longer be serviced from the first floor, but from above, allowing upper levels to be opened for commerce.

17

High-rise buildings can be directly connected by means of cable cars or elevated railways



Photo: Getty Images / Stone / VCG

Financing the upgrade of local public transport

Current budgets are insufficient to finance the upgrade of local public transport associated with networking and autonomization. For this reason, there are numerous financing proposals that involve property owners, investors, users and tenants.²

Involving indirect users

Indirect users (and beneficiaries!) of local public transport – such as property owners (as the result of increasing property values, etc.) – are not currently called upon to contribute to the financing of upgrades. Such contributions to the cost of local public transport upgrade – for example through an increase in real estate transfer tax – are therefore under discussion.

Introduction of a local transport levy

This could be assessed based on the number of employees, payroll or turnover volume, lot size, or the number of registered cars.

Introduction of a mobility pass

This would give residents in cities, districts, transport associations and federal states free access to the appropriate area. It could be financed by a levy paid by each adult or household. This simplification (no requirement to purchase a ticket) and the tendency to make use of what has already been paid for, should act as incentives for non-users to switch to public transport.

Financing through general tax revenue

A further alternative is financing from taxes regardless of place of residence.

¹ Source: www.motor-talk.de/news/der-china-bus-der-ueber-autos-faehrt

² Source: www.zukunft-mobilitaet.net/28179/analyse/finanzierung-des-oe-pnv-in-deutschland

THE RETURN OF THE BICYCLES

Bikes and e-bikes are a perfect addition to local public transport in cities. 60 percent of all trips are less than 5 km – the optimal distance for a bike. Despite this, many people use their cars for such trips, resulting in congestion of the urban transport network. But bicycle use has recently undergone a huge increase. The number of bikes in Germany, for example, increased by over 4 million last year, and the availability of rental bikes in cities is rising significantly. This trend has been accelerated above all by the development of e-bikes.

This, however, requires appropriate infrastructure such as secure parking and bike stations at mobility hubs, as well as bike stations distributed throughout urban districts. Another challenge – and one that is not easy to solve – is the construction of bike paths and cycle highways such as those planned in North Rhine-Westphalia and Berlin.³ Here, too, another level is involved, as shown in Figure 19.

A vision of the future of the city in 2050 is also very useful in the context of integrating bicycle traffic as an equal component of the mobility concept. Not everything will be possible everywhere – but future-oriented thinking is.

³ Source: BMVI, *Radverkehr in Deutschland, Stand August 2014*

18

Bicycle parking at a mobility hub



Photo: Creative-Family – istockphoto.com

19

The elevated bicycle roundabout in Eindhoven (Hovenring)



Photo: Chris Keulen

WHAT WILL BECOME OF MOTORIZED PRIVATE TRANSPORT?

The future of MPT is controversial. For environmental reasons, all vehicles with combustion engines – above all diesels – should be banned from towns and cities. The future belongs to electric cars. They don't solve the problem of congestion, however, and air pollution continues in the form of tire abrasion. And the wide-area environment is only protected if the electrical power for the vehicles is generated using renewables. Also, battery technology is controversial, as it is very resource-intensive, for example in regard to the demand for rare earths. Added to which their disposal is not unproblematic.

And finally, the general public still underestimates the infrastructure required for nationwide personal electromobility. In Germany alone, at least 70,000 charging stations and 7,100 fast-charging points will be required by 2020 for the planned volume of one million electric cars. No more than ten percent of this number have been installed so far. The infrastructure also requires a massive upgrade of the electricity grid.

The discussion is as contradictory as it is confused: Currently, it seems logical that urban areas are the ideal application for electric vehicles, as the demand is for high mobility over short distances. Over greater distances, environmentally optimized vehicles with combustion engines appear to be the better alternative in the longer term. One could conclude from this that hybrids with an electric range of 25 to 30 kilometers would be a good compromise. It is also interesting that Mercedes, for example, has tackled the problem of chemical exhaust emission control at low temperatures by developing a completely new diesel engine. It will be interesting to see what impact the new challenges have on technical advances and the carmakers' future business models. It will be the companies on the leading edge of data management and movement profiles who will benefit. And the development of hardware – such as for autonomous driving – will also depend on this expertise.

Autonomous driving

A car that no longer needs a driver is no longer science fiction (see Figure 20). The key benefits of autonomous driving are:

- > Shorter travel time due to smoother traffic flow
- > Reduced stress in congestion and when searching for a parking space
- > Avoidance of driver error caused by using smartphones, etc.
- > Mobility without the need for a driver's license

If all these benefits were realized, however, it would likely result in a further increase in MPT. And that results in additional downsides:

- > Accident prevention and fault remain largely unclarified.

20

Self-driving car
Photo: picture alliance / AP Photo



> An army of empty autonomous cars looking for parking spaces in cities is a horror scenario.

But nonetheless, autonomous vehicles can make an important contribution to networked urban mobility.

Car sharing is trending up

The car-sharing business model is gaining ever more adherents in German cities as a result of the increasing number of providers and simple-to-use apps. Car sharing could easily be integrated into a multimodal networked transport system. But views differ on the resulting environmental balance. There are fears that car sharing will attract people away from local public transport, and that the model will result in more cars returning to the cities' roads.

Financial ideas for reducing MPT

These models are intended to make MPT more expensive and difficult, thus providing an incentive to switch to public transport:⁴

- > Increase in fuel tax
- > Introduction of a city congestion charge
- > General distance-based car toll
- > Parking space management as a type of tax on public and private parking

Rather than demonizing such suggestions, it would be better to get companies to improve their integration into the local public transport system on their own initiative or to participate in the establishment of mobility hubs in their urban districts. At the same time, this would enhance the attractiveness and value of their land and properties.

⁴ Source: <http://www.zukunft-mobilitaet.net/28179/analyse/finanzierung-des-oep-nv-indeutschland>

BUSINESS MODELS FOR URBAN MOBILITY SYSTEMS

In developed cities with different modes of transport that still have a high proportion of motorized personal transport, the entire system has to be rethought. This includes all elements – from the infrastructure and means of transport, to traffic management and information, and right through to planning and payment systems. In addition to having a vision and a strategy, the cities must be able to involve the private sector in developments. Above all, this requires sustainable business models that allow the various market players to participate in the development of mobility solutions (Figure 21).

BUSINESS MODEL 1:

Integrated concepts for mobility and urban planning

Mobility solutions have to be integrated into urban planning. Local authorities and companies need comprehensive and future-safe basic design criteria to achieve this. These can range from the upgrade of local public transport stops to mobility hubs, establishing the charging infrastructure for electric cars, and route planning for autonomous minibuses servicing the districts. Further measures include energy supply and climate initiative, as well as the revitalization of districts and piazzas.

In short: It is about concepts for future-oriented urban planning that maintain the attractiveness of urban centers, while at the same time providing a livable environment for inhabitants.

BUSINESS MODEL 2:

Mobile services integrator

In this business model, providers offer special platforms that provide travel information to passengers, allowing them to plan, book and pay for tickets. The platform handles identification, information, booking and payment. The operator derives revenues from fees paid by partners or from payment for advertising space.

BUSINESS MODEL 3:

Convenient passenger transportation from A to B

This business model focuses on integrated mobile services for customers. Here, the provider presents the customer with a personalized intermodal itinerary that ensures the fastest possible travel to the destination, regardless of the mode of transport. This business model is of interest to carmakers, for example, as they could provide cars and parking spaces, or even specially designated compartments in trains. A strong brand and dense service network are preconditions for success with this model.

BUSINESS MODEL 4:

Supply of vehicles and technology

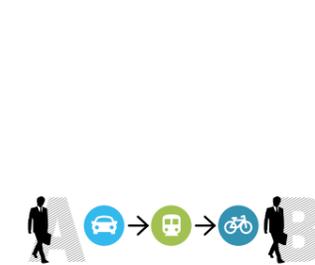
Here, the cities or system integrators are offered technologies (e.g. navigation systems) for various types of vehicle, infrastructure, or route planning. These technologies are generally standalone solutions that are not networked. This is the simplest business model, and the most common to date.



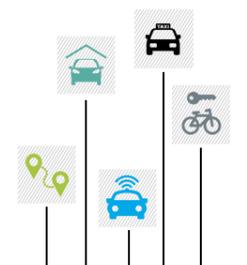
MODEL 1 – INTEGRATED PLANNING
B2B mobility solutions for local authority and companies



MODEL 2 – INTEGRATOR
Platform for networking providers and customers for information and booking



MODEL 3 – ALL-IN-ONE TRANSPORT
Itinerary and (intermodal) transport from A to B for customers



MODEL 4 – SERVICE PROVIDERS
Offering various individual hardware and software components

21

SUMMARY AND OUTLOOK

One thing is certain: Driving bans and penalties will not help the cities in the long term. Rather, if we want our cities to be sustainable, we have to completely rethink our mobility behavior and offer intelligent solutions. Because already today, the economic cost of congestion that lasts virtually all day long is immense – even without taking the impact on the environment and our health into consideration.

That is why digitization and new, networked technologies – together with a completely new approach to urban planning – have to be used to create attractive mobility services that enable fast, simple and cost-effective passenger transport in the city.

As an experienced partner for real estate and infrastructure projects, Drees & Sommer supports local authorities and companies as part of our BLUE CITY strategy (Figure 22). Drees & Sommer has supported numerous customers along the same lines as the Business Model 1 described on page 31. Our experts have worked with partners to contribute their interdisciplinary expertise in projects such as planning the redevelopment and transport repurposing of Berlin's Tegel Airport (Berlin TXL – The Urban Tech Republic) (Figure 23) and a study for the City of Ludwigsburg.

22
A holistic approach for the city of tomorrow embeds mobility solutions in a holistic urban context – as shown here in Drees & Sommer's BLUE CITY



23
Berlin TXL – The Urban Tech Republic: Transport repurposing concept

- ÖPNV**
 - E-Bus → Peoplesmover
 - Hauptstation
 - Hauptstation (optional)
 - Eingangsbereich
 - Festfahrthalle U-Bahn (optional)
- RADVERKEHR**
 - Hauptroute
 - Fahrradknoten im Umkreis
 - Radschnellweg
 - Radschnellweg (optional)
- BEGEGGUNGZONE**
 - Gestaltungsbereich
 - Schwerpunktbereich / Fahrrad

And internationally, as early as 2013, Drees & Sommer worked with bw-engineers on a local public transport study in the Saudi Arabian holy city of Mecca. As part of the design for a sustainable local public transport system, the experts examined ways to achieve economic and efficient operation of the city's Metrobus system.

As mobility is closely associated with the urban context, Drees & Sommer worked with MODUS Consult to integrate it into the development of a climate protection concept for the district of Ludwigsburg. The specialists examined the future development of traffic volumes and its impact on industry, commerce and services. They concluded by developing specific measures, in particular to reduce carbon emissions in the district.

Drees & Sommer engineering experts developed a concept for the European headquarters of the Lapp Group in Stuttgart to charge electric cars and bikes belonging to visitors, employees and the company. For example, four 22kW normal charging stations for electric cars were installed outside and six 11 kW charging points inside.

As cities and metropolitan areas increasingly back the idea of the bicycle as a sustainable means of transport, experts from Drees & Sommer Berlin are supporting the strategy with targeted services. Since November 2015, a team has been developing a bike infrastructure program for the German capital



24
Planned fast-charging stations at an autobahn service center (exemplary illustration)

comprising some 300 individual measures. On the other hand, the development of senior-friendly urban districts is still in its early phases. Here, barrier-free mobility plays a crucial role because of demographic change. For this reason, Drees & Sommer is participating in a research project called UrbanLife+ that addresses mobility in old age among many other aspects.

In addition to urban mobility, Drees & Sommer is also involved in the realization of the innovative autobahn service centers Fürholzen Ost and West (Figure 24).

The projects outlined above are examples of the degree to which mobility influences planning and construction – and of how Drees & Sommer creates added value for customers at key interfaces with technical expertise and a holistic and networked perspective.

COMPETENCE-SPECIALS AND PROJECTS

SPECIAL: MODULARIZATION

Lapp European Headquarters, Stuttgart
City Hall Freiburg
Felix Platter Hospital, Basel
Schindler Headquarters, Shanghai

SPECIAL: WORKPLACE CONSULTING

Zürcher Kantonalbank
Sparkasse Ulm
City Hall Leonberg
50Hertz Netzquartier, Berlin

SPECIAL: REAL ESTATE CONSULTING

Japan Center, Frankfurt am Main
Property Völklinger Straße, Düsseldorf
Erpho-Bogen, Münster

SPECIAL: CREM AND FM

Siemens Headquarters, Munich
RAG Administrative Building, Essen
Fire Station 4, Munich

SPECIAL: DEVELOPMENT MANAGEMENT

Eutin State Horticultural Show
Research Project SmartSite
Redevelopment Lorelei Plateau

SPECIAL: LEAN CONSTRUCTION MANAGEMENT

Ice Hockey Complex, St. Petersburg
Biotest, Dreieich
University of Düsseldorf Campus
118-Downtown Dubai



MODULAR PLANNING AND INTEGRATION PLANNING AS THE BASIS FOR COST-EFFICIENT CONSTRUCTION

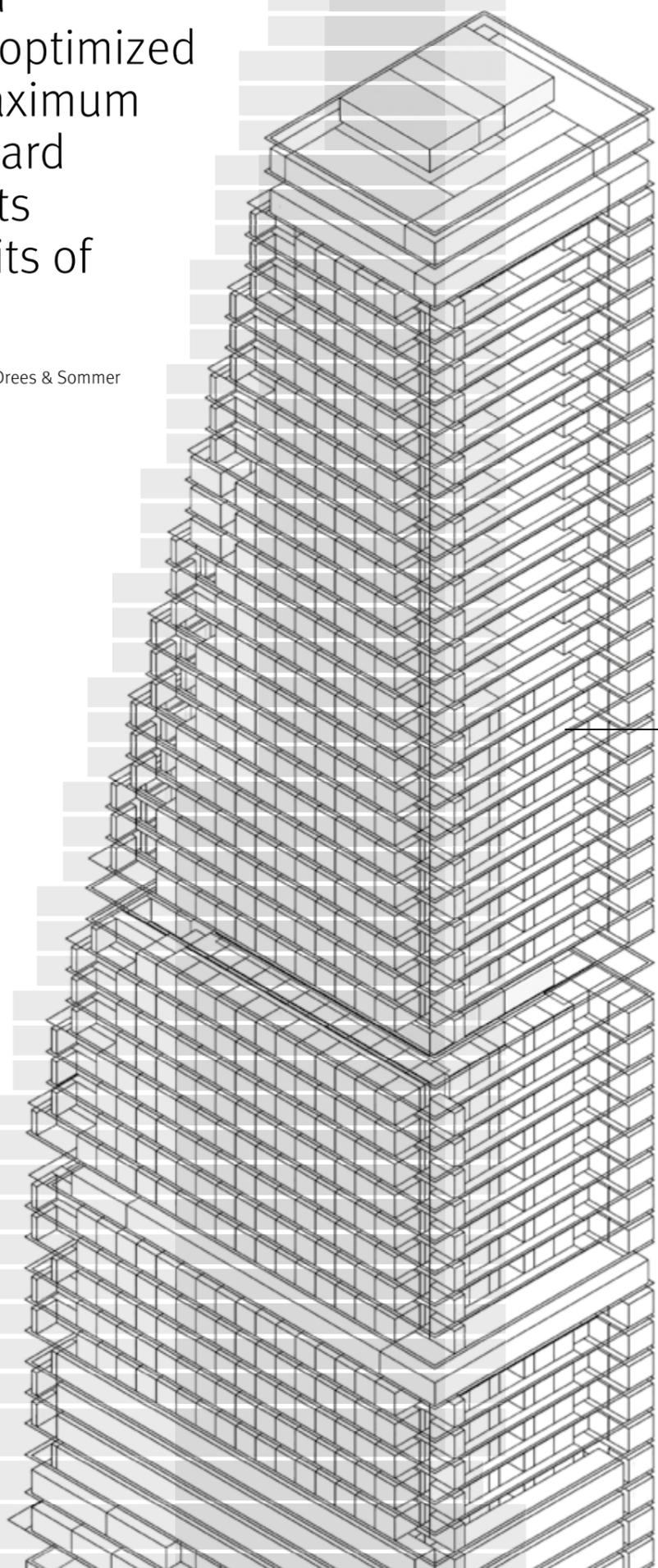
How can the quality of building planning and construction execution be ensured – or even improved? One approach is by combining modular planning and integration planning. The special feature of this approach is that it is also suitable for complex architectural designs.

The Link gives you access to a video about the innovative approach used in projects for F. Hoffmann-La Roche AG.



» Quality-assured planning, quality-optimized execution and maximum flexibility with regard to change requests are the key benefits of our approach. «

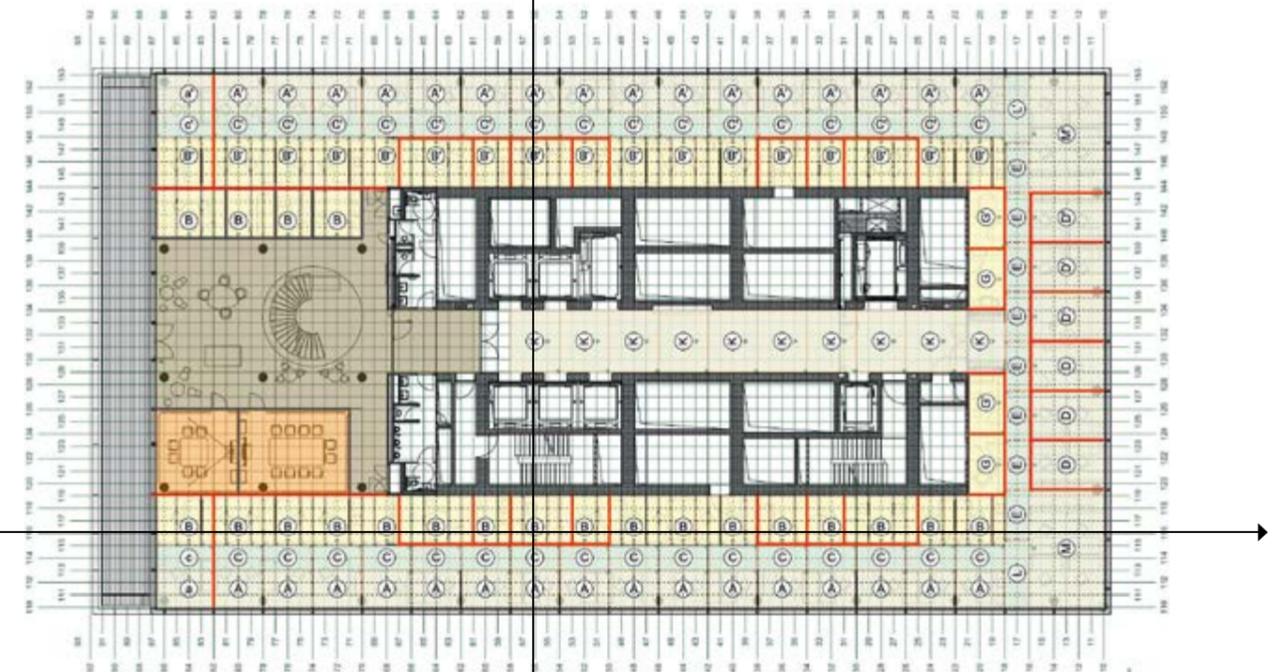
Prof. Jürgen M. Volm, Partner at Drees & Sommer



Bau 2 (Building 2) is the new headquarters of F. Hoffmann-La Roche AG in Basel. It accommodates some 2,400 employees. The architects of Herzog de Meuron chose an urban planning design that on the one hand reflects the company's architectural design language that has developed over time, while on the other allowing the development of the building from the inside to the outside.

As part of a general planning contract, the Drees & Sommer requirements planners worked with the future users to develop a utilization concept that was both innovative and coherent. The focus was on key requirements such as flexibility, functionality, and quality of the work environment.

In collaboration with experts from the company digitales bauen, the design was then transformed into a modular, integrated overall design using a special planning method.



Project coordinate system: Every structural element and every room is anchored and given an unambiguous location identifier

Modular planning is based on the projects coordinate system. It arranges the geometry of the building – from the smallest to the largest structural elements – into standard areas that are as uniform as possible based on a uniform dimensional coordination. These areas are primarily determined by the utilization concept and the modifiability requirements for the building.

The project coordinate system assigns an unambiguous location identifier to each room and building component. The high level of regularity of the project coordinate system determines the complexity and diversity of the overall structure. The geometry of Bau 2 is based on the strictly orthogonal basic grid of 2.90 meters specified by Roche. But project coordinate systems can also describe more complex architectural geometries – even freeform shapes – mathematically and with equal precision.

