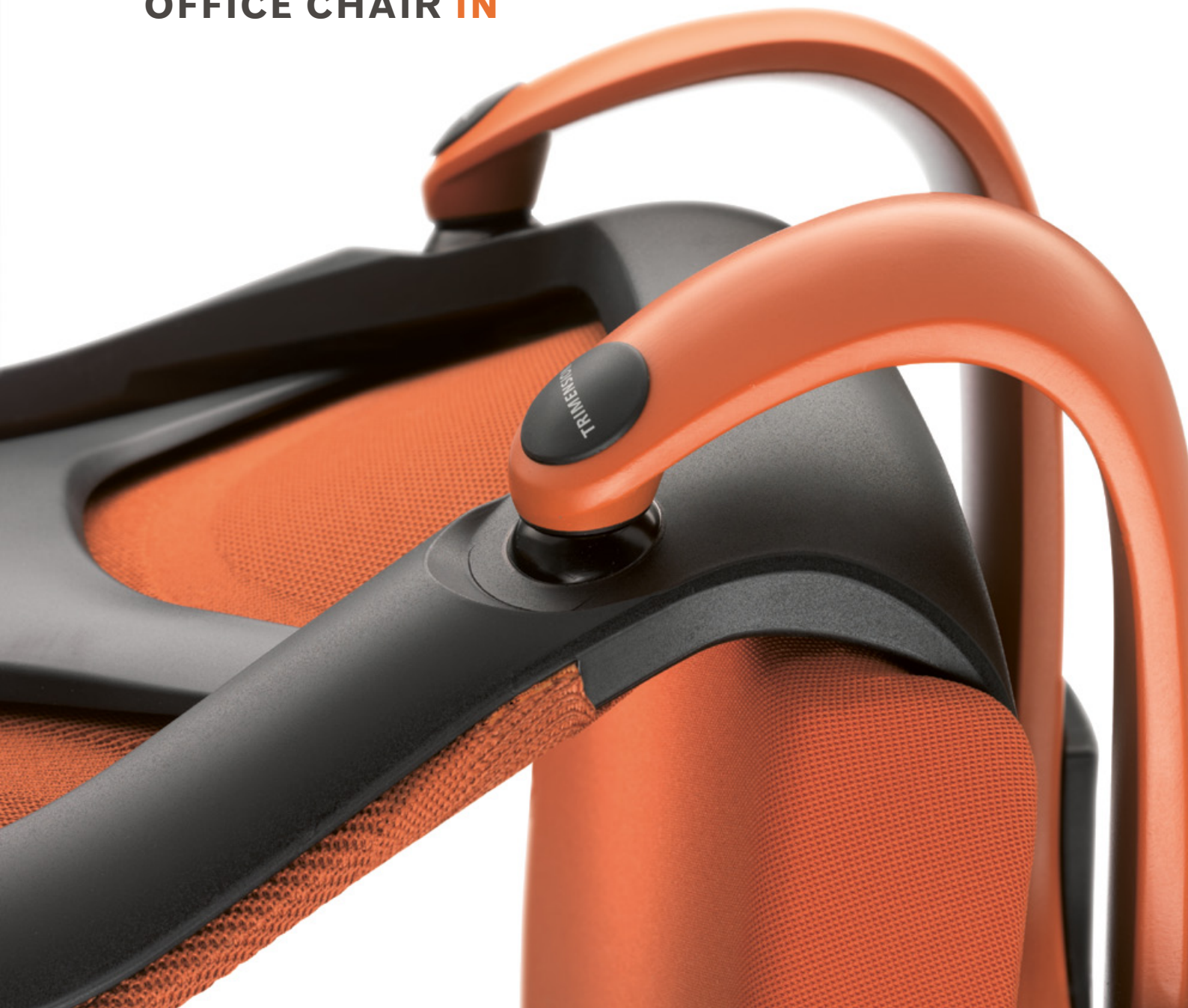


A magazine about form, function, purpose and value –

# designreport.

Special issue 1 | 15

MOVEMENT SPAWNS IDEAS  
TO PRODUCE WILKHAHN'S  
OFFICE CHAIR **IN**





Peter Wouda  
head of exterior design, Volkswagen Design Center, Potsdam

‘The features *IN* offers are truly exceptional. It’s a perfect fit with our approach at Volkswagen Design. Viewed from the back, this broad-shouldered chair conveys stability and from the front it’s understated and timeless. It suggests the kind of reliability and precision that we expect from our cars too’.





