

White paper:

Smart high-performance buildings through integrated design technology

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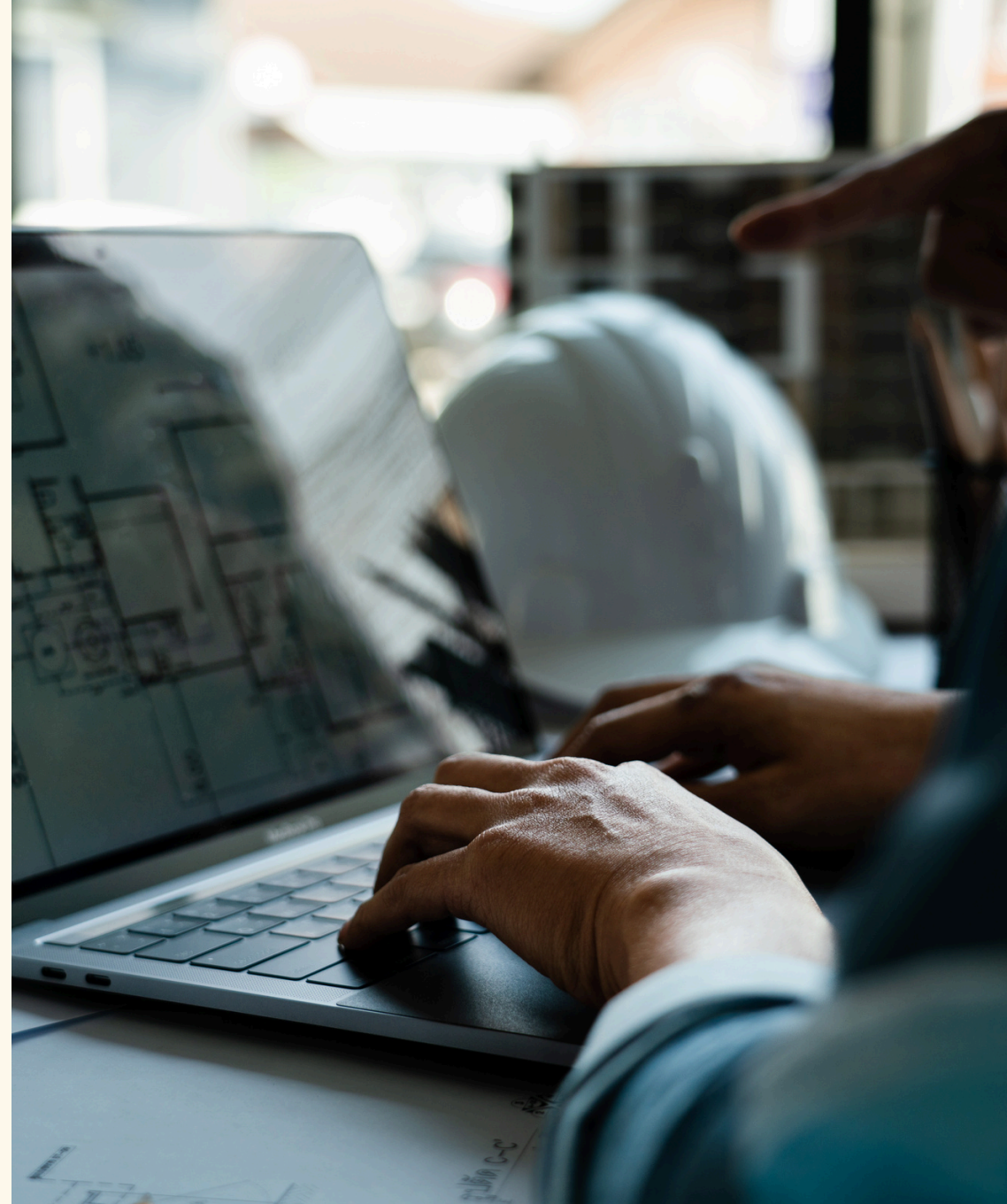


Take notice of Building Technology in a world of rising expectations

More is expected from buildings than ever before. Performance is crucial, as well as comfort for users. There is a call for buildings to support sustainability ambitions, and the desire for flexibility to adapt to changing needs. Buildings need to be cost effective - in construction, in use and in regard to maintenance. They may be required to provide a stunning landmark, standing out from the crowd. Construction itself may be subject to challenging demands in relation to speed or to avoid downtime in the client's operations while in progress.