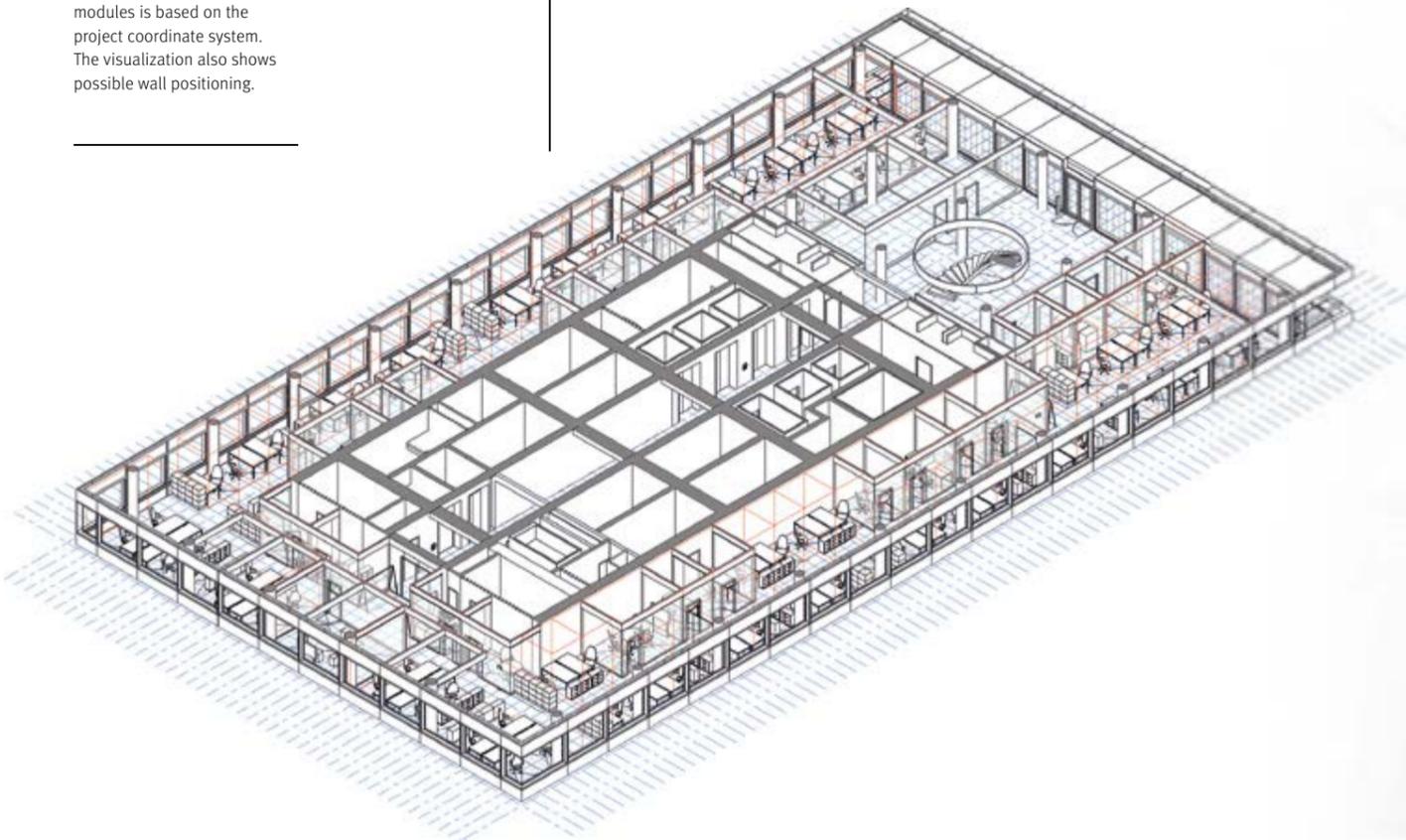
Modularization: component-based planning

Once the building design has been finalized with the project coordinate system, modularization of the design starts. This involves breaking the building structure down into modules. For the fitout of Bau 2, these are so-called use modules. Modularization covers the entire building structure from building shell and facade to fitout, building services equipment and furnishings. This includes office workplaces, meeting rooms, quiet booths, cloakrooms, tea kitchens, copier rooms, and team spaces. Drees & Sommer workplace consultants supported the project team with this step. As part of this process, they determined the functional relationships between the various use modules, such as how many employees use a meeting room or how far away the copier room is.

Infrastructure provision to the use modules – heating, cooling and ventilation and provision of technical equipment such as fire alarms and presence detectors, power points and switches – is captured in the form of technical modules. The planners define an entire catalog of different modules. The more frequently a module can be used, the greater the efficiency of building planning, construction and operation. One-off solutions are avoided.

Integration guidelines then provide constraints defining how the modules can be situated in the project coordinate system. In this way, the modules are assigned properties ex negativo – for example, that they can only be adjacent to the facade and never in the core of the building.

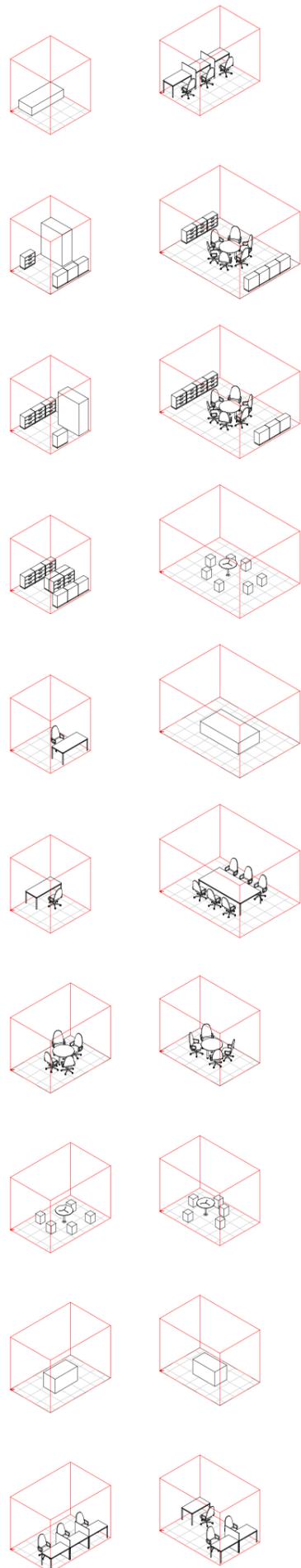
The floor layout with the arrangement of the use modules is based on the project coordinate system. The visualization also shows possible wall positioning.



» The architect's aesthetic design and the principal's requirements always form the starting point for modularization. «

Dr. Volkmar Hovestadt, CEO digitales bauen





Integrated planning then assembles the modules to a unified whole

The planning approach is completed using integration planning. Based on the various module catalogs and the defined interfaces between modules, experts from a range of planning disciplines – such as architecture, interior design and building systems engineering – assemble these to a functioning whole.

In the case of the office building in Basel, for example, the rooms were inserted into the plan using Plug and Play. This allowed the building to be configured quickly. The number of one-person offices or the variant with the highest-occupancy density, for example, were defined with just a few mouse clicks.

As in other industries, modularization allows a significant reduction in design complexity. Integrated planning can also focus on the development of the module catalogs. Identical locations and structures only need to be designed once. The interfaces and constraints ensure that the modules can be assembled to a conflict- and collision-free overall design. Using the catalogs, various configurations of the overall design can be generated simply and flexibly. This results in buildings of high modifiability that meet – or even exceed – their users' requirements.

» This planning approach is based on the utilization concept, so the key question is: What do I want to do with the building later? «

Dirk Rumler, Senior Requirements Planning Consultant at Drees & Sommer



The benefits of the approach using modular planning and integration planning are clear:

- The principal gets a cost-efficient building, even if their first priority is individualized architecture.
- Quality of planning and build are ensured from Day One – in part thanks to the significant reduction in complexity.
- The focus is on the user, as the module catalog allows extremely fast and flexible response to changing requirements.
- Planning effort is ultimately reduced, as errors are quickly detected and subsequently avoided.

The planning approach is used particularly in office buildings, but also in industry, for example in laboratory construction. There is also great potential in residential construction, for example with regard to managing tenants' special wishes. In short, the approach can be used anywhere that requires a high level of modifiability and fast response to changing requirements.

To ensure the optimum benefit from the process briefly described here, Drees & Sommer offers modularization and integrated planning as a key element of its General Construction Management (GCM) and General Planning services. This results in significant added value for customers, particularly in conjunction with Workplace Consulting, Building Information Modeling (BIM) and Lean Construction Management (LCM).



HEADQUARTERS FOR A LONG- ESTABLISHED STUTTGART COMPANY

When Lapp, the global market leader in cable technology, took the decision to build a new European headquarters at its home base in Stuttgart, it was the company's first major construction project in 30 years. Several Drees & Sommer Expert Teams ensured that the building was a resounding success.





» The close cooperation between our Expert Teams ensured that we created a building that met Lapp's exacting standards. «

Andreas Schele, Partner at Drees & Sommer

The new headquarters, with its two six- and four-story wings connected by a glass atrium, is for Lapp both a competence center and a flagship building. Not only does the building provide an inspiring work environment for some 400 employees from marketing, sales, international business, product development and the Board of Directors, but it is also a spectacular visual highlight. The impact of the highly successful architectural concept starts on the forecourt and continues into the large atrium, which welcomes visitors with its open, transparent design. Drees & Sommer guided the project to success with Project Management and planning services, and helped Lapp to create a headquarters building that sets standards in many different ways.

> Project Management, User Management, General Technical Planning <

A modern workplace concept was implemented. At first, the employees – who were used to one-person offices – were rather skeptical. But once they saw how productive and flexible the concept was, it became very popular. The building services equipment designed and implemented by the Drees & Sommer Engineering experts is a further highlight: Geothermal plant, building component activation, sun sails, a photovoltaic system and intelligent building services equipment reduced energy consumption to some 50 percent of the current Energy Conservation Ordinance requirement.

As Lapp is a family-owned company, creating mutual trust was crucial to the success of the project. Although Drees & Sommer was on site with several Expert Teams and, in addition to Project Management and General Technical Planning, was also commissioned to undertake User Management and Facility Management consulting during the course of the project, Lapp Immobilien always had a single contact person they could turn to. This meant that challenges were identified early and could be quickly and efficiently solved by the multidisciplinary team.

Client:
Lapp Immobilien
GmbH & Co. KG, Stuttgart

Project duration:
April 2014 – March 2017

Construction period:
April 2015 – October 2016

Architect:
Schwarz Architekten, Stuttgart

Structural engineering:
Boll und Partner, Stuttgart

Key project data:
– GFA: 10,700 m²
– Project cost including planning:
€19.4 million net



The use of Lean Site Management was also decisive for the successful completion of the new European headquarters. For example, despite the fact that design changes were requested for the exhibition and conference area on the ground floor in April 2016, shortly before completion of the project, hand-over took place on schedule in September. Adherence to the schedule was only achieved thanks to agile scheduling, and although it required great flexibility and commitment from all stakeholders, this ultimately played a key role in the successful completion of the project.

The harmonious and trusting cooperation was also greatly appreciated by the customer, who had already worked with Drees & Sommer on previous projects: The remodeling of the Oskar Lapp Academy and the construction of a new logistics hall with incoming goods facility.

OUTSTANDINGLY ECONOMICAL

Lapp's new European headquarters sets both economic and environmental standards through future-oriented building services equipment that was planned by Drees & Sommer Engineering experts and uses considerably less energy.

A geothermal plant with thermal building component activation handles heating and cooling functions, while rainwater is used to water the grounds. In combination with energy-saving LED lighting and a photovoltaic system, energy consumption is reduced to approximately 50 percent of the current Energy Conservation Ordinance requirement.

NEW PREMISES, NEW POSSIBILITIES

The Lapp company has created a European headquarters that will provide an inspiring working environment and be a landmark in its home city of Stuttgart for years to come. Siegbert Lapp and Petra Kimmerle, the Managing Directors of Lapp Immobilien GmbH, were asked about what employees think of their workplaces and how well the cooperation with Drees & Sommer functioned.

With its greenery and water-walls, the atrium has several eye-catching features.

The first employees moved into the new European headquarters back in October. Does it meet their expectations?

PETRA KIMMERLE › Unfortunately, my office is not in the new building, but the feedback from employees is outstanding.

SIEGBERT LAPP › I have to agree. In many ways, the building is a quantum leap. Ultimately, our employees' satisfaction – and, as a result, their productivity – is the reward for such an extensive project.

How did you find the collaboration with Drees & Sommer from the principal's perspective?

SIEGBERT LAPP › It was ideal to have a dedicated contact person at Drees & Sommer who coordinated the specialists. Any challenges that arose were communicated to us as soon as they were detected, allowing fast coordination.

What, in your opinion, were the decisive factors for the success of the project?

PETRA KIMMERLE › I think the project ran so well because all stakeholders felt that they were part of the project team and, as a result, worked together as one. That sort of harmony simplifies cooperation no end, and is really the precondition for the smooth progress of the project.

Is there anything about the project that you will always remember?

PETRA KIMMERLE › Apart from the great results, the thing that stands out is the people involved. It was their commitment and team spirit that carried the project through thick and thin.

CITY HALL GENERATES MORE ENERGY THAN IT USES

» Thanks to holistic planning and consulting, the client is getting a building that is environmentally friendly and saves money. «

An innovative City Hall – believed to be the biggest EnergyPlus building in Europe – has been built in the university city of Freiburg. The starting point was an energy concept featuring efficient building services equipment that meets the users’ exacting amenity requirements.

The Drees & Sommer engineering experts were commissioned to provide several professional planning services in the form of General Technical Planning (GTP). A key reason for this approach was to minimize interfaces for the engineering services to ensure optimal planning and implementation.

The building has excellent thermal insulation, allowing a low supply water temperature for heating and a high water temperature during cooling. A ventilation system with heat recovery further reduces energy demand, and the use of groundwater with a heat pump for heating and a plate heat exchanger for cooling allow low input for heating and cooling. The roof and sunlit sides of the facade are fitted with high-performance photovoltaic panels, which also provide solar protection.

› General Technical Planning, Building Systems Engineering, Energy Design, Building Physics, Energy Management, Facade Technology ‹

This resulted in the development of a regenerative energy concept that – thanks to the photovoltaic system – produces more energy than the building requires for heating, cooling, ventilating, and lighting. The grid-interactive building’s surplus electricity is fed into the grid.

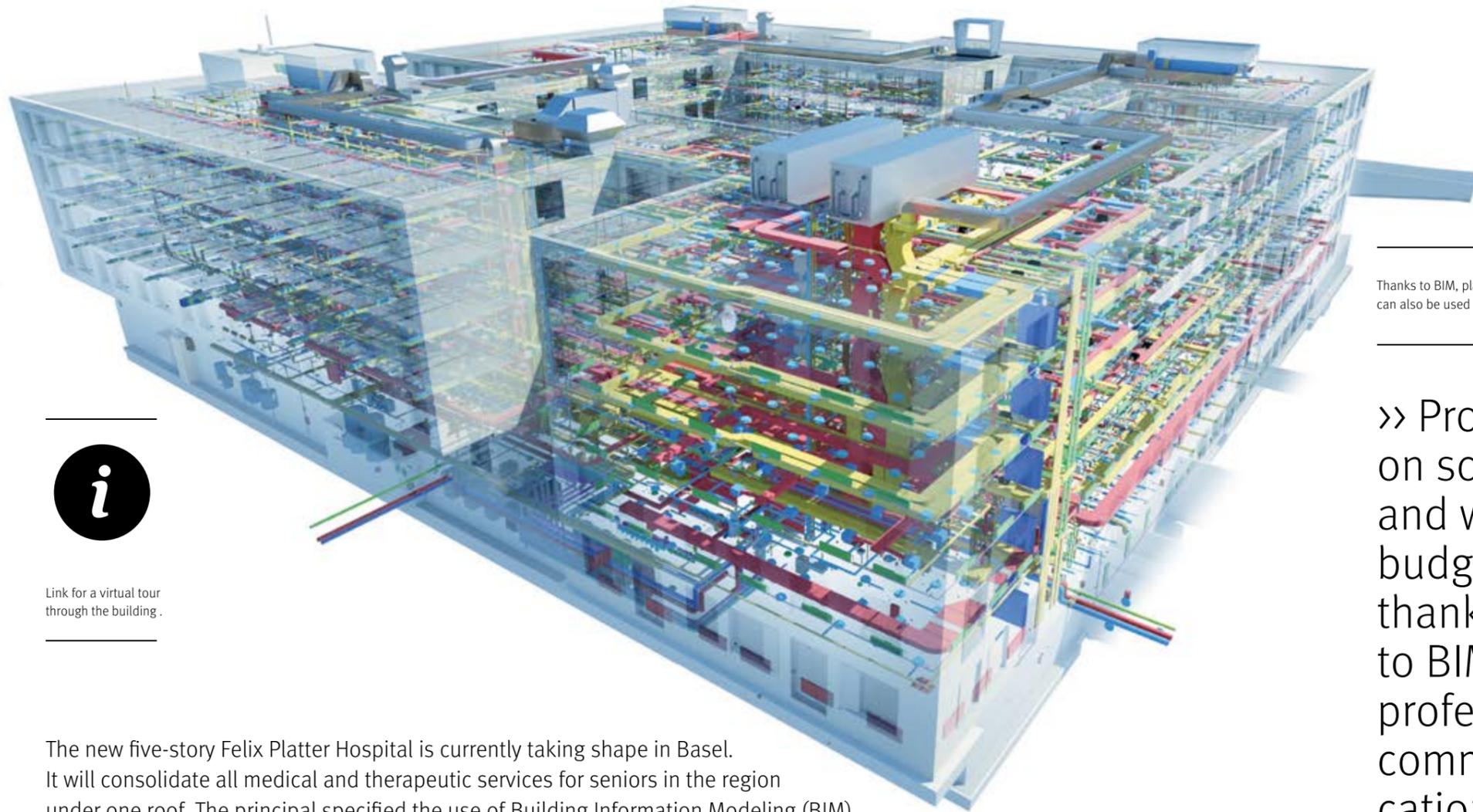
Because of the innovative nature of the project, the City of Freiburg, the Fraunhofer Institute for Solar Energy Systems, Freiburg, and Drees & Sommer set up a research project that developed its own Energy Management System (EMS).

Principal:
City of Freiburg

Project duration:
May 2013 – mid 2017

Architect:
ingenhoven architects,
Düsseldorf

Key project data:
– GFA: 24,000 m²
administration center
– GFA: 1,500 m²
kindergarten



Link for a virtual tour
through the building.

The new five-story Felix Platter Hospital is currently taking shape in Basel. It will consolidate all medical and therapeutic services for seniors in the region under one roof. The principal specified the use of Building Information Modeling (BIM) from the outset. This allows all relevant building information to be used seamlessly from an early stage of the project – from the competition to operation.

INNOVATIVE HOSPITAL TAKES SHAPE

Thanks to BIM, planning data
can also be used in operation.

»» Project
on schedule
and within
budget –
thanks
to BIM and
professional
communi-
cation. ««

Client:
Felix Platter-Spital, Basel

Project duration:
October 2014 – March 2019

General Contractor:
ARGE HandinHand (consortium)
– c/o Marti General-
unternehmung AG
– BAM Swiss AG, BAM
Deutschland
– wörner traxler richter
Architekten Frankfurt
– HolzerKobler Architekturen
Zurich

Key project data:
– Main floor area 22,323 m²
(main areas)
– CHF 250 million
– 340 beds

The aging population is increasing demands on healthcare. The Felix Platter Hospital University Center for Geriatrics with acute geriatrics, rehabilitation and geriatric psychiatry was no longer able to meet demand with the aging established building, and with its services distributed across several sites. The Board of Directors and the Executive Board opted for a new building. The special feature is that it is not a high-rise, but a compact, five-story building flooded with natural light and horizontal paths of communication. It is due to commence operation in spring 2019.

Drees & Sommer was awarded the contract for project and information management (PIM) in October 2014. The client expected the experts to manage the demanding project systematically to ensure on-schedule completion within budget and to the specified standards.

As a first step, the experts optimized project organization. By defining and assigning tasks, competencies and responsibilities, defining effective processes and creating practical structures, they put project participants in the best possible position to meet the future challenges. The project team achieved the major 'building envelope weatherproof' milestone on schedule on March 21, 2017.

Even at the competition stage, participants had to submit their projects as BIM models. At the end of the project, the BIM planning and execution model will be transferred to facility management (BIM2FM). This ensures that information from planning can be used during building operation, a move that has resulted in the project being awarded the Building Smart International award in the 'Operation and Maintenance using Open Technology' category. Drees & Sommer has contributed its BIM expertise from the outset, ensuring that the digital structures and links in the BIM architecture were set up to ensure that milestones and the overall goal would be achieved.

» Overall Project Lead on behalf of the principal,
Project Management, Cost/Schedule Controlling, Technical Project
Controlling, Quality Assurance, Data Management, BIM expertise «

But because project technologies and methods alone do not guarantee success, Drees & Sommer has made arrangements for frequent systematic exchange between all stakeholders. In addition to project managers and engineering experts from Basel and Zurich, healthcare specialists from Munich are contributing their expertise to the project. Their work impressed the client so much that in autumn 2016, they authorized Drees & Sommer to assume overall project management responsibility for the Felix Platter Hospital.

SWISS PRECISION IN SHANGHAI – WITH KNOW-HOW ‘MADE IN GERMANY’

Global Swiss company Schindler operates the largest elevator and escalator factory in the world in Shanghai. Following years of rapid expansion, the company built a new headquarters building which, since 2016, has offered facilities including 600 office workplaces and a research center.

Schindler's design specification for the building required it to guarantee a high but sustainable central European level of office amenity. This meant avoiding hitherto 'standard' Chinese solutions such as a lack of external solar protection and ventilation systems with extremely high recirculation rates, which automatically result in strong drafts.

For these reasons, the principal commissioned Chinese star architects Neri and Hu to design the new headquarters. The contract for planning and ensuring the quality of the functionally critical facade technology and energy design was awarded to Drees & Sommer.

The experts' task was to plan and engineer the implementation of the high-quality design. Swiss precision was the watchword!

› General Technical Planning, Facade Technology, Energy Design, Quality Assurance during Construction ‹

That meant, for example, that the usual Chinese solution – extremely noisy recirculating air cooling systems with their high energy consumption and drastic impact on office amenity – was out of the question. Because of this, and as the result of the 'must-have' external solar protection planned and integrated into the design, the Drees & Sommer engineering specialists came up with an innovative combination of low- and high-tech measures.

The experts achieved a highly efficient Business Class solution. Very quiet, low-maintenance, and energy-efficient cooling convectors create a perfect indoor climate – with fresh air volume regulated according to users' needs. The base load for water-based chilled beams is supplied by geothermal energy.

The principal, architects and Drees & Sommer engineering experts thus demonstrated that, in China too, the future belongs to sustainable office amenity.