## Paving the way

**Human beings aren't built to sit or stand still. However, the majority of office spaces restrict any physical activity to a minimum. And the consequences are disastrous in psychological and physical terms. There's a pressing need to come up with less static, sedentary environments. Our special magazine reveals how to get the new, movement-based approach off the ground.**

Standing or sitting still are both considered to exemplify focus. Working in silence is also cited as the best way of boosting brain power. Since the early 20th century, frequently standing up from desks, or having to walk far to workspaces were seen as signs of inefficiency. But today's world requires exactly the opposite. 'Many office workers draw on knowledge to create ideas', comments Dieter Boch from the Institute for Occupational Research and Organisational Support in Anzing, near Munich. He goes on to say that most new ideas stem from interaction with other people. In other words, not while we're tied to our desks, but in break-out areas like office corridors or recreational spaces, in canteens, while waiting for documents to print, or taking a sip from a cup of coffee. We know by experience that if we're making no headway with a task it helps to change our posture, or walk around to gain a different perspective.

Psychologist Dieter Boch's report on the positive impact of (even very little) physical activity on our frame of mind is underpinned by healthcare studies on our physical condition too. People who get up more often have lower blood fat levels, lower blood sugar levels, both of which increase the risk of cardiovascular diseases and diabetes. They also have slimmer hips. Sports scientist Ingo Froböse goes a step further, saying: 'Sitting still is just as bad as smoking'. Froböse is Professor at the Centre for Health at the German Sport University Cologne and can back up his theory with figures: 'Each year 750,000 people across Europe suffer from pulmonary diseases. But 1.2 million are affected by illnesses caused by a lack of physical activity'. In a nutshell, to stay healthy and do a good job, office workers need to be more, not less energetic.

Consequently, ergonomists are demanding innovative workspaces that enable physical activity and foster interaction between people. And architects and designers need

to take up the gauntlet. New office concepts and innovative products help meet the challenge. By tackling areas like the dynamic office and dynamic sitting, Wilkhahn is a pioneer in the field. Back in the 1980s, Wilkhahn had already redefined traditional office seating with the launch of the *FS* chair by designers Klaus Franck and Werner Sauer. It features very efficient synchronous adjustment technology that raises and lowers the seat pan when users lean forwards or backwards. It also changes the angle between the seat pan and the backrest at the same time.

After a number of other phases and developments in the interim, Wilkhahn presented a revolutionary new, three-dimensional office chair called *ON* in 2009. The product is something of a triumph. Because *ON* encourages constant physical activity in the background which has a very beneficial impact on health, as scientific studies bear out. The principle on which the chair is based has often been emulated. However, its technology and design still have no equals. Many market experts consider it to be the best office chair for dynamic sitting today.

Due to its superior look, generous size and price, *ON* has primarily appealed to top managers and executives. However, Wilkhahn is now providing the perfect complement with its new three-dimensional office chair called *IN*. As *ON*'s little brother, *IN*'s bringing dynamic sitting with new technology to another market segment. It's a task chair with an athletic aesthetic for the medium-range in price segment. This magazine describes the fine-tuning, the processes, the materials, the designs and the skill involved in adapting this ground-breaking concept for a broader segment. It also highlights the opportunities *IN* offers for office environments.

Lars Quadejacob  
Editor

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Dieter Boch  
psychologist and managing partner of the Institute for  
Occupational Research and Organisational Support

‘*IN* follows your body with every move you make. And movement doesn’t just keep you fit, but also makes you more creative. The chair will play a key role in shaping a new working environment which we so urgently need in this knowledge-driven age’.

## IN – from top to bottom







- ① Broad shouldered: the backrest's generous size suggests assurance and comfort.
- ① Under wraps: the lumbar support added to the cover is kind to backs.







- ① Hip-shaking: the fluid transition between the swivel arms and the seat shell is a key feature of the chair.
- ① Room to manoeuvre: the armrests are positioned far apart and towards the rear, they look comfortable in the double-ply Formstrick version too. The position and slight rise to the middle of the five star base arms are both attractive and offer high levels of functionality.
- ① Favourite spot: the seat pan tilts slightly forwards and grows five centimetres longer if part of the front is unrolled.

- ① Strong backing: the height-adjustable lumbar support, optionally integrated in the frame, symbolises extra stability and control. *IN* backrests come in light grey, turquoise, teal, red, orange and black.
- ① All buttoned up: the socket joints reveal the chair's three-dimensional capabilities or in other words TRIMENSION.