The discipline that integrates these elements to meet specific needs is Building Technology. It bridges the gap between the architectural drawing and the technical detail needed for construction. By coordinating input from multiple disciplines and with a clear view of what is important for the client, Building Technology creates an optimal integrated technical design. It ensures the building is feasible and constructable, bringing in specialist knowledge of processes, products, materials and building methods. Because issues are addressed and solved before construction starts, the process is more efficient, saving time and money. The end result is better too, accurately reflecting the concept and quality intended by the architect. Users benefit from attention to technical details to ensure the building functions properly in respect of draft, moisture, cold, noise or excessive heat. The same is true in extreme situations or environments where, for example, safety in the event of earthquake or explosion is necessary.

This white paper uses case studies to illustrate how an integrated approach and early involvement of the Building Technology team is adding value in building projects.





Building Technology team brings complex plan to life in practical way

The new station at Ede-Wageningen in the Netherlands provides a good example of the role Building Technology plays in creating a practical and feasible solution for a complex project. The station is being upgraded and includes a new building and canopy over the platforms as well as a bike park, shops and entrance square. The aim is to create an eye-catching landmark which works efficiently and effectively for users. It involves many stakeholders and incorporates high ambitions for sustainability. Aspects of construction can only take place at weekends to avoid rail disruption.

At the heart of the concept is a 160m-long wooden canopy curving over the wooden platforms. Working with our architects, our Building Technology team converted the concept into a practical design while retaining the essential 'wow' factor. The roof consists of huge triangles suspended on different levels and visually separated, free from support columns and from each other. The technical design needed to make sure it was watertight and could be constructed and maintained without disrupting train services unduly. This has been achieved by making the triangles off site and lifting them in place using cranes. The choice of wood was important for maintenance, and the final design adapted to the climate, with part-glazing of the roof to limit direct sunlight. Rainwater is collected for re-use on surrounding flower beds. There is no natural gas at the station, and nearly 300 solar panels are placed on the station roof.

With so many functions in a limited space, it was vital to develop the design in an integrated way and to ensure it was feasible. For example, the foundation for the canopy is incorporated within the bike park. The bike route crosses the top of the bike park and commercial units. Another important area of collaboration was with our structural engineers to meet challenging demands for the retail units, while incorporating drainage and ventilation within the design.

The bigger picture - keeping operations going

Building Technology is involved with the technical design of the building and also with the constructability of the intended design. In industrial projects, this often involves planning to ensure production processes can continue with minimal disruption.

For example, we were involved in a project to futureproof cleaning operations at a pharmaceutical site and ensure they meet new regulatory requirements. It involved replacing a washing machine and carrying out a floor-to-ceiling upgrade of the cleaning room and its technical installations. To avoid disrupting production, the original machine needed to remain in operation while the new one was installed and validated. At the same time, the integrity of the clean zones needed to be maintained, while HVAC systems were upgraded, and wall tiles replaced with panels.

Our Building Technology team was involved at every stage from design and tender to negotiations with contractors, implementation, delivery and validation. The integrated approach, together with our deep knowledge of on-site processes and experience in similar projects, meant the work was carried out with minimal disruption and executed within stringent time schedules.





When speed is key, Building Technology helps mitigate risk and maintain quality

Building Technology occupies a unique position in building projects. It has an overview of all the disciplines involved and insight into the value drivers for the client. It means the team is ideally placed to ensure the project develops in the right way for the client. This is key for data centre projects, where typically the building is relatively simple, but the project complicated by other requirements.

Data centre design needs to meet local regulations and to eliminate risk of disruption from fire or water in line with insurers' demands. The design also needs to offer flexibility in the future should needs change. Once the project starts, speed is usually of the essence. The Building Technology team manages this process, ensuring risks are mitigated and that the buildings meet the necessary quality requirements, in spite of the urgency.

The importance of an integrated approach

An integrated approach brings together diverse building goals within a single design solution, often combining environmental goals with financial and social ambitions. A strong example is a data centre in Amsterdam, designed to support the city's ambitions to significantly reduce greenhouse gas emissions. Highly energy-efficient, the new data centre is integrated into the city ecosystem, supplying residual heat from its activities into residential homes.

This approach, bringing together input from many disciplines, is ideally suited to the increasing use of parametric methods for optimising building layout and performance. Such methods rely on a clear focus on the needs of the client and enable a project to be planned with input and outcomes based on a number of different parameters. With smart parametric tools, clients are able to explore many different scenarios and make better informed decisions.

Five top benefits of integrated design

- 1 Clients' detailed requirements and expectations are realised.
- 2 Future developments or changes are taken into account, saving costs in the future.
- 3 By gearing design to implementation, significant time is saved, problems in execution are avoided, and additional costs avoided.
- 4 An optional solution is provided for the lowest-possible lifetime costs based on client needs.
- 5 When used with parametric design and BIM methods, clients are able to make better informed decisions.