» Headquarters
built to a very high
level of amenity and
sustainability. ‹‹

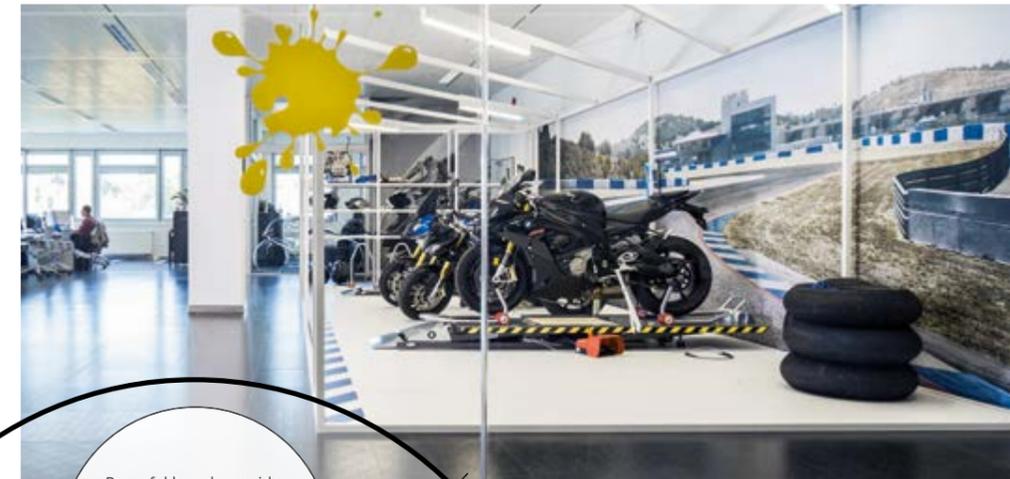
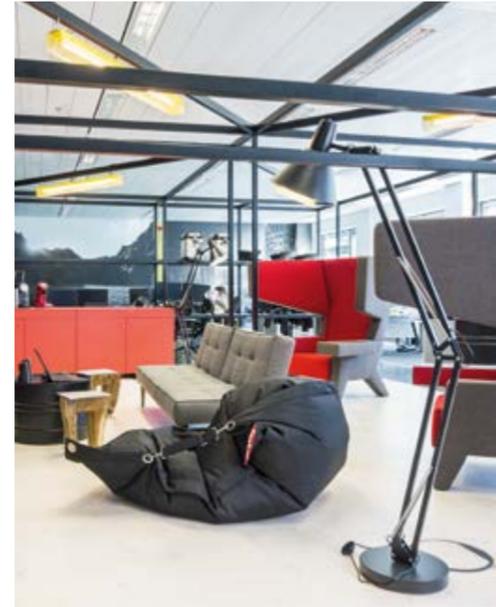
Client:
Schindler, Shanghai

Project duration:
2014 – 2016

Architect:
Neri & Hu, Shanghai

WORKPLACE CONSULTING – THE WORKPLACE AS AN EXPRESSION OF BRAND

Uninspiring offices with boring furniture in which people work from 9 to 5 are a thing of the past. Today, we talk of new work environments and spaces that embody the brand. And when it comes to developing and implementing such designs, the workplace consultants of RBSGROUP – Part of Drees & Sommer – are the consultants of choice.



Powerful brands provide both inward and outward orientation. Knowing what you stand for creates identification with the employer.

Good brand experiences generate a sense of belonging. It creates a community.

Brand experiences evoke desire. They help to attract and keep talent and to tie employees emotionally to the company.

Innovative work environments for vehicle product projects at BMW Motorrad (motorcycles). Each of the three vehicle series has its own identity, but all three share a common general design. The product becomes an integral element of the work area, and the workplace typology is tuned to the specific requirements and is further enhanced. The claim 'Make life a ride' can be experienced in the workplace, further reinforcing the already strong identity of motorcycle community.



» Recognizing trends, responding and developing solutions jointly with the customer: That is the formula we use to create real brand experiences in space – a valuable investment in the future. «

Martin Becker, Partner at Drees & Sommer

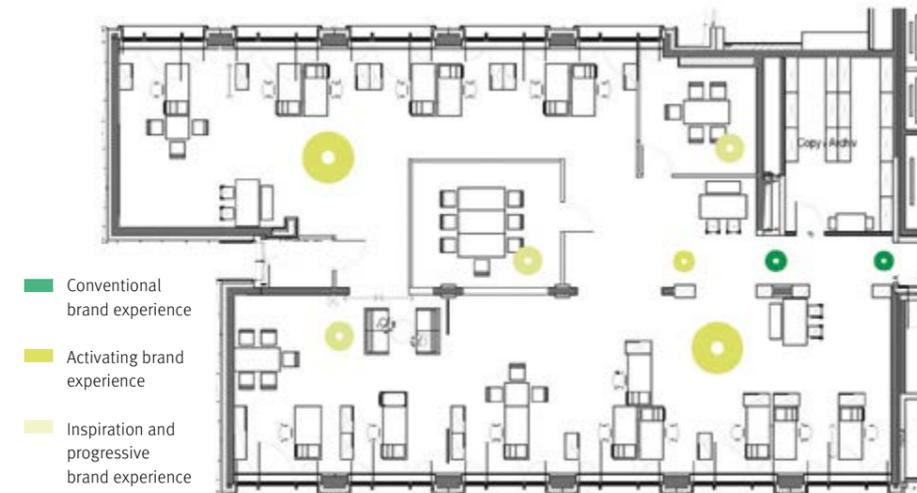
The Baywa Haus in Munich – a prestigious building that makes the BayWa brand tangible for visitors and employees – is scheduled to open in Munich in 2017. Subdued colors, a clear and minimal design vocabulary and materials of high haptic quality enhance the brand experience. The implementation in the various zones and work areas – including the lighting and furnishing concept – is not just intended to meet functionality requirements. Solidity, trust and innovation – the core values of the BayWa brand – can also be experienced in space throughout the whole building. A structured yet creative approach is required to achieve this.

Recognize, respond, solve: These are the steps that the team of workplace consultants take during their work. Megatrends – such as digitization, networked work environments, and health & well-being – that impact current and future work environments form the starting point. A further key factor is employees' identification with their employer. According to a study, only 18 percent of employees have a highly emotional bond – yet this represents a great reservoir of positive brand messages. On the other hand, 24 percent of employees have unfortunately already mentally resigned. Only those who know and follow these developments can respond to them and draw conclusions for work environment and brand experiences. Powerful brands provide orientation both inwards and outwards. Knowing what you stand for creates identification – a benefit that employees pay back to their companies by working with significantly increased commitment and being more productive and innovative. Employees with strong emotional ties show greater commitment and are less stressed. This also means fewer absences and burnouts.



In their concept, the workplace consultants focus on achieving the best possible support for the various work processes. The floor plan of the office space shows where each brand experience is implemented.

The RBSGROUP developed special Corporate Design guidelines for applications in the workspace for the BayWa headquarters in Munich and, through interior and workplace design, created the basis for a successful brand identity. The foyer, company restaurant and coffee lounge are so-called 'brandshaping areas', spaces in which the brand experience plays a special role.





» Necessity determines design – in addition to the actual activity, there are other factors such as wellbeing, health and identity. «

In the Booking.com headquarters in Salzburg, the conventional zoning of transport routes, communal areas and work areas are dispensed with. The design concept combines corporate design with traditional regional design elements, thus creating a distinctive local identity.



In addition to the higher-level topics, the workplace consultants' focus during projects is on the specific aspects of the individual customer. What does the customer do, and how? And does this match the customer's actual needs? Do the employees work in small or large teams? How much of the work is individual work requiring a high level of concentration? The precise function here is just as important as identity and attitude. The goal is to develop a wide range of customized workplace typologies – with, in each case, the appropriate proportion of basic areas, communication areas, concentration areas, and infrastructure areas (BCCI). Once the functional framework is established, the workplace consultants use brand-appropriate design and storytelling in the space to convey what the company's stands for.

RBSGROUP – Part of Drees & Sommer – is working on this with some 120 specialists. In 2016, they worked on 330 projects with 65 customers. The workplace consultants undertake requirements and user analysis as part of the 'Architecture and design' service. They analyze space efficiency and carry out feasibility studies. The concept phase, for example, includes design of space and functions, interior design, color and material concepts, lighting and acoustics, and a cost estimate. During planning, the consultants also help customers with the selection of furnishings.

They conduct user workshops, manage fitout planning including design, approval and execution, and keep track of costs. They support the customer throughout realization and beyond by preparing the invitation to tender, assisting with contract award, coordinating the building site, and managing commissioning.

Every workplace project means a change for employees, and has to be accompanied by a change management concept – even in cases where the employees largely approve of the change. In this way, the experts ensure rational and emotional understanding on the part of managers and employees. Vibrant communication offers security, creates identity and a sense of belonging, and supports the transition.

To ensure that the various stakeholders get the right information at the right time, the workplace consultants develop a communication concept, and plan and implement the measures.

Q_Perior in Munich redefines the office. Multifunctional zones promote flexibility exchange and identity.



ZÜRCHER KANTONALBANK UPGRADES HEADQUARTERS

Modern, open and featuring a large customer-friendly counter hall: The remodeling of the Zürcher Kantonalbank's headquarters implements its new customer concept. The 'Büro Züri' is also a place where customers can meet informally – away from their own four walls and places of work.

The striking spiral staircase still provides stylish access various floors after the revitalization.

» A demanding remodeling project completed on schedule thanks to an impressive team effort. «



Left:
The atrium has a new facade.

Below:
The modern reception hall welcomes the bank's customers with the suspended artwork 'Die große Holzschleife' (The great wooden ribbon).

In summer 2014, Drees & Sommer joined the revitalization project, which was already under way. The Zürcher Kantonalbank project leader was already aware of Drees & Sommer's major Swiss reference projects 'The Chedi Andermatt' and 'Toni Areal', so he called in their experts for support.

Drees & Sommer took on the challenge of managing the tightly scheduled remodeling in a confined downtown location with the building still in full operation and with stringent heritage-protection requirements needing to be met. A team of up to 20 experienced project managers and experts for building services equipment were able to offer the principal holistic, interdisciplinary support for the construction work.

» Client Consulting, Construction Management, Commissioning Management, Technical Construction Coordination, Quality Management, Defect Management with Contrace, Schedule Management, Logistics Concept, Integrated Testing «

Client:
Zürcher Kantonalbank, Zurich

Project duration:
January 2014 – January 2016

Architect:
jessenvollenweider, Basel

Key project data:
– GFA: 42,700 m²
– Construction costs:
 Approx. CHF 200 million
– Employees at city office: 600

Drees & Sommer was also responsible for the entire commissioning process and coordination of integrated testing. Both were a complete success: The roughly 600 employees located at the company's headquarters were able to move into the building on schedule on August 10, 2015. A week later, the bank's customers were allowed into the refurbished building.

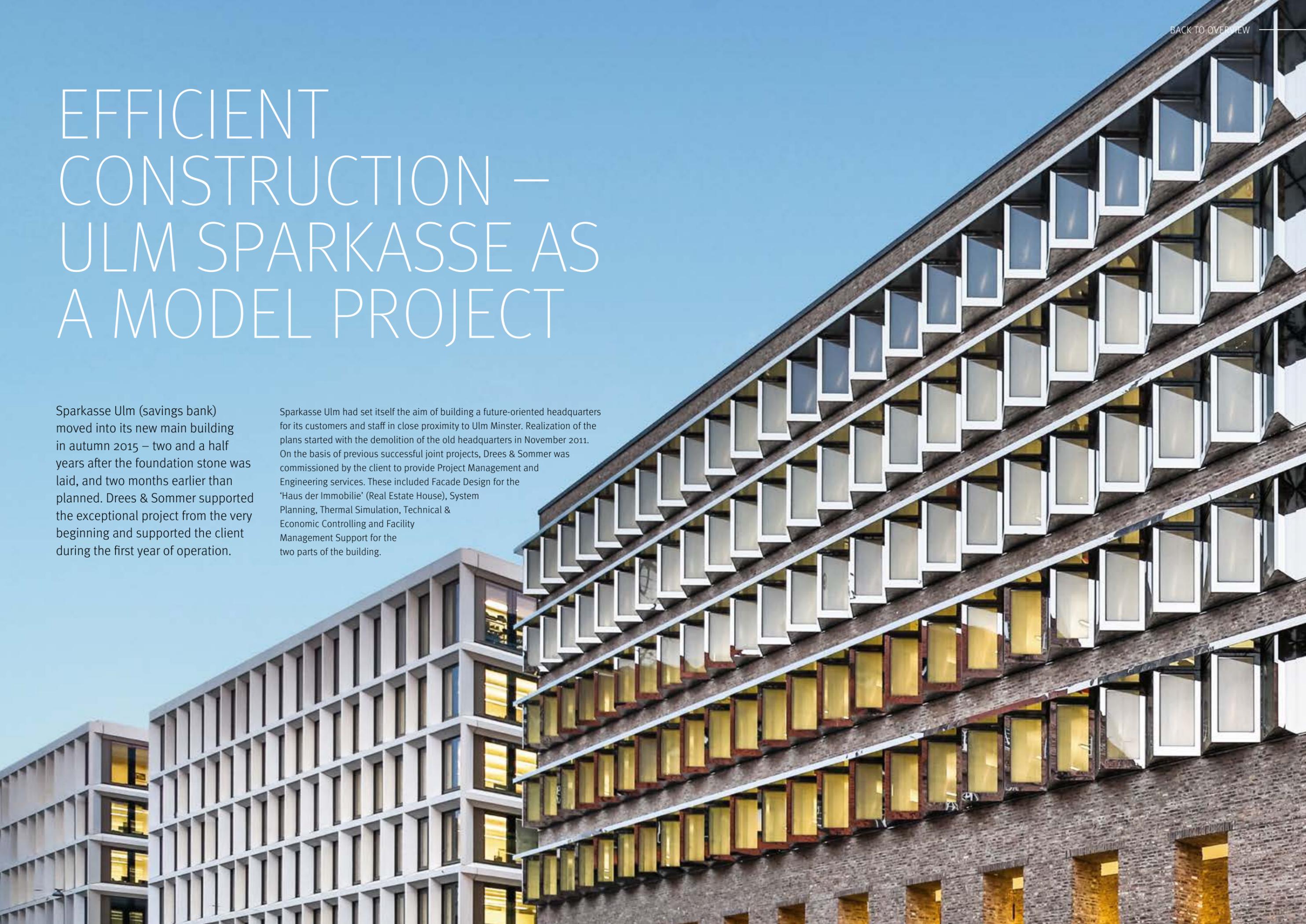
Displaying great commitment and their special spirit, the members of the Drees & Sommer team guided the project to a successful conclusion. "Drees & Sommer was always prepared to add value and never insisted on only delivering commissioned services," said the project management of the Zürcher Kantonalbank.



EFFICIENT CONSTRUCTION – ULM SPARKASSE AS A MODEL PROJECT

Sparkasse Ulm (savings bank) moved into its new main building in autumn 2015 – two and a half years after the foundation stone was laid, and two months earlier than planned. Drees & Sommer supported the exceptional project from the very beginning and supported the client during the first year of operation.

Sparkasse Ulm had set itself the aim of building a future-oriented headquarters for its customers and staff in close proximity to Ulm Minster. Realization of the plans started with the demolition of the old headquarters in November 2011. On the basis of previous successful joint projects, Drees & Sommer was commissioned by the client to provide Project Management and Engineering services. These included Facade Design for the 'Haus der Immobilie' (Real Estate House), System Planning, Thermal Simulation, Technical & Economic Controlling and Facility Management Support for the two parts of the building.





The Customer Center is located in the attractive lobby.

The employee restaurant affords an excellent view of Ulm's historic center.



» Project completed two months early and within budget despite difficult construction site conditions. «



Back in 2008, there had been a plan to refurbish the headquarters, which was built between 1955 and 1957, and to build a new small building next to it for administration. However, analysis of the building fabric established that this approach was not expedient from either the structural or economic point of view.

The bank then decided to replace the old building with a new one, which is now the nerve center of the savings bank with a 670-square-meter customer center, workplaces for some 350 employees, a staff restaurant, an underground garage with parking for 50 cars, and safety deposit boxes for 1,700 customers.

The smaller 'Haus der Immobilie' accommodates additional staff on six floors. The striking facade of the administration building consists of 125,000 recycled bricks from a Belgian monastery and rows of zigzag windows of polished stainless steel.

» Feasibility Study, Competition Preparation / Support / Coordination, Workplace Consulting, Project Preparation & Management, Cost & Schedule Controlling, Facility Management, ProjectCommunicationSystem (PCS) «

In addition to data management with its proprietary ProjectCommunication-System (PCS), Drees & Sommer building services equipment experts provided key support to the customer on site during the fitout and commissioning phases.

The fact that the construction project was in a difficult inner-city location resulted in a truly historic stroke of luck for the city: The demolition work revealed six Medieval and Early Modern vaulted cellars. Archaeologists also discovered a valuable trove of coins, which can now be preserved for future generations.

Client:
Sparkasse Ulm (savings bank)

Project duration:
March 2010 – January 2017

Architects:
– Nething Generalplaner GmbH, Neu-Ulm
– Lederer, Ragnarsdóttir, Oei, Stuttgart

Key project data:
– GFA: 23,900 m²
– Gross volume: 88,600 m³
– Workplaces: 550

CITIZENS AND COUNCIL BENEFIT FROM OPTIMAL IMPLEMENTATION

Only on rare occasions is a City Hall built from scratch. In Leonberg, Germany, this last happened some 500 years ago. This time, Drees & Sommer managed the exciting project. Benefits for the public-sector client included an execution model tailored specifically to its needs.



» Approximately 15 percent of investment cost saved as the result of efficient execution. «

Following fire prevention issues in the established building, the City of Leonberg took the decision to build a new City Hall. All departments, at that time distributed across the city, were to be consolidated in one building.

The city council then looked for a suitable implementation model for the project. The primary objective was to realize the new building within the established budget and schedule. The council had already had contact with Drees & Sommer as the result of a workplace consulting contract and the company's experts were now able to provide well-founded advice on various execution models. In the end, the customer decided on the combined award procedure based on VOB/A 'Plan & Build' (German Tender Regulations for Construction Work).

This execution model formed the basis for ensuring not only that the tight time and budget specifications would be met, but also that the new Leonberg City Hall met the quality requirements of its users. It minimized project risks as well. Supplementary negotiations with the general contractor achieved additional value added – such as the installation of cost-efficient LED lighting.

› Requirements Management (Office Concept), Execution Model Consulting, Plan & Build Contract Award as per VOB/A (pan-European tender process), Contract Controlling «

Based on their positive experience in the past, the client commissioned Drees & Sommer to undertake comprehensive controlling during the execution phase. This not only involved staying on schedule and within budget. More importantly, citizens were to see the new building as their highly accessible City Hall and as an outstanding element of their city environment. The criteria for this included modernity, flexibility and efficiency.

For a long time, construction was six weeks ahead of schedule, but there were some delays during the final months before completion, but firm commitment and close cooperation on the part of all stakeholders allowed the project to be completed on schedule. Demolition of the old City Hall behind the new building and landscaping of open spaces are scheduled for completion by mid 2017.

There has already been cause for celebration: After a construction period of one and a half years, the new City Hall was handed over to the Lord Mayor on schedule on December 30, 2016, with doors opening to the public on January 10, 2017.

Client:
City of Leonberg

Project duration:
January 2015 – June 2017

Architects:
Schaller Architekten BDA RIBA,
Stuttgart

General contractor:
Wolff & Müller Hoch- und
Industriebau GmbH & Co. KG

Key project data:
– GFA: 9,900 m²
– Construction cost:
€23.1 million gross

NEW 50HERTZ BUILDING ON-GRID

Client:
50Hertz Transmission GmbH,
Berlin

Project duration:
May 2012 – October 2016

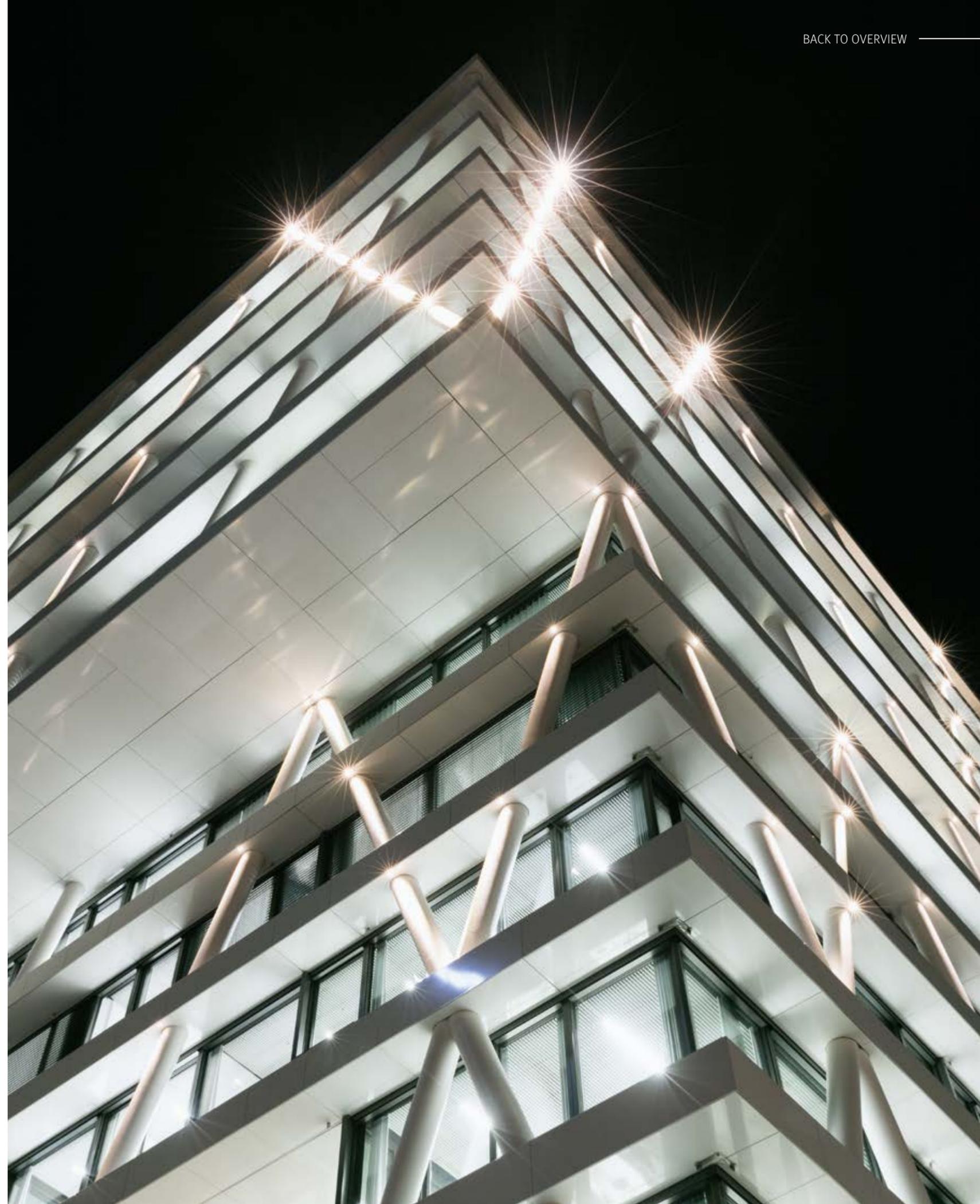
Architect:
LOVE architecture
and urbanism, Graz

Key project data:
– GFA: 24,000 m²
– Levels:
13 above-ground levels,
1 basement level
– Workplaces:
approx. 650
– Construction cost:
€65 million

For four and a half years, Drees & Sommer supported transmission network operator 50Hertz on the path to a future-proof headquarters building. During this period, the 50 Netzquartier building in the center of Berlin has become an eye-catcher in the future Europacity district. The innovative building sets new standards in terms of sustainability, employee orientation and failsafe operation.