# Time to get moving

**According to Ingo Froböse sitting or, more precisely, sitting still, has taken over from smoking as the biggest risk to our health. In this interview, the health researcher (and professor at the German Sport University Cologne) explains the connections between our all too 'sedentary' everyday working lives and the resulting dangers for our health – and points out some new ways to organise the office.**

## Interview: Kai-Uwe Scholz

**Professor Froböse, sprawling around on your office chair is frowned on – even if only for reasons of etiquette. Would you agree?**

No, I think that's wrong. The body wants to move. And it's perfectly all right for etiquette to take a back seat to biological and physiological functions now and again. It's okay to sprawl. Even at the office. And it's fine to put your feet up on the desk from time to time as well!

**To make yourself comfortable?**

No, to stimulate venous return and get the entire circulatory system going again. We sit far too much in general ... **... and start jiggling our legs when we find ourselves in cramped or claustrophobic situations!**

Exactly! Anybody who fidgets and shuffles his feet under the table is actually doing something very healthy: he's getting some exercise. And it's a good idea to put a wobble board or twister plate under the desk too – it's great for reflexology. Our motor restlessness is a result of evolution.

**In what way?**

Human beings are made for ten to twelve hours of physical activity a day. But we don't get anything like that much exercise.

**Probably because people try to optimise the way they work and avoid unnecessary exertion!**

Obviously people have always strived for convenience in order to economise on calories, which used to be in short supply. But nowadays, this convenience mindset comes at the expense of our physical agility. The desire to lighten our load has long since resulted in us being so under-stimulated that we're virtually comatose.

**In the 1920s, architect Schütte-Lihotzky designed the 'Frankfurt Kitchen', in which all the equipment and furnishings were grouped around the user, and today's office workstations are based on the cockpit idea, where everything is supposed to be within easy reach. Isn't that an optimal organisation principle?**

Technology has replaced too much of our activity, we don't demand enough of ourselves anymore. Nature simply couldn't have foreseen that we'd end up being able to survive by moving nothing more than our fingers.

**But what's so wrong about this approach to organising work? It actually seems to make very good sense.**

By clustering my work situation around a chair and table and automating sequences of movement, I deprive my biology of stimuli. But human beings live by reacting to stimuli. Technical developments are progressing so rapidly that the human organism can't keep up. You could say evolution hasn't had time to adapt to the inventions of Schütte-Lihotzky or Bill Gates yet. When it comes to the evolutionary history of humans, 90 or 15 years are nothing. And the gap that's opening up worries me.

**What are the consequences?**

We're damaging our health! In the mean time, physical inactivity has become the biggest risk factor of all. Not to put too fine a point on it: sitting still has taken over from smoking. Whereas some 750,000 Europeans die of lung disease every year, illnesses caused by lack of exercise are claiming around 1.2 million lives.

**Are those verified figures?**

There are even studies by WHO, the World Health Organisation, that back them up. Sitting still on a daily basis is an independent risk factor.

**So what can be done about it?**

We have to get people moving again. And I don't just mean sporting activities in the evening.

**Why not?**

Because not even an after-work fitness programme can compensate for long phases of physical inactivity during the day. Just two hours of sitting motionless at the computer are enough to ensure that basically only the brain is well supplied with blood, whereas numerous other bodily functions are shut down to such an extent that the rest is inadequately supplied – it's not just the heart and circulatory system that suffer long-term damage, the muscles and cartilage do too. Being overweight is a symptom of this way of life and this work posture – but it's only one symptom.

**What does that mean as far as day-to-day life at the office is concerned?**

It has to be made more dynamic. The activity-hostile workplace situation has to be transformed into an activity-



friendly one again. Why do I have to have the printer, fax and preferably even the coffeemaker right next to my desk? And when you think about it, why should an office chair actually be on castors so that I don't have to stand up at all anymore? I know all these things are standardised nowadays, but that doesn't necessarily make it right. The more I make myself get up and walk, the better. Rather than expecting people to do fitness training in the evenings, we need to explore different paths. A more active office routine is the answer.

**So what steps do you yourself take?**

I've decentralised my office. I don't have the printer and fax at my desk, I make my coffee in the kitchen and I prefer to go and talk to my co-workers face-to-face rather than writing them emails. That's a lot more efficient too. And

by the way: both my desk and the conference table in my office are height-adjustable. I sit on a chair that moves in all kinds of different ways and like to stand up while I'm on the phone.