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Integrated solution enables transformation of a historic building

A 100 year old building in Delft has been transformed into a new office for Haskoning. To create an attractive, modern environment where people can meet and inspire one another, two large internal courtyards have been enclosed.

As the building is a listed national monument, it is subject to strict requirements. The new roof is supported by a structure positioned within the courtyard. A key technical challenge for our Building Technology team was how to connect the roof to the existing building in a way that is secure and weatherproof, while minimising impact on the historic façades.

This complex integration of old and new brought together multiple disciplines to address challenges such as rainwater, snow loads, drainage and fire safety systems. It is also where Building Technology added real value. The team resolved these technical challenges in a way that aligns with the architectural design and meets municipal requirements.

Balancing costs and benefits in search of carbon neutral solutions

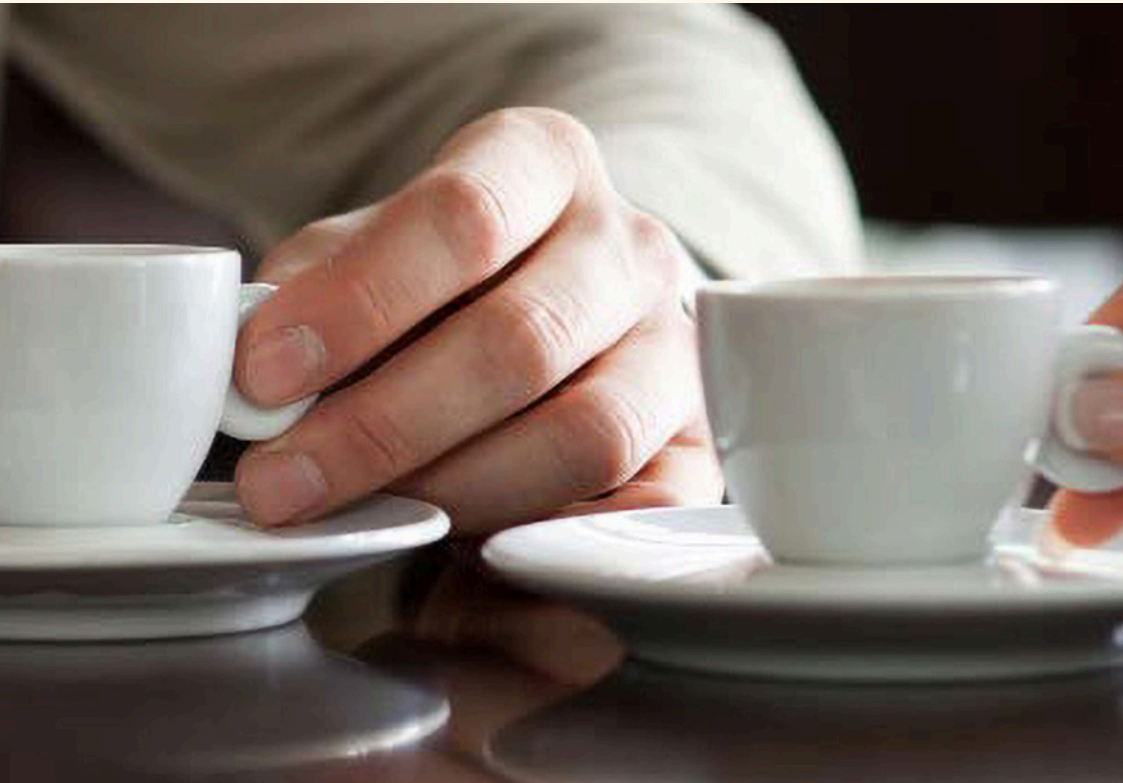
Clients are increasingly looking to buildings to help meet their climate neutral ambitions. As the natural overall design coordinator, the Building Technology team ensures these objectives are included in the project scope and can also address contradictions.

For example, lower energy consumption in a building typically requires more insulation. However, while that reduces ongoing consumption, the material brings with it embedded carbon. The mechanical, engineering and plumbing concept will also play a role in the efficiency for cooling and heating. By balancing costs and benefits, the Building Technology team plays a role in identifying the best solution for lowering carbon emissions.



Discover the value that our Building Technology team can add to your project

By guiding, coordinating and discussing your project with construction partners and advisers in all phases from design via building permit to implementation and realisation, our Building Technology team can significantly improve the quality of solutions and future proof them for the long term. To find out more, get in touch.



How can we help?

To find out more, get in touch with:



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