When the Drees & Sommer team joined the project in spring 2012, the principal's requirements fitted on one sheet of A4. Some four and a half years later, that seems almost unbelievable in view of the vast scope the project has assumed, with nearly every Drees & Sommer area of expertise helping to bring it to a successful conclusion.

Continuous growth and changing requirements for employee work processes meant that 50Hertz in Berlin had to start looking for a new central headquarters at the start of the decade. The company found what it was looking for in a roughly 8,000 square meter site north of the central station, not far from the Federal Chancellery and the Federal Ministry for Economic Affairs and Energy. It was decided to begin construction of an innovative future-oriented building there from 2014.



» 50Hertz operates the extra-high-voltage grid in the north and east of Germany with a total length of 10,215 kilometers. «

The Drees & Sommer experts were integrated into the project as central contacts, consultants and managers. Whether the selection of architects as part of the architectural competition, the search for suitable specialist planners, cooperation with construction companies, or the numerous interlocking service modules, the relationship between the principal and the planning and management professionals was characterized by mutual trust from the very beginning.

› Project Management, Requirements Planning, Workplace Consulting, ProjectCommunicationSystem (PCS), System Concept & Energy Design, Thermal Room Simulation and Flow Simulation, FM Consulting, Technical & Economic Construction Consulting (TECC), Commissioning, Acceptance & Handover Management with Black Building Tests, Green Building Certification (DGNB and LEED) ‹

Of the many unusual aspects of the project, three stand out in particular: Firstly, the award of the world's first-ever DGNB Diamond certification to the building – designed by the architectural firm LOVE architecture and urbanism – for outstanding design quality. Secondly, the principal's goal of using the construction project to promote cultural change in the company and create an interdepartmental, open, transparent and communicative approach to work. And thirdly, the major obstacles to be overcome during the commissioning, acceptance and handover process, because – in contrast to normal office buildings – the 50Hertz Netzquartier has to continue to function autonomously and be in a position to restore the grid even in the event of a complete failure of the distribution network.

Drees & Sommer held positions of responsibility in all three areas. These aspects are described in greater detail on the following pages.

OF MANY FACETS, PERHAPS THE MOST BRILLIANT – THE FIRST DGNB DIAMOND

For the German Sustainable Building Council (DGNB), the award to the 50Hertz Netzquartier represents a milestone in its Green Building certification system, because the Diamond award for the first time recognizes a building for design and architectural excellence in addition to outstanding economic, ecological and social qualities.

The 'design and architectural quality' criteria examine and assess how well the building fits into the cityscape – in other words not only its outward, but also its inward impact. The certification jury also rates the significance of the building for the architecture of the future.

The Netzquartier achieved high scores impressive in all of these categories. The open and flexible structure of the building promotes exchange between users and ensures that it is flexible and therefore future-safe in an ever faster changing work

environment. The external supporting structure – which resembles a sine wave when illuminated – makes the building a landmark in the center of the city. Intentional visual axes inside and outside the building form a continuous communication space in the city and, in this respect, are a model for the coming Europacity district.

Drees & Sommer Green Building specialists supported the DGNB certification process. The building inspection took place in May 2016, with the jury on site. Then at the end of September, just before the Expo Real real estate fair, good news was received in Stuttgart: The Netzquartier had been awarded the world's first Diamond!

But the building is not only decorated with a diamond, it also has gold: In addition to the DGNB award, the building was certified LEED Gold.



LIVE DIFFERENTLY, WORK BETTER: NEW WORKSPACES IN THE NETZQUARTIER

Gone are the days when employers could lure specialists with the promise of their own desk and coffee cup. It takes a lot more to attract coveted high potentials, and 50Hertz is well aware of this. One of the key reasons for building its own corporate headquarters was therefore to offer employees – both those of long standing and those in the future – the best possible work environment. This required a look ahead into the future – and at the company's own needs. The study was carried out jointly with experts from if5 and workplace specialists from Kinzo. Boris Schucht from 50Hertz reports on the background.

The 50Hertz Netzquartier is an urban landmark in Berlin and particularly in the Europacity district at the Central Station – as well as a real eye-catcher for Berliners and visitors to the city. How are these qualities maintained inside the building?

› Seen from the outside, the building shows everyone how important transparency is for us. And this requirement for transparency – along with dialog orientation – was of huge importance even as early as the architectural competition. We wanted the interior to be structured, but still have open floors with various team and networking areas, as well as terraces and loggias for collaborative working. I think that this self-set goal was really well achieved in the end.

The colleagues have been in the building for half a year now. Have all their expectations been met?

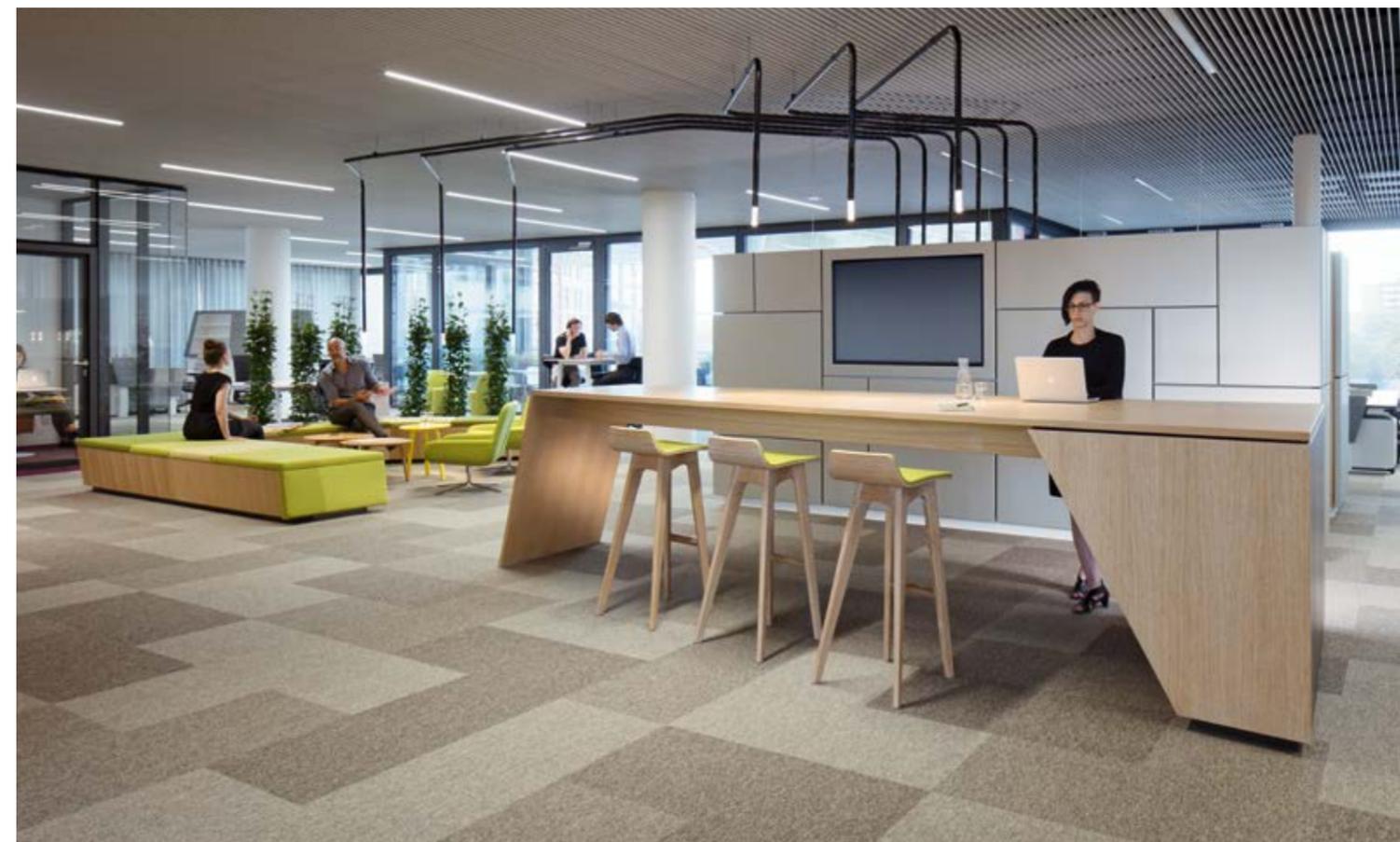
› For 50Hertz, the construction of the so-called Netzquartier was a central element of a comprehensive culture change, and for this reason we took the incorporation of the relocation process into

the change process very seriously. The 50Hertz staff knew what to expect and were active participants in the process. The furniture, for example, was chosen by a working group and graded by everyone. The color schemes and workplaces were also jointly developed in the departments. During the preliminary stages, we closely examined the work practices to be expected, so that the vast majority were very positive about the Netzquartier from the beginning.

What role does the new building play in the change process?

› My colleague and Director of Human Resources, Dr. Katharina Herrmann, once said that the 50Hertz Netzquartier is the 'bricks and mortar sparring partner' in our culture change. We set out to achieve a building that is completely tailored to our current and future corporate needs. It features latitude for agility, encounter rooms for dialog and interdepartmental cooperation, transparency and sustainability as expressions of our approach to work – and all of these reflect our values-based corporate culture. So it was the right decision.

The open and communicative spatial concept extends to the terraces.



PLEASE LEAVE THE LIGHTS ON: THE NETZQUARTIER PASSES THE BLACK BUILDING TEST

The lights in the 50Hertz Netzquartier go out last – in the ideal case, never. The individual floors of the new headquarters and the Reserve Control Center (RCC) have to have power even in the event of a total failure of the Berlin electricity grid. And the power has to stay on for seven days! The reason for this autonomy requirement is that key parameters – such as grid balance and power input and consumption for the entire northeast German electricity grid – are monitored and controlled from here.

To ensure readiness for a total failure of the electricity grid, the Drees & Sommer Engineering experts subjected the building to a so-called black building test in autumn 2016,

prior to commissioning. The team members developed the test themselves during the planning and tender phase. During a number of test runs, this involved switching different building systems and areas on or off, and making and breaking various grid connections. Do the emergency generators start up when the building is cut off from the urban grid? Did any systems hang or fail? Did doors lock, did elevators stop moving? Did the computers crash?

The test was repeated multiple times to find out what didn't work when, and why not – and to establish the stress limits of the system. The final result was 'Grid switched back on, test passed!'

» Shining example:
The building can withstand
any blackout and remains
fail-safe for many days.
This was confirmed
by a special test during
commissioning. «

Markus Weigold, Partner at Drees & Sommer



FULL TRANSACTION MANAGEMENT – FROM INTENDED SALE OR PURCHASE TO CLOSE

» Technical & economic consultancy and negotiation – a combination that achieves the best outcomes for clients. «

The Commerzbank Tower changed hands in 2016.



When large property portfolios change hands, Drees & Sommer is often involved as the technical consultant for the vendor or the buyer. But this humble term understates the wide range of real estate, commercial and strategic expertise required for the services provided. Two examples from 2016 show how the experts helped their clients close successful deals.

In 2016, Drees & Sommer was involved in just under half of the 20 biggest commercial real estate transactions in Germany. Some of the deals supported were valued in the hundreds of millions of euros. One of these was the Commerzbank Tower in Frankfurt, which the bank sold to Patrizia Immobilien and Samsung. Preparations had to be fast, structured and goal-oriented to ensure that the deal could be closed. This allowed just ten months from the start of the project in June 2015 until the commencement of marketing.

A team of experts for Real Estate Consulting, Project Management, Technical & Economic Controlling, Engineering, Facility Management, Design and Process Consulting pulled out all the stops to get the Commerzbank Tower ready for the transaction process. A special feature of the project was that the Commerzbank wanted the two towers, which were technically and structurally connected, to be sold separately. Heritage-protection requirements and a complex mix of uses with offices, retail, apartments, a canteen and parking also had to be taken into account.

To ensure that all technical issues were managed directly and smoothly, the client gave Drees & Sommer a project lead function within overall project management. This allowed the team to identify and act on issues. For example, the experts quickly drew up a concept to optimize operating costs. This cut costs and met a key precondition for LEED certification. A transaction data room ensured efficient management of sale documents.



» Experienced staff who use digital tools and nevertheless have time to focus on the individual challenges of each transaction: Our Real Estate Consulting team will continue to use this recipe to bring many deals to a successful close over the coming years. «

Sascha Kilb, Partner at Drees & Sommer

The Commerzbank signed the contracts with the buyers in September and November. Construction work designed to increase the sale value of the properties scheduled to be completed in 2017 is also being managed by Drees & Sommer.

Customers really appreciate comprehensive consultation on all the different aspects of a property sale. Identifying and addressing issues – and goal-oriented implementation, if desired – are all undertaken by the company's in-house experts. These skills and services also led to the successful sale of a plot of land belonging to Paul Gerhard Diakonie in Berlin.

After repeated attempts, the client – one of the biggest church social welfare organizations in Berlin and the northeast of Germany – was again seeking to sell parts of its property portfolio with development potential. To ensure transparency, the transactions were to be conducted with a large range of bidders in a structured bidding process. Paul Gerhardt Diakonie commissioned Drees & Sommer to draw up a development strategy

and manage the transactions. The specialists started by taking an inventory, then examined the feasibility, carried out Technical Due Diligence, calculated the cost-effectiveness, and undertook transaction management, including negotiations with the bidders.

Because of the complex nature of the properties for sale, close communication with the international bidders was essential throughout the bidding process. And the effort paid off: Paul Gerhard Diakonie was able to sell the land and buildings at the target price.

The examples in Frankfurt and Berlin are only a tiny sample of a total of 700 transactions that Drees & Sommer supported for customers from various sectors in 2016. The great importance that the company attaches to the Transaction Management service offers many benefits for customers. For example, digital support of standardized processes: Employees use an app developed in-house to capture building data on a tablet, and further processing takes place with database support.

Kategorie	Objekt	Wert	Unternehmen
Pflege	Panacea-Portfolio	995	Even Capital
Hotel	Interhotel-Paket	800	Brookfield, Starwood
EZH	39 Metro-Märkte	780	Cerberus
Büro	Commerzbank Tower Frankfurt	660	Commerzbank
Büro	Taurus-Turm Frankfurt	650	Tishman Speyer, Commerz Real
Büro	Max und Moritz-Paket	630	Savills IM
Büro	Highlight Towers München	500	KanAm
EZH	Christie-Paket	>450	Morgan Stanley, Redos
Büro	Cloud9	<450	Allianz Real Estate
Pflege	Pegasus-Portfolio	421	Berlinovo
Büro	IBC Frankfurt	400	RFR Holding
Logistik	Giant-Paket	360	Garbe Industrial Real Estate
Büro	Zürich-Zentrale Köln	350	Strabag Real Estate, ECE
EZH	Zimmobilien	320	Savills IM
Gesundheit	Lisa-Portfolio	310	Blackstone
Gemischt	Stadtquartier Q6/Q7 Mannheim	300	Diringer & Scheidel
Büro	BayWa-Zentrale München	280	BayWa, Competo Capital Partners
Logistik	Sechs Objekte	250	Goodman
EZH	Karstadt am Hauptbahnhof München	250	Tristan, Signature

Netto-Gewertimmobilien - Quelle: Thomas Dally

EFFICIENT HANDLING OF CONSTRUCTION PROJECT

Client:

Commerz Real Investment-
gesellschaft mbH

Project duration:

- Total:
October 2015 – March 2017
- Construction window:
April 2016 – September 2016

Architect:

- Original architect:
Joachim Ganz, Berlin
- Remodeling: BGF+/
Eckertharms, Wiesbaden

Key project data:

- GFA: Approx. 49,700 m²
 - Restaurants at
ground floor and floor 25
-

A large financial institution leased commercial space in Frankfurt in addition to its headquarters. This included offices in the Japan Center, one of the most striking high-rise buildings in the financial hub. Drees & Sommer managed the complex remodeling of rooms and the tenant's move into the building.

17 floors with just under 24,000 square meters of office space in the 115-meter-tall building had to be custom remodeled and modernized prior to employees moving in. As the building was completed in 1996, a security upgrade was also required, whereby special attention was paid to the particular requirements of the financial sector.

In autumn 2015, the lessor Commerz Real awarded Drees & Sommer real estate experts the contract to steer the multifaceted coordination and management processes. The customer's key requirement was the realization of the tenant's wishes with a very short window of only six months for construction work. It was essential that the deadline of September 30, 2016 be met for the move-in. The key challenges were the decision-making processes, the support of the demanding lease contract negotiations, and the exacting standards with regard to the transparency of the process. During the project, the tenant was effectively a second contracting party for the specialists.

› Project Management and Support for Overall Project Management, Technical Project Management, Lean Construction Management (LCM), Support with Lease Contract Design & Negotiation, Technical Consulting during lease contract process ‹

Following signing of the lease agreement on March 18, 2016, work on the fitout began almost immediately at the beginning of April. The fitout took place with all other areas and the restaurants in the building in full operation.

Drees & Sommer developed a special strategy to handle this difficult task: To meet the tight deadlines, the specialists used Lean Construction Management (LCM) in the project, with measures including detailed process analysis and process planning. The interdisciplinary team of managers, architects and engineers ensured the success of the project, even in critical situations, through direct coordination sessions with the tenant.

Based on the successful cooperation and the team's impressive performance, the customer then also commissioned Drees & Sommer to undertake Project Management including Technical Project Management and Technical & Economic Controlling. The tenant finally took over the office space in the Japan Center on October 4, 2016.

» All technical services were provided to the customer by a single company and the team impressed with its performance and fast response times – allowing an extremely short realization phase. ‹‹

Sascha Kilb,
Partner at Drees & Sommer

SUCCESSFUL REPOSITIONING OF AN ESTABLISHED PROPERTY

Drees & Sommer supported West-Invest Gesellschaft für Investmentfonds mbH – represented by Deka Immobilien GmbH – with the repositioning of a established property in Düsseldorf. Built in 1995, the property in Völklinger Strasse comprising two six-storey blocks now offers modern, attractive office space.

» Consulting, planning and execution with a professional partner for every aspect. «



Located in a prime location in the immediate vicinity of the Düsseldorf City Gate, the property was occupied by a single tenant for some 20 years. Following the expiration of the lease and the tenant's departure, the challenge was to upgrade the building to meet current and future market requirements. To achieve this, Drees & Sommer worked with the principal to develop a holistic repositioning concept that covers all aspects for successful retenanting. This includes a flexible approach to office sizes and concepts allowing one-person, group, or open-plan offices with appropriate allocation scenarios. Particular attention was paid to developing an energy-saving and flexible building services equipment concept to address the different needs of future tenants and keep operating costs as low as possible.

In addition to the reconfiguration of the office space, there was a strong focus on the lobby area and access routes. A bridge to the street and a well-appointed reception area and upgraded elevator landings for the individual office units have completely changed access to the building. There is also has an attractive outdoor room with seating.

» Repositioning Concept, General Construction Management (GCM) with Design Consulting, Energy Design, BSE Technical Planning, Structural Engineering and Building Physics, Marketing Support «

Client:
WestInvest Gesellschaft für Investmentfonds mbH, Düsseldorf represented by DEKA Immobilien GmbH, Frankfurt

Project duration:
March 2014 – June 2017

Architects:
– Original architect:
Peter Kulka Architekten GmbH, Cologne
– Revitalization architect:
apd architektur+ ingenieurbüro Ulf Pauli und Partner mbH, Frankfurt

Key project data:
– GFA: 24,000 m²

The guiding principles for the development of the repositioning concept were maximizing use of existing features and keeping building modifications to the level required to achieve the goals. Major changes to the structure of the building – including new stairwells – were thus avoided. Our experts were helped by the fact that the client's clear objectives and project structures defined parameters. This enabled them to develop integrated interdisciplinary concepts and jointly realize a market-oriented property that is highly attractive to users. The excellent leasing rate of over 60 percent – achieved while construction was still taking place – demonstrates the property's success in the rental market.

The project was executed using the General Construction Management (GCM) model. This gave the client the benefit of dealing with one company for all aspects of the project, with a minimum number of interfaces involved. The fact that the repositioning concept was developed jointly with the client following this format allowed existing know-how to be efficiently incorporated into the project with a single source for all management services right through to completion.



URBAN DEVELOPMENT A COMMERCIAL SUCCESS

The city of Münster is creating additional housing with a huge construction project. Drees & Sommer, as project controller, supported the project from the outset with residential construction expertise.