**Does that have a measurable effect?**

If I spend an hour sitting still, I burn about one gram of fat, whereas if I stand up I burn two grams. That means I can double my metabolic rate just like that. The more muscle mass that's active, and the more different kinds, the better the blood supply to the entire body. And the good news is that even relatively small changes have a big impact.

**How can that be verified?**

By examining transport and metabolic responses in the body. Moving makes you feel fresher too.



## ‘And the good news is that even relatively small changes have a big impact.’

**Does that mean the more freedom we have for physical movement, the more mentally agile we are too? Or to put it another way: is there a connection between creative sitting and creative thinking?**

We know that movement is THE major stimulus for the brain – more so and in a totally different way than Sudoku or a crossword puzzle. That’s because it doesn’t just encourage neurogenesis, i.e. nerve cell growth, it encourages the cells to interconnect as well. That doesn’t happen when you’re sitting motionless on the sofa.

**But on chairs it does?**

Yes – provided the office chair enables me to perform all the movements I can make while seated. We did a field study about it, and participants who used an ON chair, which permits movement in three dimensions, exhibited much better levels of concentration than those who sat on conventional office chairs.

**So it’s a chair that lets me sprawl out as well?**

For instance. What’s important is that it gives me as many degrees of freedom for my three-dimensional movements as possible whilst nevertheless providing support.

**What does that mean?**

Earlier attempts to bring more activity to office life resulted in people sitting on exercise balls, the complete instability of which was just too much for the body. We can’t concentrate on our work when we’re constantly trying to keep our balance. At the other end of the scale there are office chairs with umpteen levers and pads that don’t require the body to adapt at all; instead, they take over the body’s functions like a corset – which is precisely why they actually end up weakening it. What I’m suggesting isn’t just finding the happy medium; I want us to be dynamic.

**While we’re sitting down?**

Yes: if my muscles are in adequate condition, I don’t actually need that much help and support, theoretically I could even sit on a simple bench. It’s so uncomfortable that it automatically forces me to keep changing my movements and posture. But if I have to sit for too long, my office chair shouldn’t just provide me with plenty of opportunity to move, it should support me as well ...

**... just like the ‘dynamic sitting’ technology in Wilkhahn’s latest office chair developments ...**

... yes. We investigated that in depth as well. If body and chair interact intuitively without a cognitive act of will being required, we’re already a whole lot further. But having said that, I can’t hand responsibility for my own fitness and health over to some product. You can’t buy fitness and health: they’re things you have to take care of yourself. But good products can certainly help ease the rigid situation at the desk and ensure more ‘desk diversity’.

**Is more opportunity to move the most important thing?**

Well, obviously office chairs need to give me the stability and sense of security I need for tasks that require ‘dexterity’ as well – and that just so happens to include working on the computer.

**Besides the immediately obvious ‘ergonomic’ construction and the measurable effects you’re able to verify with your methods, does the appearance or the design of the chair play a role as well?**

Our bodies have various senses and analytical capabilities at their disposal. The visual aspect plays a part in that. It’s generally accepted that colours can create and influence moods, for instance. In the same way, the office ought to create a positive impression and environment – from the attractively coordinated overall look of the rooms all the way to the design of the individual items in them. 🪑





Martin Haller  
partner at Caramel Architects, Vienna

‘Sitting on *IN* is like a session of fun gymnastics. It’s an enjoyable, instinctive and cool chair. An experience that you don’t expect – and that’s exactly how we at Caramel Architects see our designs’.

# A brief history of dynamic sitting

Long before **IN** and **ON**'s arrival, Wilkhahn designers sought and found ways of introducing more movement to office life.

Author: Mathias Remmele

Way into the mid-20th century, ergonomics in the Western world were dominated by the theory that sitting upright and still was absolutely imperative. This forced posture was seen as a must, especially when sitting at dining tables and at desks. Correct, or rather proper ways of sitting, were practised in families and in schools and considered evidence of a good upbringing, good posture and good discipline. It wasn't until the 1950s that a different social climate permitted a break with these virtually unchallenged set of rules about the way we sit. New research findings had exposed inconsistencies between these unbending conventions, the way human beings' bodies are designed and their needs.



① Wilkhahn's dynamic sitting tradition began in 1955 with Walter Pabst's three-legged school chair that enables different postures.