» The customer benefited from professional consulting – above all during contract award negotiations and at the start of the project. «

Client:
CM Immobilien-Entwicklung
GmbH, Münster

Project duration:
October 2014 – April 2017

Architects:
– Maas und Partner
Architekten, Münster
– Architekturbüro
Ingo Meyer, Telgte

Key project data:
– GFA: 30,000 m²
– Total investment: €50 million

As in many large German cities at present, the housing situation in Münster is challenging. The population of the city increases by about 2,000 each year – and good quality, affordable housing is hard to find. And as a university city steeped in tradition, Münster has another responsibility: For many years, there has been a shortage of student accommodation.

A new residential district in the city center now offers relief: Approximately 240 new units have been built in the Erpho-Bogen, on a site of over 14,000 square meters. They range from apartments to premium-quality condominiums in urban villas – and include an underground car park with 170 parking spaces. The adjacent site, formerly owned by the Winkhaus company, will accommodate a bakery with café, doctor's practices, a day-care center, a home for seniors, and offices.

The principal commissioned Drees & Sommer as project controller, both with support for the planning and contract award phases, and with management of execution. For the customer, one of the key aims was effective marketing of the properties. In addition to which, close contact was kept with the purchasers throughout the project. The development enjoys a good reputation in Münster.

The Drees & Sommer team started by developing a suitable contract award strategy to kick off the award process. Conducting negotiations on behalf of the customer during general contractor negotiations was a key task. During execution, keeping up with the tight schedule proved particularly challenging, but towards the end of the execution phase, individual areas were taken into operation earlier than planned. This included the 140 student apartments, which were ready in time for students to move in at the start of the winter semester in October 2016.

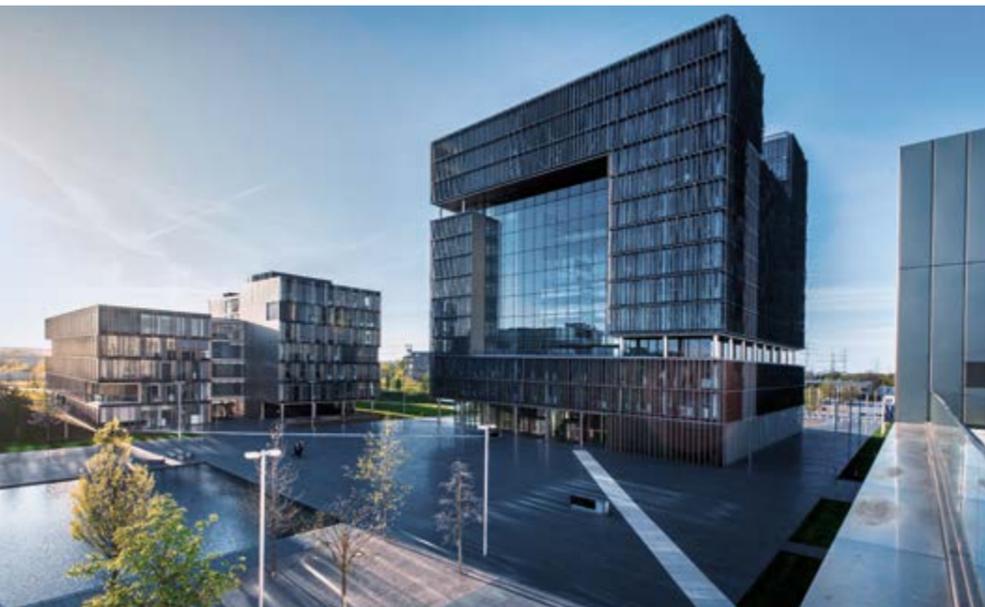
» Project Control «

The topping-out ceremony in spring 2016 was one of the milestones on the way to completion of the development at the beginning of 2017. Some 95 percent of the properties had already been sold by this stage, mainly to private buyers from Münster and the surrounding region of Münsterland. One of the reasons for this level of success was the decision to sell individual buildings with six to 20 residential units en bloc. Condominiums were also sold individually. This required a lean special request management process.

Excellent cooperation was also a factor in the success of the Erpho-Bogen project. The principal, Drees & Sommer, planners and general contractor worked hand in hand. This allowed the ambitious marketing goal to be achieved: The development was nearly 100 percent sold before it was even completed.



INCREASING POTENTIAL THROUGH PROFESSIONAL CONSULTING



Client:
thyssenkrupp AG, Essen

Project duration:
August 2015 – March 2017

Regions:
– Southern Germany
– Austria, Switzerland,
Liechtenstein
– USA

The efficient organization of Corporate Real Estate Management and Facility Management (CREM and FM) offers companies and organizations with large property portfolios opportunities to achieve significant cost savings. Drees & Sommer supports customers from a range of industries with these services.

The thyssenkrupp group is professionalizing its Corporate Real Estate Management. The purpose of the project is to take an inventory of all properties (owned, leased, etc.) to optimize their use and costs, minimize risks, and to gradually integrate the associated processes into a global shared service model. Their ultimate goal is to achieve cost-effective facility management of standardized quality.

The project is unique, as it not only involves office buildings, but also industrial buildings and other operational facilities. These include logistics halls and warehouses, and buildings for manufacturing, production and assembly.

Drees & Sommer supported the customer with numerous subprojects, including structuring and setup, and, in some cases, operational implementation of the global undertaking. The range of services for the Austria, Switzerland and Liechtenstein region includes asset and contract analysis, schedule coordination with external service providers, for example site surveys, Technical Due Diligence, and Project Management support. The team also undertook interim management for the simultaneous project launch in the US.

Thanks to the close cooperation between the thyssenkrupp and Drees & Sommer project teams, integration was successfully started and the way was paved for professional Corporate Real Estate Management in conjunction with Global Shared Services.

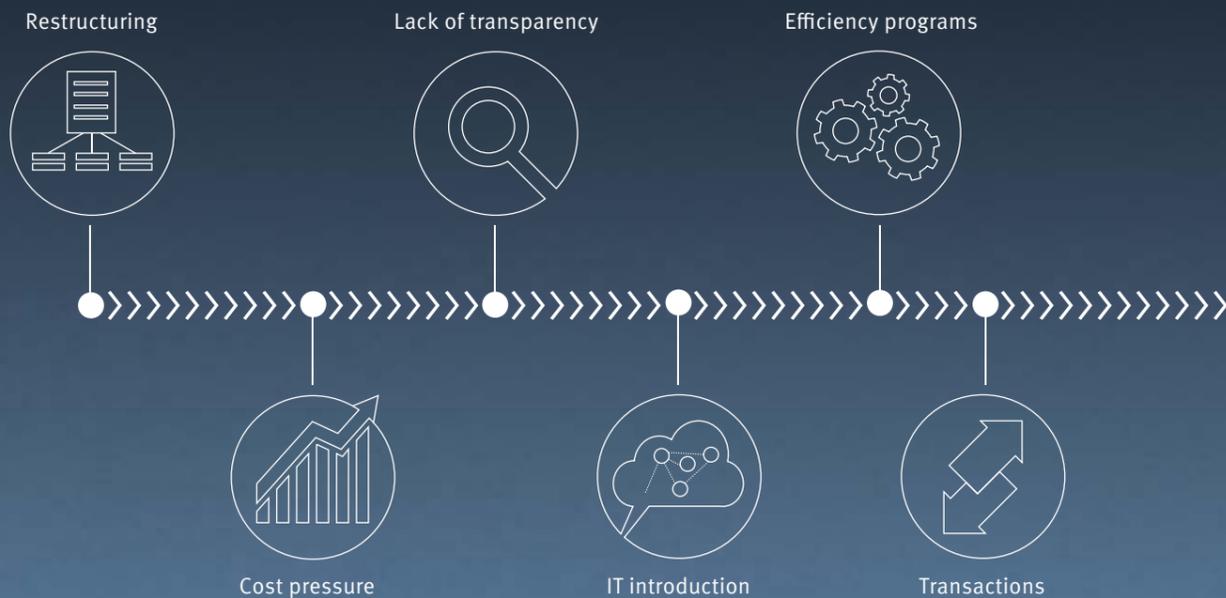


» Many years of FM and CREM experience are the indispensable basis for successful real estate consulting. «

Thomas Häusser, Partner at Drees & Sommer



Indicators that professional CREM services are required can be found in central and supporting processes. These include, for example, realignment as part of expansion or the introduction of new software.



IMPROVING COST EFFICIENCY

The building itself generally only functions as a kind of wrapping, or as the infrastructure needed to facilitate and support the actual core business. This is true for both large corporates and manufacturing SMEs. But it can be done differently: Portfolio flexibility, cost optimization, digitization, location development, new work environments, and sustainability are just some of the challenges in the field of professional Corporate Real Estate Management. Managing and valuing business-critical properties is now a thing of the past – systematic Corporate Real Estate Management (CREM) identifies and enhances the potential for improving floor space and cost efficiency.

As we did, for example, for the world's largest chemical group, BASF SE with an international network of sites. Drees & Sommer has defined mandatory standards for operator services for some 65 sites across seven European countries, supported the invitation to tender for FM services, and coordinated their introduction. As a result, the FM consulting team achieved considerable operating cost savings for the client.

Our individual consulting service for strategy and implementation combines practical expertise with management consultancy methods. In this context, we rely on our own experts from the particular industries. We develop strategies and concepts for you – and we are not afraid to measure ourselves against the operational implementation and actual outcome from our work.



SIEMENS CORPORATE HEADQUARTERS OPENED ON SCHEDULE

Since June 2016, the new Siemens corporate headquarters in the heart of Munich has formed a link between the city center and the museum district. The ground floor, which is open to the public, is only one of the many special features of this showcase project. Drees & Sommer experts supported the project from the outset – and provided more and more services over the course of the project.

The new building on Wittelsbacherplatz offers the 1,200 employees a new and inspiring work environment. Open-plan office layouts promote communication. Despite the high-tech nature of the building, there is natural ventilation, plenty of daylight, and heating & cooling ceilings ensure a pleasant indoor climate. A fitness center, parking for bikes and e-bikes, catering, childcare and other services round out the range of facilities. Photovoltaic systems on the roof also publicly demonstrate that environmental compatibility plays an important role in the new corporate headquarters. LEED Platinum and DGNB Platinum certification prove that the building meets the world's highest sustainability standards.

On the ground floor, which is open to the general public, the café and restaurant make the building an attractive inner-city venue – a place to meet, stroll and linger. Sensitively incorporated into the city center, the corporate headquarters offers a new and attractive route between downtown and the art gallery quarter, and is itself becoming a place to encounter art, with exhibits of works by Baselitz, Libeskind and Struth.



» Major projects can be completed on schedule and within budget – provided a cooperative approach is taken. «

Holger Seidel,
Associate Partner at Drees & Sommer

Six years ago, Siemens decided to get its corporate headquarters fit for the future. The structurally and technically outdated building from the 1950s was to be replaced by a modern work environment. Siemens Real Estate – which, as a leading corporate real estate company, managing all Siemens real estate activities – started with the implementation of the project. Drees & Sommer impressed the company as the perfect partner for project management – one of the reasons was the multidisciplinary team of experts provided from the company network.

Together with the City of Munich, Siemens launched an international architectural competition. The winning design by the Danish architectural firm Henning Larsen Architects combines tradition with the future: The historic Ludwig Ferdinand Palace – which has been the centerpiece of the Siemens headquarters since 1949 – was, along with the neighboring building, renovated and seamlessly integrated into the state-of-the-art new building.

» Project Control of the Overall Project, Securing Planning Permission, Facility Management during Planning & Construction, Data Management, Workplace Consulting, LEED Platinum and DGNB Platinum Certification, Defect Management (Contrace), Commissioning, Acceptance & Handover, Layout Planning & Relocation Logistics, Claim Management «

For the Drees & Sommer experts, this also meant taking stringent heritage protection specifications into account throughout the project. Some old building fabric had to be demolished. The team had to prepare three temporary sites for the Siemens staff and manage their relocation. The inner-city location with apartment blocks and ministries close by also posed a challenge for the construction project. The solution was a ten-meter barrier that significantly reduced the impact of construction site noise on neighbors. The logistics concept provided for nearly all deliveries to the building site to be made via the Altstadttring (ring road around the historic city) to reduce the impact on small residential streets.

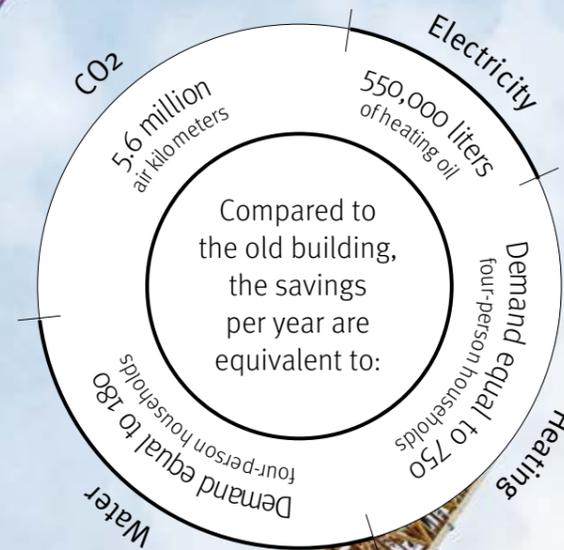
But none of these special issues were permitted to have any impact on the basic project management criteria: The major project had to be completed on schedule and within budget – and meet the exacting demands of the users. A key success factor was Drees & Sommer’s ability to respond quickly and flexibly to new challenges that arose during the project. Whether Sustainability Certification, Claim Management or Technical & Economic Controlling, thanks to the large network, the appropriate experts for any new content could always be found in-house. Their work obviously impressed the client: In 2014, Siemens commissioned Drees & Sommer to undertake its next major project, the Siemens Campus in Erlangen.

Client:
Siemens Real Estate, Munich

Project duration:
June 2010 – June 2016

Architects:
Henning Larsen Architects,
Copenhagen

Key project data:
– Building area (above ground): 45,000 m²
– Certifications: LEED Platinum, DGNB Platinum
– Workplaces: 1,200
– Construction costs: In the low hundreds of millions



SUSTAINABLE INSIDE AND OUT

Siemens has set itself the highest sustainability goals for the new building: Drees & Sommer Engineering experts advised and supported the principal on implementation. With impressive results:

- Low-energy standard fulfilled: The primary energy requirement for the new corporate headquarters is 40kwh/m³/year → 52 percent lower than prescribed by the German Energy Conservation Ordinance (EnEV).
- Resource efficiency: 7 m³ water/person/year → 75 percent lower than the old building, 50 percent lower than DGNB.
- The building uses rainwater.
- Thermal comfort is very high (based on DIN 15-251), thanks to features including natural ventilation with openable windows, heating & cooling ceilings, inclined facades for daylight control.
- LED lighting throughout.
- Users can customize settings for their workplace (building automation: temperature and light).
- Special blinds allow active light control.
- Power consumption is 90 percent down on old building.
- Photovoltaic systems provide 30 percent of electricity, the remainder is sourced from renewables.
- DGNB Platinum certified (German Sustainable Building Council).
- LEED Platinum certified (Leadership in Energy and Environmental Design).





» Model project in terms of sustainability meets schedule, budget and quality goals. «

FOUR QUESTIONS TO THOMAS BRAUN, GENERAL MANAGER AT SIEMENS REAL ESTATE

What aspect of the project was particularly important for Siemens?

THOMAS BRAUN › From the outset, one of the major goals of the project was to create openness and transparency in many different areas – in collaboration with the city council, in communication with neighbors and the public, and in the architectural realization. This can be seen, for example, by the fact that the campus is open to the general public and creates a link between the historic city and the art gallery district.

With regard to creating a modern work environment, it was of paramount importance that the building is open and transparent. Modern work environments have long been established at Siemens. But they could not be implemented in the old building with its disparate architecture from the 1950s and 1960s. The new headquarters has numerous communication zones and places to meet and exchange ideas. It functions as a meeting place for all Siemens AG employees, not just for staff working at the headquarters. In addition to which, from the outset, Siemens wanted to realize a building that met the highest sustainability standards.

How was Drees & Sommer able to assist you?

› Drees & Sommer was a central player in the project team and undertook management of the project together with Siemens

Real Estate. Particularly when we needed a second opinion or some forward-looking thinking, Drees & Sommer was a good partner to have beside us.

What do you value in a project team?

› For me, it was always important to have an effective team, not too big and not too small, and with competency across the board. In other words, with the right people in the right places. And reliability is just as important as competency. I expect that from my own team and from everyone involved in the project. Drees & Sommer measured up well in this respect.

Is there an event that stands out for you?

› The positive moments are the milestones that one achieves. The laying of the foundation stone at the project's halfway point was one such moment – the realization that we were still right on schedule was a marvelous feeling. To celebrate, we had a party attended by neighbors, the public and all project participants – and the atmosphere was very positive. The fact that we could celebrate together shows that we were on the right track with project participants, employees, the public and neighbors.



ENGINEERING FOR A WORLD HERITAGE SITE

The new administrative building of the RAG Foundation and RAG Aktiengesellschaft (stock corporation) is launching the Zollverein Coal Mine into the future. And comprehensive General Technical Planning by Drees & Sommer is guaranteeing optimal project execution.

The principal chose a versatile building design by kadawittfeldarchitektur for its new headquarters on the UNESCO World Heritage site of the Zollverein Coal Mine. It was to meet the highest Green Building certification (DGNB Platinum) and to delight with a roof garden.

Initially, Drees & Sommer engineering experts undertook the entire concept planning right through to building application planning for the project developer. Drees & Sommer is primarily supporting the construction project by providing General Technical Planning services, and is integrating building ecology and various Cradle to Cradle approaches into planning and realization with the help of special Circular Engineering concepts. Designed by kadawittfeldarchitektur, the new building is based on the latest sustainability standards and thus forms a bridge between nature and culture not only visually and materially, but also in terms of energy use. Added to which the building is extremely cost-efficient.

» The principal is getting an extremely sustainable building, as demonstrated – with excellent resultant publicity – by the DGNB Platinum Green Building certification. «

Following the C2C approach, the building uses materials from the local region that are completely recyclable. For example, the facade and window elements can be returned to the manufacturer at the end of their use.

In keeping with the principle of only using as much technology as absolutely necessary, the engineering specialists avoided superfluous elements. The energy concept developed by Drees & Sommer is extremely cost-effective, offering major savings compared to standard solutions. Key features are a geothermal system and a solar pergola integrated into the roof.

› General Technical Planning with BSE Planning, Structural Engineering, Building Physics, Circular Engineering, Facade Technology, Green Building Certification, ICT Consulting ‹

User needs were also integrated into planning. Thanks to its simple construction, the building is very versatile and can be quickly converted for different roles and uses.

The foundation stone laying ceremony was held on the grounds of the coal mine's former coking plant in May 2016, with the building scheduled for completion in 2017. As a result of the project, Drees & Sommer was also able to successfully support the customer, RAG Foundation and RAG AG, with the architectural competition for the construction of a new control center. This resulted in the award of a further General Technical Planning services contract, in which the Drees & Sommer experts will advise on information and communications technology (ICT).

Client:

– Projektgesellschaft
Zollverein Im Welterbe 10
GmbH & Co.KG, Essen
– KÖLBL KRUSE GmbH, Essen

Project duration:

May 2015 – September 2017

Architect:

kadawittfeldarchitektur,
Aachen

Key project data:

– GFA: approx. 9,600 m²
– Car parking spaces: 28



EVERY READY: NEW FIRE STATION CONSOLIDATES RESOURCES

Munich's continued expansion poses new challenges for the Bavarian capital's fire service. Fire Station 4 – the first of ten fire stations in Munich to be relocated to new buildings – was completed in three years with Drees & Sommer support throughout the project.



» The constant presence of expert teams guarantees successful completion of a complex project. «



Above:
The professional fire department has its own canteen ...

Right:
... as well as its own gymnasium

Below:
The Integrated Control Center



In 2007, in preparation for the growing challenges ahead, the Munich City Council passed a comprehensive range of measures for the fire department that provides for the progressive modernization of the city's fire stations over time. The start was made with the construction of Fire Station 4 in the district of Schwabing, which was completed in three years with constant support from Drees & Sommer as project controller.

The new fire station not only guarantees adherence to the ten-minute response time in north and northwest Munich, but also consolidates resources in a major emergency response base. In addition to Munich's professional fire service, the new building accommodates the Integrated Control Center, the Munich volunteer fire service's Central division, and the emergency services.

The experts' high level of presence throughout the project – as well as the use of the ProjectCommunication-

System (PCS) and e.BIX, the online room book – ensured seamless cooperation and the smooth implementation of the wide range of facilities, including offices, lounge areas, locker and storage rooms, relaxation rooms, building services areas, vehicle halls, a dining room, and a 200-square-meter gymnasium.

The completion of the highly complex information and communication technology for the control center – which is responsible for the entire city and district – in accordance with the fire department's special requirements posed a special challenge. But the constant exchange with Drees & Sommer engineering experts and the early and continuous involvement of users ensured that this task was completed smoothly.

» Project Control, ProjectCommunicationSystem (PCS), e.BIX Online Room Book, Technical & Economic Controlling (TEC) «

A photovoltaic system was installed on the rear, lower part of the building to cut energy costs associated with the operation of deep and shallow wells. The sealed surface is balanced by greened roof areas. An art installation on the facade, with LED panels that interactively reflect the number of incoming calls and radio messages, serves as a visual highlight.

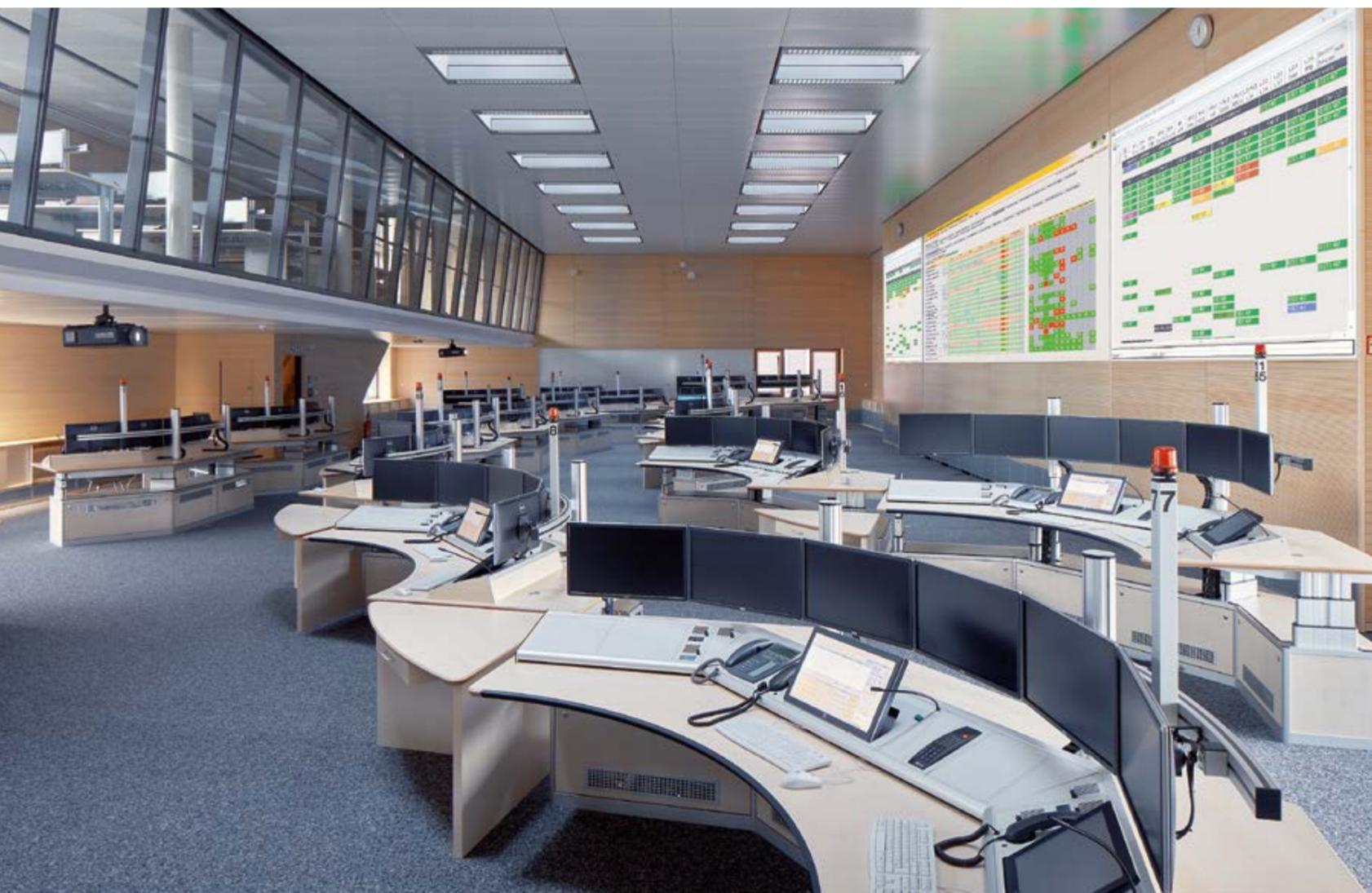
Project control by Drees & Sommer was so successful in meeting cost, schedule and quality targets that it was even possible to complete necessary additional services and still remain within the original budget. The successful cooperation with the City of Munich will continue on the site of fire station 3, which will accommodate the new emergency control center as a back-up for the Integrated Control Center.

Client:
City of Munich,
Building Department

Project duration:
April 2009 – March 2017

Architect:
agn Niederberghaus & Partner
GmbH, Halle/Saale

Key project data:
GFA: 20,103 m²
– Budget: €85,040,000



MAKING THE MOST OF LUCRATIVE POTENTIAL

Many property owners pay little attention to brownfield and gap sites, or disused industrial and military lands. But these often represent lucrative potential which should be identified and exploited. And that is exactly what Drees & Sommer's targeted Development Management services set out to do.

Professional support from the outset

When the British Army in Münster decided to close its York and Oxford Barracks, the city decided to purchase the lands from the Federal Office for Real Estate Management (BImA) and develop them. Urban planning concepts – selected in a competition – already exist for the 50- and 26-hectare sites. The brief of the project company KonvOY, representing the City of Münster, is to purchase the sites and develop them for future use, while taking existing planning, established buildings and the quality of open spaces into account.

In view of our regional presence and extensive experience with redevelopment projects, Drees & Sommer was brought on board at an early stage and commissioned to develop business plans for both sites. The Development Management experts assisted the client with professional business plan development and were awarded follow-up contracts to manage purchase negotiations, establish the company, coordinate procurement of planning permission, and undertake site preparation, infrastructure provision, and process management. Following the successful purchase, marketing of the sites – which together have a potential gross area of some 350,000 square meters – is planned from mid 2017.

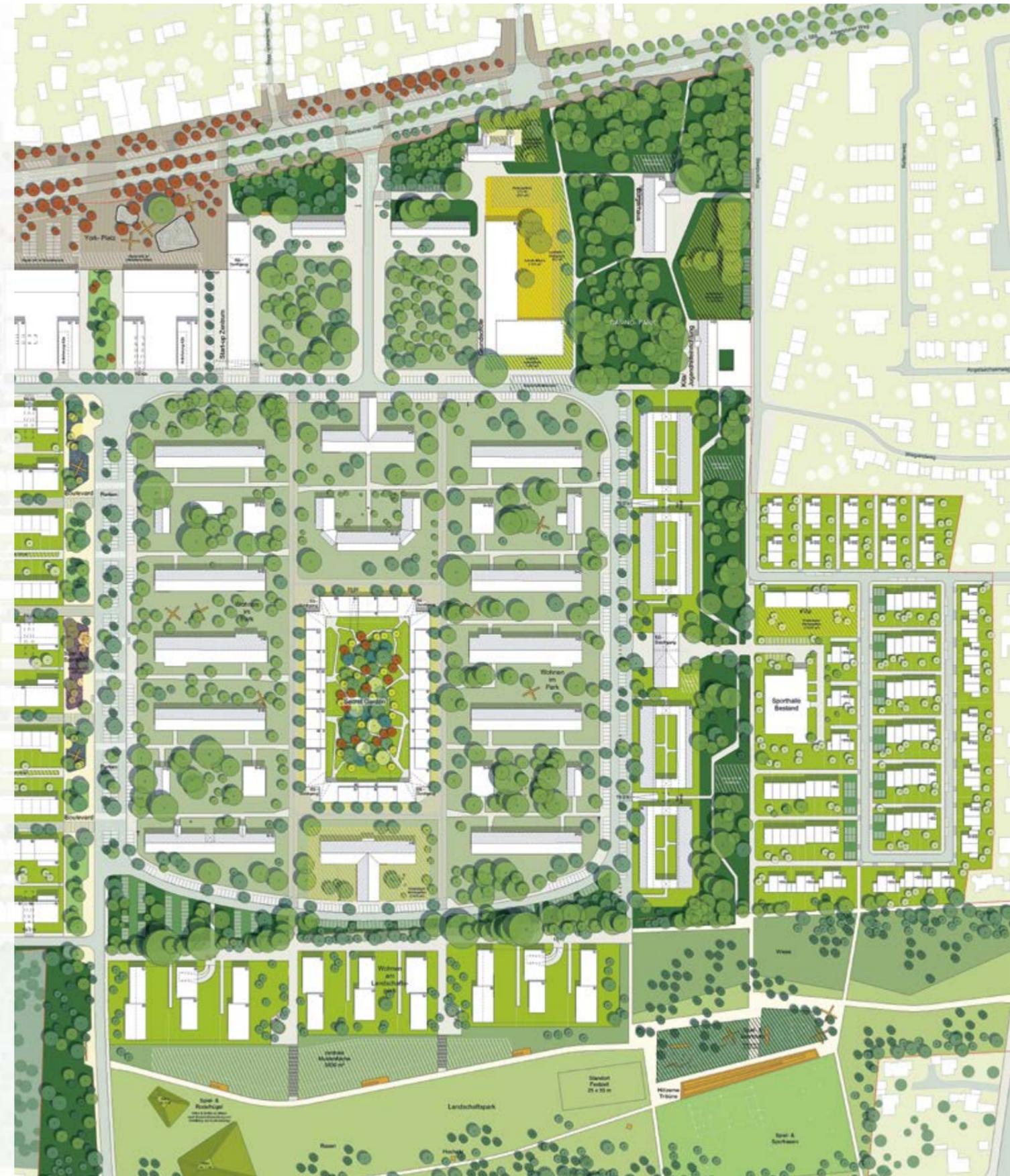
Client:
Stadt Münster
Wohn+Stadtbau GmbH

Project duration:
March 2016 – December 2017

Architects:
– Oxford: ArGe Oxf (consortium)
– York:
– Lorenzen Architekten
– Argus
– ArGe IFS + Müller-Kalchreuth (consortium)
– Atelier Loidl

Key project data:
– Area of Oxford development: 27 ha
– Area of York development: 50 ha

Right: York Barracks, Münster





» By thinking creatively, our interdisciplinary team of experts finds economically viable solutions for sites of all types. «

Roland Huber, Partner at Drees & Sommer

Breathing new life into disused industrial sites

Development Management experts also breathe new life into derelict industrial sites: The Malsch local authority intends to redevelop an area of some 67,500 square meters – part of which was formerly occupied by a paper mill – to build a new business park. The local authority commissioned Drees & Sommer, which is taking responsibility for infrastructure provision and procurement of planning permission. Following completion of the infrastructure, priority will be given to establishing local industry from the Karlsruhe region in the area. Drees & Sommer is supporting the local authority with the marketing of the sites to companies wishing to establish there.

- Client:**
Malsch local authority
- Project duration:**
August 2016 – December 2018
- Key project data:**
 - Development area: 6.7 ha
 - Development costs: approx. €5 million

Business park on the site of the former Malsch paper mill



Freiham-Nord housing development, Munich



Proven expertise for urban development projects

Meanwhile, in the Munich district of Freiham, the state capital's biggest development project is taking place on the last major contiguous site within the city limits. A new quarter – that will later be home to 20,000 people and offer workplaces for 7,500 – is to be established on a 350-hectare site twelve kilometers from the city center. The residential area in the north of the development will include an extensive landscape park and a school campus. A civic center at the new urban rapid transit station will connect the business park in the south with the residential area in the north.

The City of Munich commissioned Drees & Sommer with project control of this outstanding urban development project. The Development Management experts prevailed in a pan-European selection process that lasted over seven months, and are now supporting the Department of Urban Planning and Building Regulation with procurement of planning permission, infrastructure provision, and marketing of the new quarter.

- Client:**
City of Munich, Department of Urban Planning and Building Regulation
- Project duration:**
October 2016 – September 2019
- Key project data:**
Development area: 350 ha



» Based on extensive analysis and planning, we help our customers to make the right decisions for their land. «

Mustafa Kösebay, Associate Partner at Drees & Sommer

Sound planning as the basis for clear recommendations

The Luxembourg Ministry of Sustainable Development and Infrastructure plans the development of an urban district with the aid of a company yet to be established. The company is to be a consortium of local authorities, the government and private owners. The final makeup has not yet been decided. The goal is to have the development company undertake the major public measures, thus ensuring that the site development is of high quality.

Drees & Sommer was requested to undertake development of the overall project as part of an execution concept and business planning. In addition to a structural concept derived from the planning specification, in-depth cost and schedule planning will be prepared, on the basis of which risks and funding requirements can be established. The result will be a clear recommendation regarding the company model, with a starting date in January 2018.

Client:
Ministry of Sustainable Development and Infrastructure (MDDI), Luxembourg

Project duration:
December 2016 – February 2017

Key project data:
Development area: 28 ha



THANKS FOR THE FLOWERS: STATE HORTICULTURAL SHOW LEAVES A LASTING LEGACY

When the Eutin State Horticultural Show opened its gates on April 28, 2016, the entire project team had two years of hard work behind them. And as the show drew to a close in early October, the bottom line was positive: Numerous measures in the 137-hectare redevelopment have added lasting attractions to the town in Ostholstein.



» The Drees & Sommer team was able to ensure the punctual opening of the State Horticultural Show through experience, know-how and great personal commitment. «



'At one with nature' was the motto of the Eutin State Horticultural Show 2016.

Visitors had five months in which to enjoy the various exhibitions, events, flower and plant shows in the Holstein Switzerland Nature Park. The town of Eutin invested nearly two years in preparations for the great event, receiving competent support from Drees & Sommer from February 2014. The experts provided project management services for urban development measures and the State Horticultural Show's exhibition facilities. They also kept track of costs, schedule and quality, ensuring that the show opened on schedule.

» Project Management, Multiproject Control, Consulting Services, Finance & Subsidy Controlling, Data Management, Cost & Schedule Controlling «

While the flowers grew in the numerous garden beds over the course of the project, so did the number of tasks faced by Drees & Sommer. Being a reliable partner, more and more responsibilities were transferred to the experts. For example, they reduced the client's workload by also providing support with the renovation of the historic gatehouses and with the technical assessment of an established building. Drees & Sommer also recorded the costs incurred during the operational phase of the State Horticultural Show.

In addition to the fixed opening date, the wide range of activities and interdependencies that had to be managed in this multiproject presented a particular challenge. As part of its urban renewal program, the town had the landscape surrounding the Large Eutin Lake redeveloped. The Lake Park, the previously little-used Town Bay, and the historic municipal maintenance yard were rehabilitated and upgraded. The Lakeside Park was also redeveloped and provided with direct access to the lake. This legacy lives on, ensuring that the area remains full of life well after the end of the State Horticultural Show.

Client:
Landesgartenschau Eutin 2016
gGmbH

Project duration:
February 2014 –
December 2016

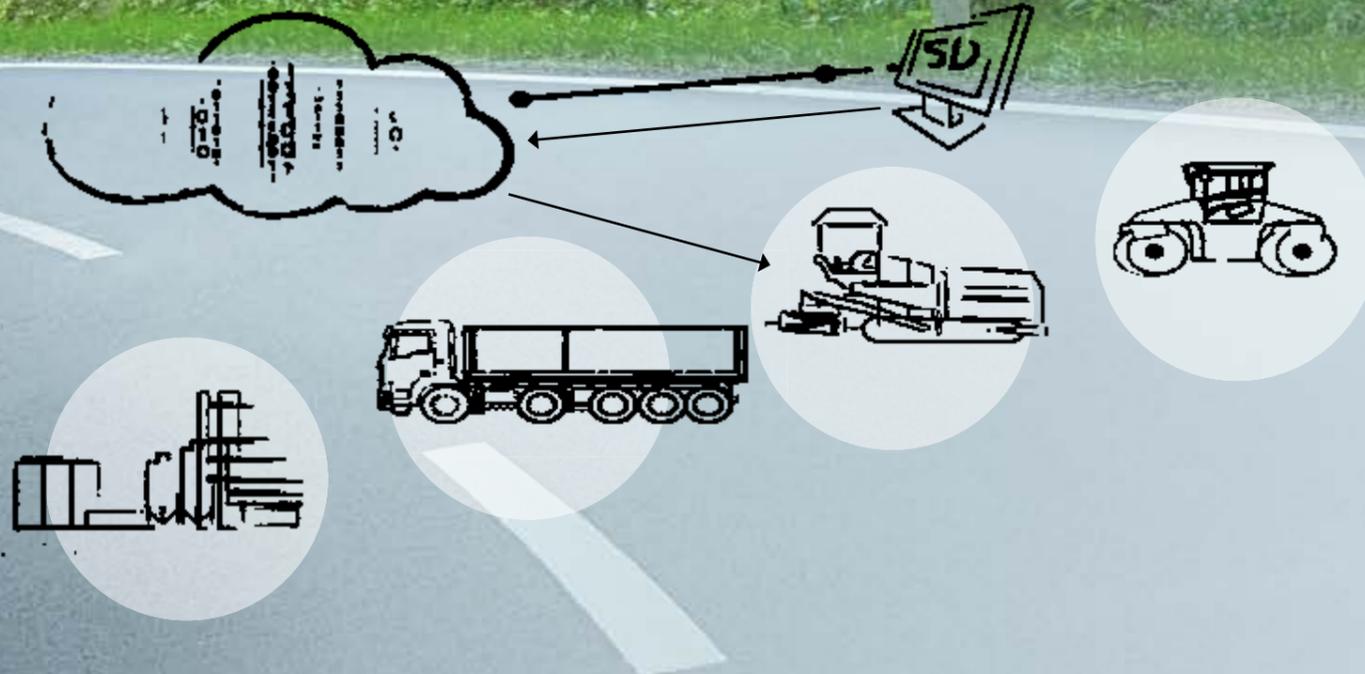
Architect:
A24 Landschaft, Berlin

Key project data:
– Area 137.7 ha
of which 87.3 ha
water surface
– Construction cost:
– Redevelopment area:
approx. €10 million net
– State Horticultural Show:
approx. €2.3 million



Germany's vast network of roads needs constant repair and maintenance. The SmartSite research project is examining the use of innovative solutions to prevent avoidable defects in the road surface. As the lead member of the consortium, Drees & Sommer played a crucial role in the project.

THE FUTURE OF ROAD-BUILDING



Avoidable defects in road surfaces require constant rehabilitation and result in annual costs of more than €2 billion. Added to which, the countless construction sites regularly cause bottlenecks, the financial consequences of which for the national economy are almost impossible to quantify. After Drees & Sommer won the tender process for the Autonomik 4.0 program from the Federal Ministry for Economic Affairs and Energy, a team of specialists from science and industry, led by the company's infrastructure experts, came together to form the SmartSite Research Consortium and tackle this problem.

› Project Management, Technical Process Consulting ‹

SmartSite uses BIM planning to control the logistics and preproduction process to allow the asphalt paving process to be done continuously. Smart-Site controls the entire value chain of the asphalt road construction from the mixing plant and transport of the mix to the construction site right through to the paving machines and subsequent compaction by the rollers. It is crucial that the asphalt is laid continuously while hot. To achieve this, the roadbuilding equipment is fitted with additional sensors that are linked via cloud solutions. The process manager has a transparent overview of the entire production process in real time and can control it by means of target/actual comparisons. This ensures optimal production quality, while at the same time reducing construction time and resource consumption. These advances were achieved in just three years, with Drees & Sommer ensuring the smooth progress of the project throughout its duration by providing technical process consulting and professional project management.

The Final Demonstration at the end of September 2016 provided impressive proof that SmartSite is ready for the road. At the event organized by Drees & Sommer, the results of the project were presented at a real construction site, with a state road near Stuttgart being quickly and efficiently rehabilitated using the newly developed technology.

From this year the results of the research project are to be applied in various projects, thus helping to improve road quality, minimize construction-related traffic congestion, and to save energy and resources.

Client:
Federal Ministry for Economic Affairs and Energy

Project duration:
October 2013 – December 2016

Key project data:
– Project volume: €6.65 million
– Subsidy volume €2.96 million

You can find more information on the project and the video 'Smart technologies for road construction' here.



RESTORING A FAMOUS ATTRACTION TO GLORY

Lorelei is one of the most important landmarks of the UNESCO World Heritage 'Upper Middle Rhine Valley cultural landscape'. The historic site is currently being redeveloped. Drees & Sommer experts, as project managers, are ensuring smooth progress of construction.



» We reduced the burden on the client during the modernization of the UNESCO World Heritage site, and achieved a positive image for the project in the media. «



"The peak of the mountain sparkles, in evening's final ray" – even the poet Heinrich Heine knew the best vantage point from which to view the romantic Rhine valley.

The Lorelei rock and the plateau high above the Rhine are a symbol for the cultural, geological and geographical identity of the region like no other. To ensure that the site continues to enjoy this status, the Lorelei Municipalities Association is redeveloping the area. The goal is to present the captivating Lorelei legend to young and old in a parkland, and to create a 'Lorelei plateau for all'.

Initially, the project faced numerous challenges. These included establishing a sound project structure, integrating various institutions and local, state and federal authorities, and securing finance via subsidy programs. Drees & Sommer development management and infrastructure experts started by structuring the project and clearly defining its goals. In particular, the team focused on precise definition of tasks and responsibilities.

» Project Control, Contract Award Management, Subsidy Procurement «

At the start of the project, Drees & Sommer experts compensated for a lack of project capacity through a high level of personal commitment and the provision of additional services. When the company joined the project, it was already running some six months behind schedule. For this reason, the specialists developed a strategy that secured planning results through short intervals between milestones. At the same time, they optimized the contract award strategy and cash outflow.

The official groundbreaking ceremony for the new cultural and landscape park took place on September 29, 2016 with the general public and the press in attendance. In their speeches at the ceremony, Federal Environment Minister Barbara Hendricks and Rhineland-Palatinate Interior Minister Lewentz promised that Lorelei would soon once again occupy a prestigious place in the list of German World Heritage sites.

By the end of 2018, various established buildings will be demolished, new path signage installed, and open spaces naturally landscaped. The realization phase will also be challenging, as tourists will still have access to the plateau during construction work.

Client:
Lorelei Municipalities Association

Project duration:
April 2016 – December 2018

Architects:
Werkteam Loreley, Erfurt

Key project data:
– Size of the site 4 hectares
– Cost: Approx. €5 million net

LEAN CONSTRUCTION MANAGEMENT KEEPS PROJECTS ON TRACK

In the middle of the desert 70 kilometers north of Qatar's capital Doha, Consolidated Contractors Company (CCC) is building a huge water reservoir with a capacity of two million cubic meters. The project is just one of many that Drees & Sommer experts are supporting with Lean Construction Management. The key to success is flexible takt planning.