① In 1971, a distinctive joint between the seat and backrest shell in task chair 232 allowed torsos to lean in different directions.

## Ground-breaking achievements and milestones

Designer Walter Pabst was one of the pioneers of the revolution in sitting emerging at the time. In the early 1950s he created a three-legged, wooden chair for children at home and in schools which was later called the *360 range*. It deliberately encouraged different postures – even ones previously thought of as sloppy and ill-mannered. While he was working on the design, Pabst talked to orthopaedists at the University of Kiel in Germany. They provided scientific evidence that proved that his ideas about sitting were on the right track. The product was manufactured between 1955 and 1959 (and reissued in 2009) but wasn't particularly successful, mainly because the market for school furniture wasn't yet ready for this innovation. But the underlying concept of making sitting a more physically active experience continued, especially at Wilkhahn. The products developed and marketed here since the 1960s are typical examples.







⊙ Designed by Nick Roericht, *Stitz 2* has been produced since the 1990s and is still considered a radical interpretation of dynamic sitting today.

⊙ Synchronous adjustment technology was used for the first time in the *FS-Line*. It was launched in 1980, but is still produced today and regarded as a milestone in ergonomic office-furniture development.

The 232 *task chair*, designed by Wilhelm Ritz and launched in 1971, has a swivel-mounted joint between its fibreglass-reinforced-plastic seat and backrest shells. This distinctive joint allows users to change how far their torsos lean back or forwards and to alternate infinitely between work-driven and relaxation-based postures. The *FS-Line*, developed by the two designers Klaus Franck and Werner Sauer and launched in 1980, allowed the principle of dynamic sitting to gain widespread acceptance.

The unitary, highly flexible seat shell made mechanical joints superfluous. And the synchronous adjustment technology, used for the first time, ensured that the backrest and the seat almost moved virtually in tune with one another. If the person sitting on the chair leans back, the seat follows accordingly by tipping backwards slightly. At the same time the angle of the armrest changes too to deliver perfect support whatever the posture adopted. The *FS-Line* was awarded numerous design prizes and quickly became an outstandingly successful product range. It has long since become a definitive piece of office furniture and is still in production today. Subsequent Wilkhahn office chairs, like *Modus* (1994), *Solis* (2002) or *Neos* (2004) have refined and honed these ergonomic qualities and translated them into another aesthetic.

In the 1990s, designer Hans (Nick) Roericht, a graduate of the legendary Ulm University of Design, came up with a radical concept. Based on his 'Ulmer Pulmers' from 1975, he produced *Stitz* which focused on making sitting a more active experience. The one-legged, height-adjustable piece of furniture is a modern-day version of a traditional milking stool. It supports our bodies, but requires us to flex your muscles if we want to keep our balance. It gets our metabolism going and teaches coordination skills. Fun and quirky *Stand-up* by designer Thorsten Franck is one of the latest models in Wilkhahn's portfolio. It's based on Roericht's principle and has been impressively modernised and enhanced.

#### **ON – state-of-the-art dynamic sitting**

After a five-year, extensive developmental phase, *ON* was launched in 2009. This task chair was a quantum leap in dynamic seating. This fundamentally new office chair doesn't just reflect the latest ergonomic-research findings, but also signifies a transformation in office environments. The tools we use to communicate and work with are becoming increasingly flexible. The doctrine of sitting still and upright has long been called into question and has now become obsolete at last. Creative work re-



⊖ The *Modus* range was launched in 1994. With its minimalist approach to materials it combines dynamic sitting with Wilkhahn's ecological design concept.

Ⓛ Developed by Thorsten Franck, *Stand-up* has been encouraging dynamic sitting in a playful and charming way since 2014.

quires freedom and stimulation – even when we're sitting down.

Therefore, *ON* was designed for maximum movement and flexibility from the outset. At the heart of this multi-award-winning chair is Trimension. This new, unique technology enables three-dimensional sitting. Trimension encourages us to alter our posture in any direction – forwards, backwards and sideways – while supporting our bodies at the same time. During the process our pelvis rotates, helping to stabilise the spine and therefore prevent back ache.