» Takt planning can be used in any construction process – regardless of whether it is a high-rise building or a water reservoir. The challenge is use takt planning for the process, but still respond flexibly to special circumstances. «

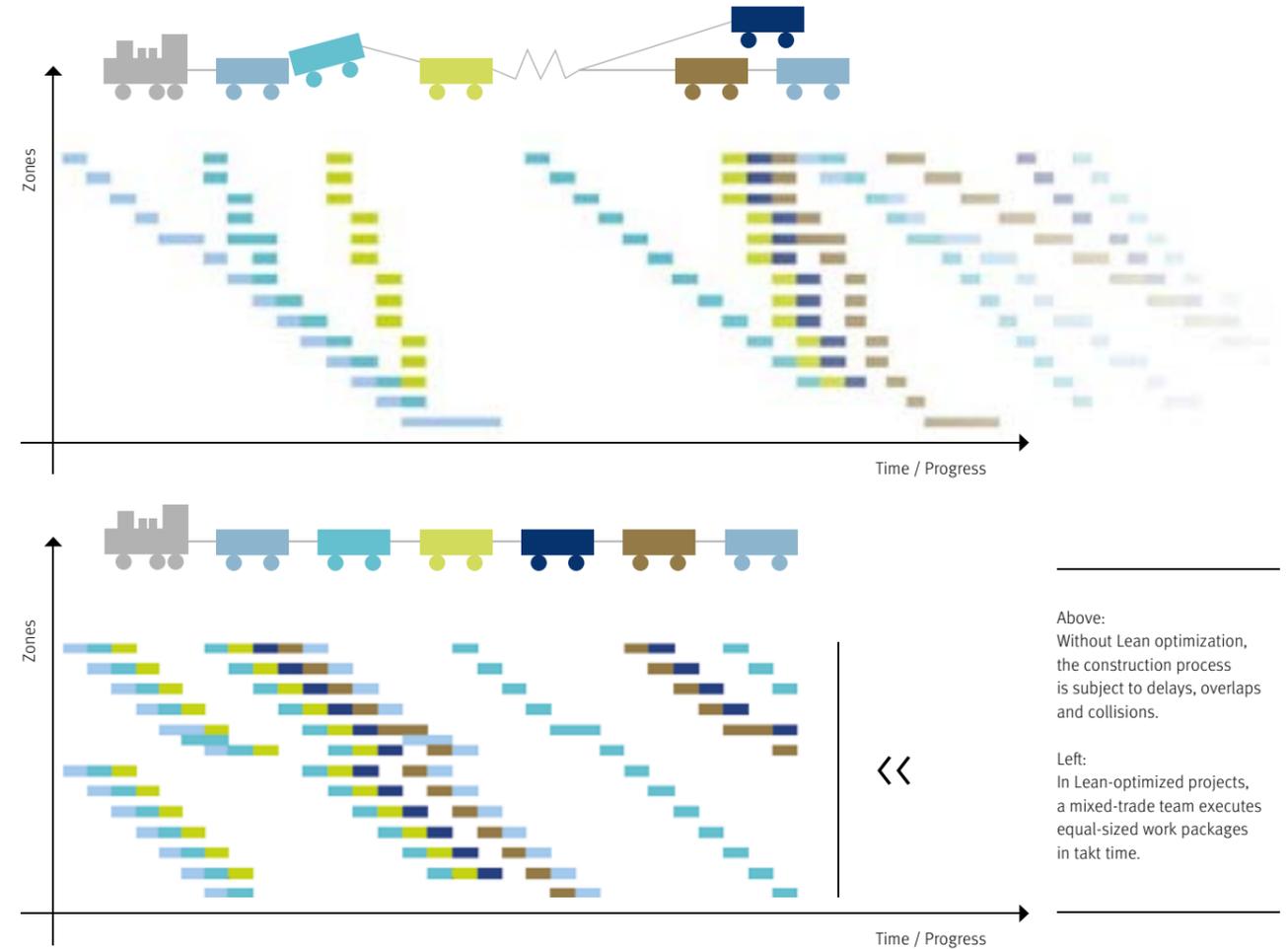
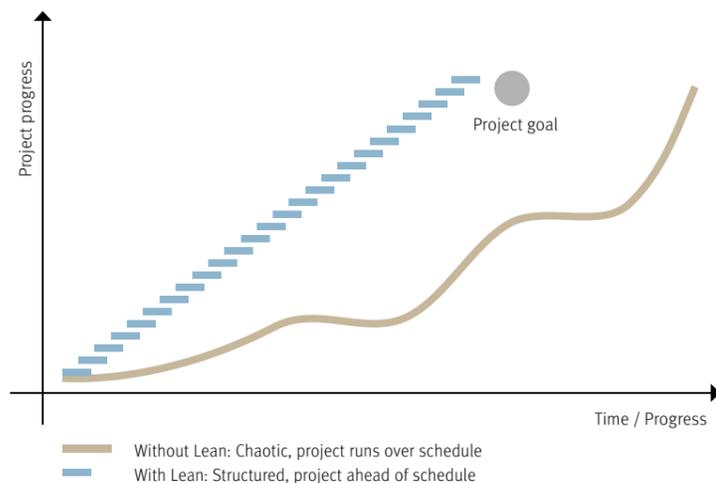
Patrick Theis, Partner at Drees & Sommer

Thanks to balanced production rates, an LCM project progresses quickly and smoothly, and may even result in the project being completed ahead of schedule.

Unclear schedules often lead to idle time and delays in the construction process. Contractors obstruct each other because individual workflows are not properly coordinated. Firefighting is often required towards the end of a construction project in order to meet the planned completion deadline.

Not so with Lean Construction Management (LCM®): Takt planning gives priority to achieving the optimal construction process. Equal-sized work packages are executed in the takt time by a so called 'trade train'. This trade train symbolizes teams of trades that work through the building. The daily check of promised performance – the daily work packages – ensures the high quality and speed of the process. The optimization of processes leads to even shorter takt times and this means exceeding project goals. And the takt time can be adapted flexibly to changes, so that the planned goal can even be achieved even sooner than expected.

First, the Lean experts divide a building into identical zones – for example offices, meeting areas, and staircases. They then establish the process sequence in these identical zones, that is, the detailed sequence of the individual trades or steps of each workflow. To balance work rates, the experts divide the project into takt areas with the same work input – for example, 'one week'. Once the sequence and work input have been established, the experts develop a visualization of trade train that works its way through the individual takt zones and lists the work to be done in sequence. When one team leaves a takt zone, the next team starts. Based on requirements and the resources available, the project team defines how many trade teams move through the building in parallel. This allows for an even higher speed. In the case of the water reservoir, up to 5,900 workers were on the construction site, assigned to 120 teams working in three shifts. In addition to highly efficient execution, the individual trades benefit from a smoothing of resource usage and team deployment. This avoids peaks in resource demand and allows cost-efficient offers to be made.



Above: Without Lean optimization, the construction process is subject to delays, overlaps and collisions.

Left: In Lean-optimized projects, a mixed-trade team executes equal-sized work packages in takt time.

As a building site is not a production line, changes are inevitable. LCM allows a quick response to such changes by flexibly adapting the takt time. A planning board acts as a takt control tool on the building site. It shows the workflow steps in takt zones for each trade per day. Work cards show who is working in which takt zone and the work to be completed for each week and each day. These targets are discussed by the team each morning and reviewed in the evening. The stability of this process is impressive: Goal achievement rates in excess of 90 percent are not uncommon, meaning that in nine out of ten cases, the promised work has been completed. In contrast, the goal achievement rate on a normal construction site is often only 30 percent.

This daily collaboration speeds up the construction process. In the case of the water reservoir, the team achieved a time saving of 23 percent. One key thing that Lean experts have learned from more than 250 Lean Construction Management projects is that everyone has to pull their weight. From the principal and construction management to the contractors' employees – all must embrace Lean culture. By organizing workshops, Drees & Sommer Lean experts involve all stakeholders in the planning at an early stage, rather than simply imposing the takt planning on them.

The benefits of LCM at a glance

- Time savings of up to 30 %
- Design process is based on the information flow that is really necessary
- Constant utilization of workers and machines
- Clear work preparation, as the required tasks are identified early
- Stability of over 90 %
- Avoidance of obstruction and disruptions
- Flexible response to changes

NEW ICE HOCKEY COMPLEX FOR CROWD PULLER

» Project managers ensured the smooth completion of the ambitious project. «

Ice Hockey Club SKA St. Petersburg achieves the highest attendance figures in the Kontinental Hockey League, regularly attracting more than eleven thousand spectators. The club decided to build a major new facility in the vicinity of the Ice Palace.

Drees & Sommer was commissioned to undertake project management as the support to the expert team of the client. The company's many years of international experience in the realization of similar construction projects and its local presence in St. Petersburg were decisive factors in the award.

» Project Management «

The new multifunctional complex "Hockey City" – which blends in well with the surrounding apartment buildings despite its striking facade – is a unique project not only for St. Petersburg but for Russia as a whole, created to improve hockey skills and training of the SKA club's talented youngsters. "Hockey City" is developed with the most modern building and fitout technologies. The complex includes a universal sports hall, two ice arenas, a hockey development center, a hotel, an outfitting center, a hockey museum, a medical center, a restaurant and other facilities that will be opened during 2017.

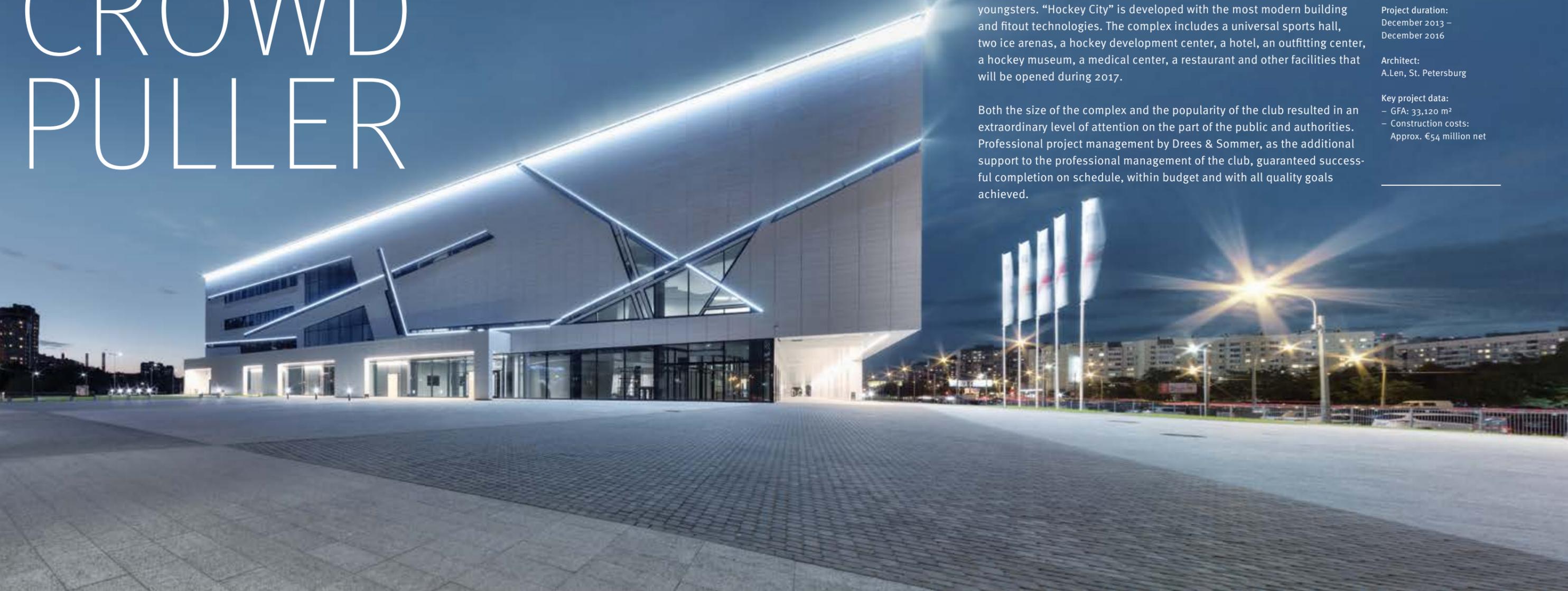
Both the size of the complex and the popularity of the club resulted in an extraordinary level of attention on the part of the public and authorities. Professional project management by Drees & Sommer, as the additional support to the professional management of the club, guaranteed successful completion on schedule, within budget and with all quality goals achieved.

Client:
Hockeyny Gorod SKA,
St. Petersburg

Project duration:
December 2013 –
December 2016

Architect:
A.Len, St. Petersburg

Key project data:
– GFA: 33,120 m²
– Construction costs:
Approx. €54 million net



LEAN SITE MANAGEMENT PUTS CONSTRUCTION PROCESSES IN THE FAST LANE

Blood plasma specialist Biotest AG is investing some €250 million in the expansion of production facilities in Dreieich, Hessen. This project marks the first time a pharmaceutical company in Germany has commissioned Drees & Sommer to undertake Lean Site Management.

» The challenge lies in meeting the tight schedule for planning and execution. This can only be achieved if the planning team and the client coordinate regularly and closely across all disciplines to make sound decisions within the shortest possible time. «

Ulrich Kaufmann, Associate Partner at Drees & Sommer



» For projects of this magnitude, it is important that clients equip themselves with expertise in all disciplines. Drees & Sommer's many years of experience is a valuable addition to our own know-how and capacities. «

Michael Moritz, Managing Director of Biotest Pharma GmbH and project leader for the Biotest Next Level project.

Biotest AG develops, produces and markets innovative products in the fields of hematology, immunology, and intensive care medicine. These are either obtained from human blood plasma or produced using biotechnology processes. Numerous factors – such as the growing and aging global population and an increasing number of autoimmune diseases – are resulting in greater worldwide demand for immunoglobulins. That is why Biotest is expanding its production facility in Dreieich by some 35,000 square meters in a project called 'Biotest Next Level'. A special feature of the project is that it marks the first time Drees & Sommer has used Lean Site Management for a pharmaceutical construction project in Germany. As part of this approach, a planning board system was introduced on the building site right at the start of installation to enable finely tuned control of construction processes. Drees & Sommer construction management experts are also on the building site supervising construction, fitout and building services equipment.

Currently, Biotest has a production capacity of six tonnes of immunoglobulin per year – this is to be more than doubled to some 12.5 tonnes. Furthermore, the new production plant will produce five instead of the current three products from each liter of plasma, thus significantly increasing profitability and competitiveness.

» Deputy Project Lead Function, Project Management, Lean Site Management «

Earthworks for the new building began at the end of 2014. Prior to this, a multistory car park with 700 parking spaces was built. The production facility was built using a modular design with finished and semi-finished elements, an approach that significantly accelerated the construction process. The building structure and shell were already completed by the start of 2016. Since then, work has continued on interior finishing and the installation of process technology. The immunoglobulin is manufactured in clean-room conditions that require the appropriate fitout. The entire production process, which has been in operation since the end of 2016, takes place on three levels. Above and below



Right: The new 'Biotest Next Level' building at the bottom right of the photo is the principal's response to growing demand for its products.

Below: The planning board is a key tool for Lean Site Management at the construction site.



Client:
Biotest Pharma GmbH, Dreieich

Project duration:
March 2013 – December 2017

General planner:
VTU Engineering Deutschland GmbH, Hattersheim

Key project data:
– GFA: 35,556 m²
– Gross volume: 251,773 m³

these levels are support areas, such as the ventilation plant and media supply. Power is supplied by a cogeneration plant located in a separate building connected to the main building by a tunnel. Completion of qualification for fitout, building services equipment, and the media and process equipment is scheduled for the end of 2017. Drees & Sommer experts are supporting the planning and procurement of material and equipment for the building structure, building services, process technology and production, and subsequent realization. The company is undertaking organizational management, detailed cost controlling, overall schedule management, and all aspects of tendering, contract award, and contract management. Drees & Sommer also represents the lead project manager for the investment program, as well as assuming the role of principal for the construction and fitout subproject.

When designing its new home, the goals of the University of Düsseldorf were to consolidate the previously scattered facilities in a campus in a vibrant district with good transport connections. Drees & Sommer acted as project controller for the North Rhine-Westphalian Construction and Properties Office throughout the project, ensuring that this goal was realized.

NEW UNIVERSITY OF DÜSSELDORF CAMPUS BRINGS IT ALL TOGETHER



» Project managers are guiding this major project to success through sound basic design criteria and continuous optimization. «

Right:
The Campus IT center and library are housed in the historic livestock hall using an intricate room-in-room design.

Below:
Despite featuring materials that are simple, robust and inexpensive, the new buildings offer students an esthetically pleasing and inspiring learning environment.



The heritage-protected livestock hall, which was built in the early 1900s, has been completely redeveloped and skillfully integrated into the new campus.

As the existing university buildings dating back to the 1970s were in need of renovation and no longer met current needs, the University of Düsseldorf decided to usher in a new era and consolidate all its departments at a modern site. And so, following the General Planner competition managed by Drees & Sommer, the new, inner-city university campus was built on the site of the former Schlösser brewery and slaughterhouse in the district of Derendorf.

Drees & Sommer supported the project throughout, acting as project controller on behalf of the North Rhine-Westphalian Construction and Properties Office, ensuring completion to the desired quality specification within budget, and also acting as moderator between the Construction and Properties Office as client and the university as the user. Drees & Sommer was also commissioned to develop a construction logistics concept that would ensure the smoothest possible execution of more than 50 contract award units. In addition to six new buildings, the historic livestock hall was preserved and now, following a complete renovation, accommodates facilities including the campus IT and the library. A special highlight is the 'Tricolumn' architectural art project: This is a geometrically fascinating concrete column that extends through all floors of the new Peter Behrens School of Arts. The column was designed and realized by the school's students.

› Project Control as per AHO*, Construction Logistics Concept, Commissioning Management «

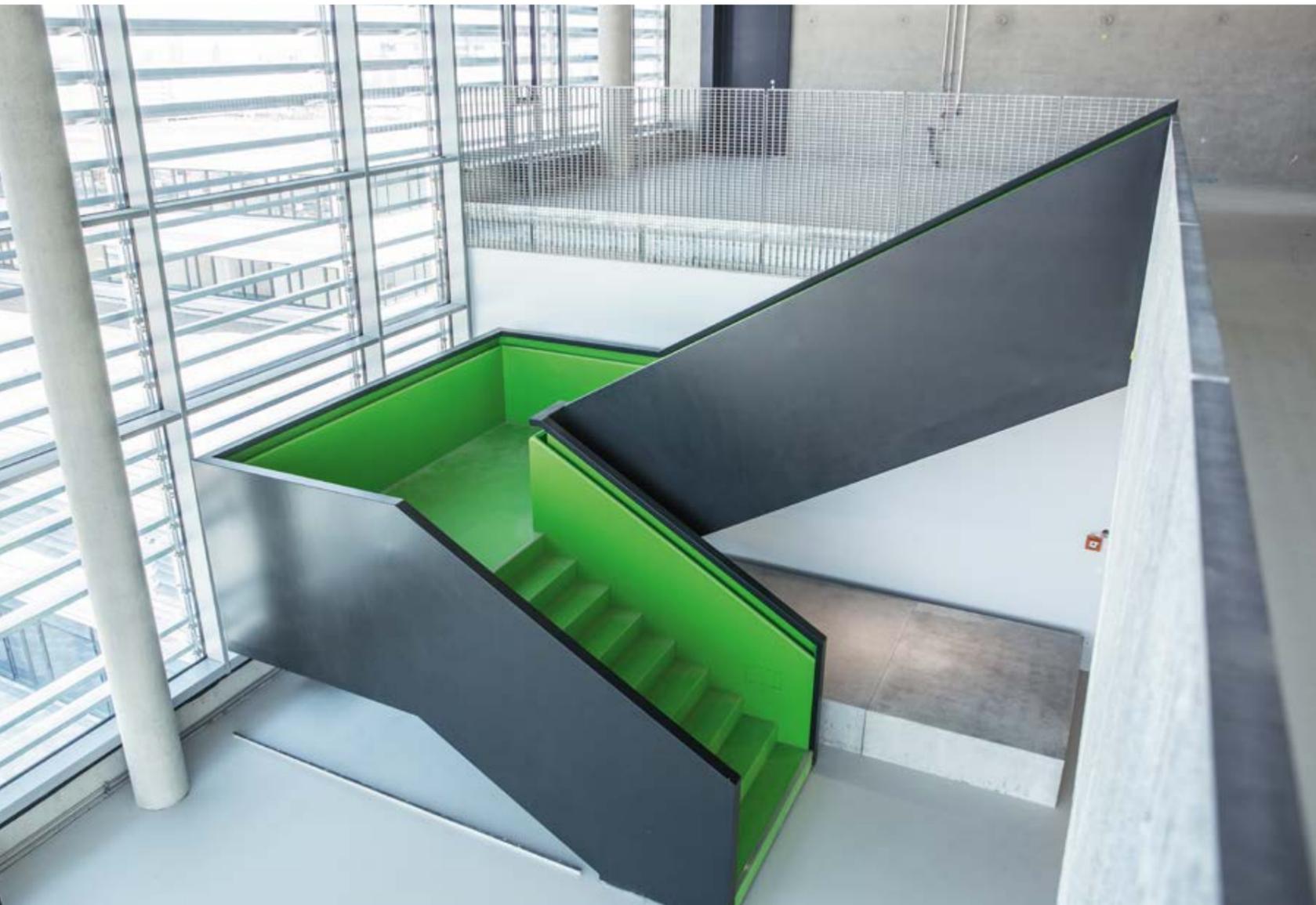
Thanks to commissioning management developed and supported by Drees & Sommer engineering experts in close collaboration with the project managers, the first departments were able to move into their new buildings at the beginning of the 2016 summer semester. Attractive outdoor areas with extensive parkland and the versatile multipurpose auditoriums make the new campus a perfect meeting place and a defining feature of the city. All departments and facilities of the University of Düsseldorf will finally be consolidated at one site by the start of 2018.

Principal:
Construction and Properties Office

Project duration:
August 2008 – May 2018

Architect:
Nickl & Partner, Munich

Key project data:
– GFA: 108,600 m²
– Construction costs: approx. €239 million net



* Commission of Engineers' and Architects' Associations and Chambers Fee Structure

LUXURY RESIDENTIAL TOWER SETS QUALITY BENCHMARKS

» Through committed project management, experts have realized a flagship project in terms of quality and luxury. «

Client:
Signature DT Real Estate
Development, Dubai

Project duration:
June 2014 – June 2017

Architect:
Archgroup International, Dubai

Key project data:
– GFA: 19,005 m²

'The 118' luxury tower has now joined the ranks of exclusive residential buildings in central Dubai. As project manager and the client's representative, Drees & Sommer ensured that the project met the high quality specifications.

It is not easy to build a building in downtown Dubai that stands out solely on the basis of its quality and luxurious facilities – within sight of the iconic Burj Khalifa. So the expectations that Drees & Sommer had to meet – and indeed met – as project manager and client representative during construction of the 44-story 'The 118' were correspondingly high.

The exclusive residential tower features 26 apartments and two penthouse suites. Each of the apartments takes up a complete floor, while penthouse suites extend over two each. As the first apartment is on the 14th floor, each of these luxury residences offers a breathtaking 360-degree view of Dubai. The client's goal was to set a benchmark in Dubai and the Middle East by constructing a building of outstanding quality. The resulting extremely high quality specifications are reflected in particular in the high-quality fitout, the security concept, and the innovative building technology used, for example an RFID system that gives owners easy access to their apartments and active control of them.

› [Client Representation, Project Management, Cost Controlling, Value Engineering](#) ‹

Despite the challenges, thanks to committed project management – in particular effective coordination of all stakeholders and structured communication and decision-making – Drees & Sommer led the project to success. The experts were also able to install innovative products in the building – such as the largest sliding folding steel glass doors currently in use in the region – and, through a high level of identification with the project, ensured that all the client's requirements were met. 'The 118' not only sets benchmarks in terms of luxury and quality, but at 212 meters, is one of the highest buildings for which Drees & Sommer has undertaken management.



ALWAYS THE RIGHT CONTACTS

The staff are our link to our customers. On the following pages we give you an overview of our international offices and contact persons as well as an overview of our industry experts and central specialist divisions.

All offices are well acquainted with regional peculiarities. This allows us to support our local clients, but also to support international customers in these countries.

OFFICES AND CONTACTS

STUTTGART

Drees & Sommer – Holding
Obere Waldplätze 13
70569 Stuttgart, Germany
Phone +49 711 1317-0
Fax +49 711 1317-101
info@dreso.com

Your contacts:
Dierk Mutschler
Steffen Szeidl
Peter Tzeschlock

**Drees & Sommer –
Project Management and
Real Estate Consulting**
Obere Waldplätze 13
70569 Stuttgart, Germany
Phone +49 711 1317-0
Fax +49 711 1317-101
info.stuttgart@dreso.com

Your contacts:
Thomas Berner
Mirco Beutelspacher
Thomas Jaißle
Alexander Kittel
Josef Linder
Heiko Rihm
Ralph Scheer
Andreas Schele
Philipp Späth
Matthias Stolz
Bernhard Unseld

Drees & Sommer – Engineering
Obere Waldplätze 11
70569 Stuttgart, Germany
Phone +49 711 687070-0
Fax +49 711 687070-368
info.stuttgart@dreso.com

Your contacts:
Prof. Dr. Michael Bauer
Martin Lutz
Dr. Peter Möhle

**Drees & Sommer –
Development and
Infrastructure Consulting**
Untere Waldplätze 37
70569 Stuttgart, Germany
Phone +49 711 222933-0
Fax +49 711 222933-4190
info.infra@dreso.com

Your contacts:
Claus Bürkle
Roland Huber
Dr. Jürgen Laukemper
Christopher Vagn Philipsen

**Drees & Sommer –
Strategic Process Consulting and
Facility Management Consulting**
Untere Waldplätze 37
70569 Stuttgart, Germany
Phone +49 711 1317-2288
Fax +49 711 1317-101
info.stuttgart@dreso.com

Your contacts:
Thomas Häusser
Dirk Jannausch
Patrick Theis

Drees & Sommer – International
Obere Waldplätze 13
70569 Stuttgart, Germany
Phone +49 711 1317-0
Fax +49 711 1317-101
info.stuttgart@dreso.com

Your contacts:
Sascha Hempel
Peter Prischl
Bernhard Unseld

**RBS - Projekt Management GmbH -
Unternehmensberatung**
Untere Waldplätze 37
70569 Stuttgart, Germany
Phone +49 711 1317-1577
Fax +49 711 1317-401577
welcome@germany.rbsgroup.eu

Your contacts:
Andreas Bay
Sven Mylius

**Gassmann + Grossmann
Baumanagement GmbH**
Kronenstraße 34
70174 Stuttgart, Germany
Phone +49 711 225558-30
Fax +49 711 225558-46
stuttgart@gagro.de

Your contacts:
Heinz Heger
Peter Jürgensen
Boris Maticic
Andreas Schele
Mirko Weiss

AACHEN

Drees & Sommer
Campus-Boulevard 57
52074 Aachen, Germany
Phone +49 241 9278762-0
Fax +49 241 9278762-7499
info.aachen@dreso.com

Your contact:
Klaus Dederichs

AMSTERDAM

Procore Group
Hoefbladstraat 20 – 22
2153 EX Nieuw-Vennep, Netherland
Phone +31 88 776-2670
info@procore.nl

Your contacts:
Kurt van Dijk
Michel de Haan

ATLANTA

Drees & Sommer USA
100 Hartsfield Centre Parkway
Suite 500
Atlanta, Georgia 30354, USA
info.atlanta@dreso.com

Your contact:
Christine Gruna

BARCELONA

Drees & Sommer España
Roc Boronat, 147, 10^a planta
08010 Barcelona, Spain
Phone +34 93 451-0839
info.spain@dreso.com

Your contact:
Billy Taylor

BASEL

Drees & Sommer Schweiz
St. Alban-Vorstadt 80
4052 Basel, Switzerland
Phone +41 61 785-7200
Fax +41 61 785-7270
info.zuerich@dreso.com
www.dreso.ch

Your contacts:
Niklaus Arn
Prof. Jürgen M. Volm

Drees & Sommer Schweiz
Malzgasse 20
4052 Basel, Switzerland
Phone +41 61 785-7337
Fax +41 61 785-7270
info.zuerich@dreso.com
www.dreso.ch

Your contacts:
Tomas Kucharik
Veit Thurm

BEIJING

**Drees & Sommer
Project Management and
Consulting (Beijing)**
Room No. 072, 7th Floor, Unit 1,
Sanlitun DRC, Office Building
No. 1 Gongti North Road,
Chaoyang District
100600, Beijing, V.R. China
Phone +86 10 65900-265
Fax +86 10 65900-275
info.beijing@dreso.com

Your contacts:
Martin Lutz
Dennis Schulz

BERLIN

Drees & Sommer
Bundesallee 39 – 40a
10717 Berlin, Germany
Phone +49 30 254394-0
Fax +49 30 254394-222
info.berlin@dreso.com

Your contacts:
Oliver Beck
Claudia Niendorf
Markus Weigold

**Gassmann + Grossmann
Baumanagement GmbH**
Bundesallee 39 – 40a
10717 Berlin, Germany
Phone +49 30 254394-0
Fax +49 30 254394-499
berlin@gagro.de

Your contacts:
Jürgen Brandstetter
Peter Jürgensen

BREMEN

Drees & Sommer

Auf der Muggenburg 9
28217 Bremen-Überseestadt, Germany
Phone +49 421 278712-0
Fax +49 421 278712-6599
info.bremen@dreso.com

Your contacts:

Prof. Phillip W. Goltermann
York Friedrich Stahlknecht

BRUSSELS

Drees & Sommer Belgium

Boulevard Brand Whitlock 87
1200 Brüssel, Belgium
Phone +32 2 73770-30
Fax +32 2 73770-31
info.brussels@dreso.com

Your contacts:

Maximilien Ast
Christopher Matthies

COLOGNE

Drees & Sommer

Bürogebäude Westgate
Habsburgerring 2
50674 Köln, Germany
Phone +49 221 13050-5260
Fax +49 221 13050-5202
info.koeln@dreso.com

Your contacts:

Jörg Ewald-Lincke
Stefan Heselschwerdt
Frank Kamping
Matthias Schulle

Gassmann + Grossmann

Baumanagement GmbH

Bürogebäude Westgate
Habsburgerring 2
50674 Köln, Germany
Phone +49 221 27079-5341
Fax +49 221 27079-5320
koeln@gagro.de

Your contacts:

Heinz Heger
Mirko Weiss

COPENHAGEN

Drees & Sommer Nordic

Wildersgade 10B, 2. OG
1408 Copenhagen, Denmark
Phone +45 45 2690-00
Fax +45 45 2690-99
info.nordic@dreso.com
www.dreso.dk

Your contacts:

Prof. Phillip W. Goltermann
Carsten Hyldebrandt
Sebastian Lundholm Petersen

DORTMUND

Drees & Sommer

Königswall 21
44137 Dortmund, Germany
Phone +49 231 9125697-0
Fax +49 231 9125697-9511
info.dortmund@dreso.com

Your contacts:

Nadin Bozorgzadeh
Stefan Heselschwerdt

DRESDEN

Drees & Sommer

Freiberger Straße 39
01067 Dresden, Germany
Phone +49 351 873239-0
Fax +49 351 873239-20
info.dresden@dreso.com

Your contacts:

Andy Brunner
Andreas Rost
Jörg Wohlfarth

DUBAI

Drees & Sommer Gulf

DIC – Dubai Internet City
ElBo4 (BT) Building, Office 210,
P.O. Box 500 128
Dubai, U.A.E.
info.dubai@dreso.com

Your contact:

Stephan Degenhart

DÜSSELDORF

Drees & Sommer

Derendorfer Allee 6
40476 Düsseldorf, Germany
Phone +49 211 23390-0
Fax +49 211 23390-111
info.duesseldorf@dreso.com

Your contacts:

André Boers
Jörg Ewald-Lincke

ERFURT

Drees & Sommer

Anger 66 – 73
99084 Erfurt, Germany
Phone +49 361 59896-6410
Fax +49 361 59896-6420
info.erfurt@dreso.com

Your contacts:

Christian Krajci
Andreas Rost
Jörg Wohlfarth

FRANKFURT

Drees & Sommer

Schmidtstraße 51
60326 Frankfurt am Main, Germany
Phone +49 69 758077-0
Fax +49 69 758077-8833
info.frankfurt@dreso.com

Your contacts:

Sascha Hempel
Klaus Hirt
Thomas Hofbauer
Sascha Kilb
Ralf Molter
Norbert Otten
Marc Schömbms
Dietmar Zwipp

Gassmann + Grossmann

Baumanagement GmbH

Schmidtstraße 51
60326 Frankfurt am Main, Germany
Phone +49 69 29802887-0
Fax +49 69 29802887-46
frankfurt@gagro.de

Your contacts:

Jürgen Brandstetter
Peter Jürgensen

RBS - Projekt Management GmbH - Unternehmensberatung

Schmidtstraße 51
60326 Frankfurt am Main, Germany
Phone +49 89 318561-251
welcome@germany.rbsgroup.eu

Your contact:

Simone Bücksteeg

FREIBURG

Drees & Sommer

Kaiser-Joseph-Straße 194
79098 Freiburg, Germany
Phone +49 761 881790-0
Fax +49 761 881790-1790
info.freiburg@dreso.com

Your contacts:

Stefan Kattendick
Ralph Scheer

HAMBURG

Drees & Sommer

Ludwig-Erhard-Straße 1
20459 Hamburg, Germany
Phone +49 40 514944-0
Fax +49 40 514944-6398
info.hamburg@dreso.com

Your contacts:

Prof. Phillip W. Goltermann
Björn Jesse
Claudia Niendorf
Helge Plath
Harald Wüst

Gassmann + Grossmann

Baumanagement GmbH

Ludwig-Erhard-Straße 1
20459 Hamburg, Germany
Phone +49 40 514944-0
hamburg@gagro.de

Your contacts:

Jürgen Brandstetter
Peter Jürgensen

RBS - Projekt Management GmbH - Unternehmensberatung

Ludwig-Erhard-Straße 1
20459 Hamburg, Germany
Phone +49 89 318561-251
welcome@germany.rbsgroup.eu

Your contact:

Dr. Verena Hilgenstock

HANOVER

Drees & Sommer
Podbielskistraße 342
30655 Hannover, Germany
Phone +49 511 2138870-0
Fax +49 511 2138870-20
info.hannover@dreso.com

Your contacts:
Martin Albrecht
Heinz Günter Freihoff
Björn Jesse

JEDDAH

Drees & Sommer Consulting Engineering
Jameel Square Office 125
Tahlia Street
23612 Jeddah,
Kingdom of Saudi Arabia
Phone +966 12 283 2576
info.saudiarabia@dreso.com

Your contact:
Daniel Kluck

KIEL

Drees & Sommer
Schlossgarten 6
24103 Kiel, Germany
Phone +49 431 200027 9600
Fax +49 431 200027 9630
info.kiel@dreso.com

Your contacts:
Prof. Phillip W. Goltermann
Joachim Lenschow

LEIPZIG

Drees & Sommer
Brühl 65
04109 Leipzig, Germany
Phone +49 341 91930-0
Fax +49 341 91930-6220
info.leipzig@dreso.com

Your contacts:
Andreas Rost
Jörg Wohlfarth

LONDON

Drees & Sommer UK Ltd.
Unit 6, 36 – 42 New Inn Yard
EC2A 3EY London, UK
Phone +44 20 3858-0221
info.uk@dreso.com

Your contacts:
Sascha Hempel
Phillip Ratcliffe

MANNHEIM

Drees & Sommer
Q7, 24
68161 Mannheim, Germany
Phone +49 621 7186899-449
Fax +49 621 7186899-40449
info.mannheim@dreso.com

Your contacts:
Mirco Beutelspacher
Jochen Günther

MILAN

Drees & Sommer Italia
Viale Luigi Majno, 17
20122 Mailand, Italy
Phone +39 02 290-62666
Fax +39 02 290-11388
info.milano@dreso.com

Your contact:
Jürgen Kreisel

MOSCOW

Drees & Sommer Russland und GUS
Zemlyanoy Val 9, 4th Floor
105064 Moscow, Russia
Phone +7 495 79230-92
Fax +7 495 79230-91
info.moscow@dreso.com
www.dreso.ru

Your contacts:
Tim Comaia
Tatjana Kovalenko
Steffen Sandler

MUNICH

Drees & Sommer
Geisenhausenerstraße 17
81379 München, Germany
Phone +49 89 149816-0
Fax +49 89 149816-4890
info.muenchen@dreso.com

Your contacts:
Dr. Thomas Harlfinger
Frank Reuther
Holger Seidel
Hermine Szegedi
Dr. Markus Treiber
Rino Woyczyk

RBS - Projekt Management GmbH - Unternehmensberatung

Kistlerhofstr. 70, Geb. 76
81379 München, Germany
Phone +49 89 318561-0
Fax +49 89 318561-99
welcome@germany.rbsgroup.eu

Your contacts:
Martin Becker
Kai Ertel
Daniel Seibert

Gassmann + Grossmann Baumanagement GmbH
Geisenhausenerstraße 15
81379 München, Germany
Phone +49 89 2441920-0
Fax +49 89 2441920-46
muenchen@gagro.de

Your contacts:
Boris Maticic
Mirko Weiss

MÜNSTER

Drees & Sommer
Am Mittelhafen 10
48155 Münster, Germany
Phone +49 251 67430-222
Fax +49 251 67430-224
info.muenster@dreso.com

Your contacts:
Stefan Heselschwerdt
Christian Terwey

MUNSBACH/LUXEMBOURG

Drees & Sommer Luxembourg
6c, rue Gabriel Lippmann
5365 Munsbach, Luxembourg
Phone +352 261205-5550
Fax +352 261205-5580
info.luxembourg@dreso.com

Your contacts:
Maximilien Ast
Heiko Butter
Lothar Diederich

NUREMBERG

Drees & Sommer
Äußere Cramer-Klett-Straße 19
90489 Nürnberg, Germany
Phone +49 911 9928660-0
Fax +49 911 9928660-4988
info.nuernberg@dreso.com

Your contacts:
Frank Pickel
Holger Seidel

PARIS

Drees & Sommer France
70 boulevard de Courcelles
75017 Paris, France
Phone +33 1 4293-6320
Fax +33 9 7212-7219
info.france@dreso.com

Your contacts:
Maximilien Ast
Jean-Marc Guillen

RIYADH

Drees & Sommer Consulting Engineering
Level 1, Building 7, Zone A,
Airport road, Business Gate,
P.O. Box 93597, Riyadh 11683,
Kingdom of Saudi Arabia
Phone +966 50 4723713
info.saudiarabia@dreso.com

Your contact:
Daniel Kluck

SÃO PAULO

Drees & Sommer do Brasil
Condomínio Millennium, Av. Chedid Jafet, 222
Bloco D – 5. Stock Vila Olímpia
04551-065, São Paulo, SP Brazil
Phone +55 11 2655 7302
Fax +55 11 2655 1710
info.brasil@dreso.com

Your contact:
Simon Girntke

SHANGHAI

Drees & Sommer Engineering Consulting (Shanghai)
The Bridge 8, Building 9, Unit 9506,
No.25 Jianguo Zhong Rd., Huangpu District,
Shanghai 200025, V.R. China
Phone +86 21 6136-9165
Fax +86 21 6136-9162
info.shanghai@dreso.com

Your contacts:
Martin Lutz
Baldur Steimle

PHOTO CREDITS

ST. PETERSBURG

Drees & Sommer Russland und GUS
pl. Truda, 2, lit. A
190000 St. Petersburg, Russla
Phone +7 812 309-9323
Fax +7 812 309-93230
info.st.petersburg@dreso.com
www.dreso.ru

Your contacts:
Evgeniy Kaverin
Tatjana Kovalenko
Steffen Sandler

ULM

Drees & Sommer
Hämpfergasse 9
89073 Ulm, Germany
Phone +49 731 9691495-1831
Fax +49 731 9691495-401831
info.ulm@dreso.com

Your contacts:
Ralph Scheer
Petra Wohlgemuth

VIENNA

Drees & Sommer Wien
Lothringerstraße 16, Top 9
1030 Wien, Austria
Phone +43 1 5335660-0
Fax +43 1 5335660-90
info.wien@dreso.com

Your contacts:
Manfred Drescher
Marc Guido Höhne
Nadja Pröwer
Michael Schreil
Georg Stadlhofer

WARSAW

Drees & Sommer Polska
Ul. Chmielna 132/134
00-805 Warschau, Poland
Phone +48 22 48778-29
Fax +48 22 48778-13
info.polska@dreso.com

Your contact:
Jörg Wohlfarth

ZURICH

Drees & Sommer Schweiz
Förlibuckstrasse 10
8005 Zürich, Switzerland
Phone +41 43 366-6864
Fax +41 43 366-6863
info.zuerich@dreso.com
www.dreso.ch

Your contacts:
Niklaus Arn
Rainer Preisshofen
Veit Thurm
Prof. Jürgen M. Volm

CONTACTS FOR SPECIFIC INDUSTRIES

Automotive

Philipp Späth
philipp.spaeth@dreso.com

Education and Research

Matthias Stolz
matthias.stolz@dreso.com

Finance

Marc Schömbbs
marc.schoembs@dreso.com

Healthcare

Hermine Szegedi
hermine.szegedi@dreso.com

Hospitality

Gesa Rohwedder
gesa.rohwedder@dreso.com

ICT

Klaus Dederichs
klaus.dederichs@dreso.com

Real Estate Industry

Sascha Kilb
sascha.kilb@dreso.com

Life Sciences

Rino Woyczyk
rino.woyczyk@dreso.com

Public Sector

Claus Bürkle
claus.buerkle@dreso.com

Retail

Dirk Hünerbein
dirk.huenerbein@dreso.com

Residential

Simon Dietzfelbinger
simon.dietzfelbinger@dreso.com

Cover, Pages 26 – 27, 134 – 135
© kantver – Fotolia.com
© Kaikoro – Fotolia.com

Pages 2 – 7
© Marius Schwarz
© Thomas Zörlein

Pages 5 – 9, 30, 50, 74, 85, 120
© Nino Halm

Pages 28 – 35
© Herzog & de Meuron

Pages 36 – 41
© Wolfram Scheible

Pages 42 – 43
© Andreas Schweizer (Drees & Sommer)

Pages 44 – 45
© ARGE HandinHand:
Marti Generalunternehmung AG,
BAM Swiss AG, BAM Deutschland,
wörner traxler richter Architekten,
HolzerKobler Architekturen

Pages 46 – 47
© Markus Diem (Drees & Sommer)

Pages 48 – 53
© Peter Neusser

Pages 54 – 57
© jessenvollenweider

Pages 58 – 61
© Martin Duckek

Pages 62 – 63
© Malte Vollmerhausen

Pages 64 – 71
© LOVE ARCHITECTURE
© HG Esch
© Werner Huthmacher

Pages 72 – 75
© everythingpossible – Fotolia.com
© Veniamin Kraskov – Fotolia.com
© MaxFrost – Fotolia.com

Pages 76 – 77
© Thomas Ott

Pages 78 – 79
© Deko Immobilien GmbH

Pages 80 – 81
© Michael Johann Dedeke

Pages 82 – 85
© thyssenkrupp AG
© everythingpossible – Fotolia.com
© peshkov – Fotolia.com

Pages 86 – 91
© Siemens AG, 2016

Pages 92 – 93
© kadawittfeldarchitektur

Pages 94 – 97
© Jens Weber

Pages 98 – 101
© Volkswagen

Pages 102 – 107
© Stadt Münster Wohn+Stadtbau GmbH
© Gemeinde Malsch
© Landeshauptstadt München,
Referat für Stadtplanung und Bauordnung
© Ministerium für nachhaltige Entwicklungen
und Infrastruktur (MDDI), Luxemburg

Pages 108 – 111
© LGS Eutin 2016

Pages 112 – 113
© apfelweile – Fotolia.com
© Projektgruppe SmartSite

Pages 114 – 117
© rendertaxi | werkteam Loreley

Pages 118 – 121
© Dr. Selim Tugra Demir (Drees & Sommer)

Pages 122 – 123
© A.Len Architect Bureau

Pages 124 – 127
© Biotest AG

Pages 128 – 131
© Hochschule Düsseldorf
© Tobias Vollmer

Pages 132 – 133
© Torsten Seidel

IMPRINT

Drees & Sommer SE
Obere Waldplätze 13
70569 Stuttgart
Phone +49 711 1317-0
Fax +49 711 1317-101
info@dreso.com
www.dreso.com