*ON*'s sophisticated technology delivers superb comfort. It flexibly follows any posture and encourages physical activity, in other words exactly what the findings of contemporary research into ergonomics advocate. Because movement simulates our muscles, gets our metabolisms going and makes us more productive. For a long time office-chair development was governed by the desire not to tax our bodies in any way and to provide corset-like support. These days ergonomists realise how flawed this approach was. Prof. Ingo Froböse (see page 12) from the German Sport University Cologne agrees: 'Chairs need to stimulate our







Ⓞ *ON* demonstrates its flexibility in a variety of settings. It's ideal for a prestigious conference room (Badischer Gemeindeversicherungsverband in Karlsruhe), or a private meeting space (management consultancy in Sydney) or a huge auditorium (NTT Data in Tokyo).



neurological systems and to encourage us to flex our muscles. And that's exactly what ON's three-dimensional movement options do'. Since its launch, many market experts have quoted ON as being the best office chair for dynamic sitting currently available. It has also become a popular and well-received product the world over. The exceptional functional aspects of the chair and its crisp design mean it can be used in a wide range of different settings. As a number of reference projects show, as a conventional chair in offices, executive boardrooms or in conferences, ON's a versatile choice in all sorts of places. Due to its high-quality, confident appeal it's also perfect for areas where a little more prestige is required. However, ON played its most spectacular and unusual role in a place you wouldn't normally expect to find office furniture – in a gourmet restaurant. 'Ultraviolet' is a restaurant run by French master chef Paul Pairet in Shanghai. It's currently one of the most exclusive gastronomic hotspots in this vast Chinese city. This eatery has caused a huge stir across the world. The excellent cuisine isn't the only thing that makes it remarkable. Food is presented as a multi-sensory experience with dry scent projectors and 360° wall projections. What's more, it's the ideal spot for a very comfortable chair like ON which activates all the senses too. 🌿







*Ultraviolet* is a restaurant run by French star chef Paul Pairet in Shanghai that styles itself as a multi-sensory experience with 360° wall projections, each matching the food on offer to stimulate all the guests' senses. *ON* is a welcome partner in this spectacular gastronomic concept.



# Successful moves

**In our knowledge-based society, multi-purpose workspaces and flexible working models are the keys to success and job satisfaction. And mental and physical agility are closely related. Occupational psychologist, Dieter Block, is calling for a shake-up of office environments**

Any modern office concept requires a fundamental change in workplace culture. It's essential to take a close look at and update typical furniture and management methods. Work has to be based on trust and devoid of rules that separate people into managers and their underlings. We're increasingly seeing our job as one of many areas in life that are inseparable from one another. Therefore, it shouldn't make any difference where we work or how long we spend there every day. It also shouldn't matter if we leave a meeting to call our children. The end result is all that counts. Trust encourages employees' ability to organise their day and work on their own initiative. Trust gives us room to manoeuvre, encourages new ideas and problem-solving. It also discourages our resistance to change. The structure of working processes and the architecture of the office building must reflect one another. Today's environments require offices with a market-place character, where people can connect and talk about issues outside their own subject areas. Sociological studies on creativity show that four fifths of ideas evolve during chance meetings. But learning and taking time out are part of working life. These interludes compensate for busy periods and are vital in keeping us healthy and productive.

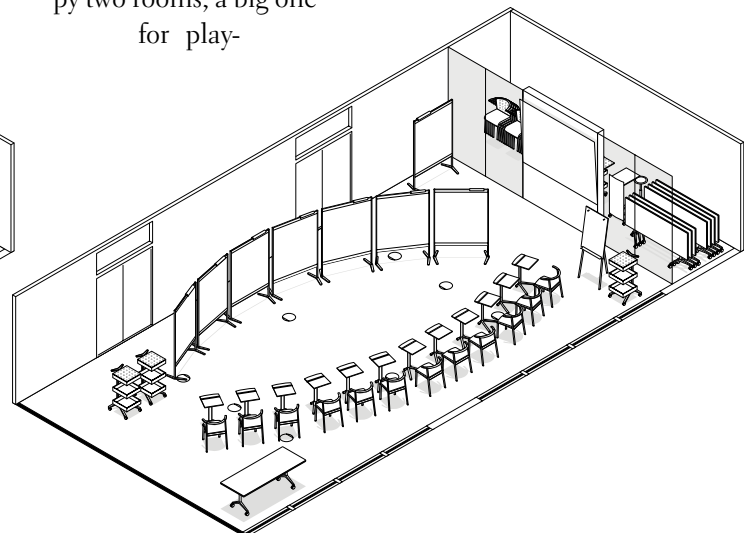
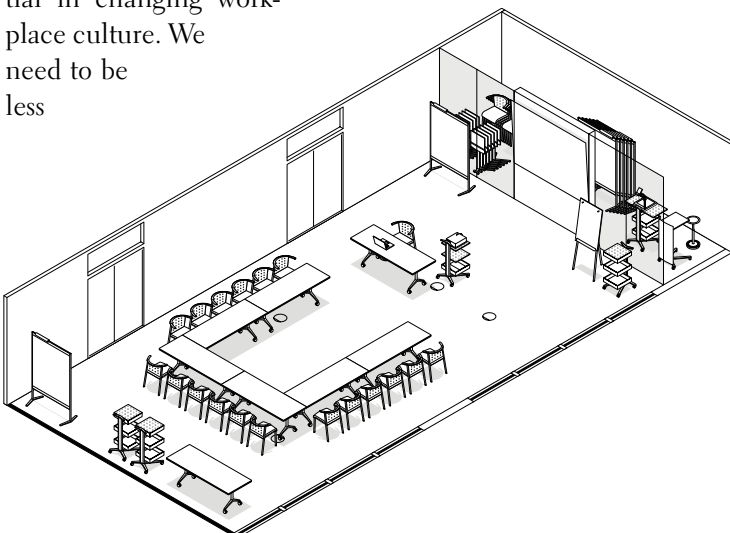
Boosting health by encouraging more physical activity is essential in changing workplace culture. We need to be less

desk-bound and incorporate as much movement as possible when going about our jobs. The benefits are obvious. In 2010, a study carried out on 4,700 people by biomedical specialist Genevieve Healy from the University of Queensland showed that those who got up the most frequently had the lowest blood-fat levels, the lowest blood-sugar levels and the slimmest hips. All of the latter heighten the risk of cardiovascular diseases.

Anyone liking the comfort of sitting at a desk will object and say that frequent standing up and walking any distance will make them less efficient. But that's a fallacy. Office staff don't do piece work. They're not factory staff, but knowledge workers. More than ever employers are under huge pressure to produce innovative ideas because it's the only way of coming up with new products and services. But that can't be accomplished by just sitting at desks. Ideas occur to most of us when we talk to colleagues in corridors or canteens, while waiting for documents to print, or over a cup of coffee. Getting up to make a phone call already gives us a different perspective. And gaining a new perspective is the key to innovation.

Kindergartens are prime examples of contemporary *working landscapes*. They have been enhanced over a long period of time as places with a focus on learning. They also nurture a culture of personal and social interaction. They usually occupy two rooms, a big one

for play-





Psychologist Dieter Boch is managing partner of the Institute for Occupational Research and Organisational Support (iajob deutschland) in Anzing near Munich, Germany. He spearheads the 'Flexible Office Network' and lectures on future working practices and workplace design at the University of Applied Sciences in Business in Zurich, Switzerland.



ing and learning in and a smaller one to stow away any furniture. The large room can be adapted to fit the purpose. For a sing-song the children put the chairs in a circle, or tables and chairs are set up for a painting session, or mattresses are placed on the floor if they want a nap etc. Children enjoy helping set up the room, can be their natural active selves and learn social skills.

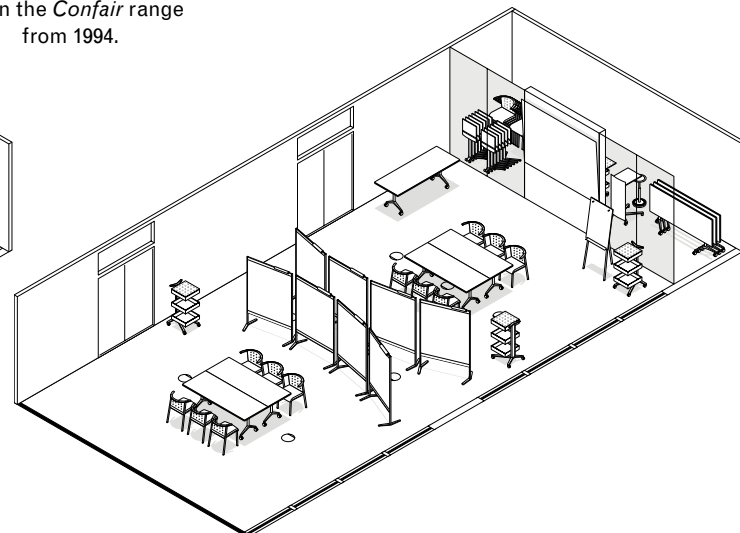
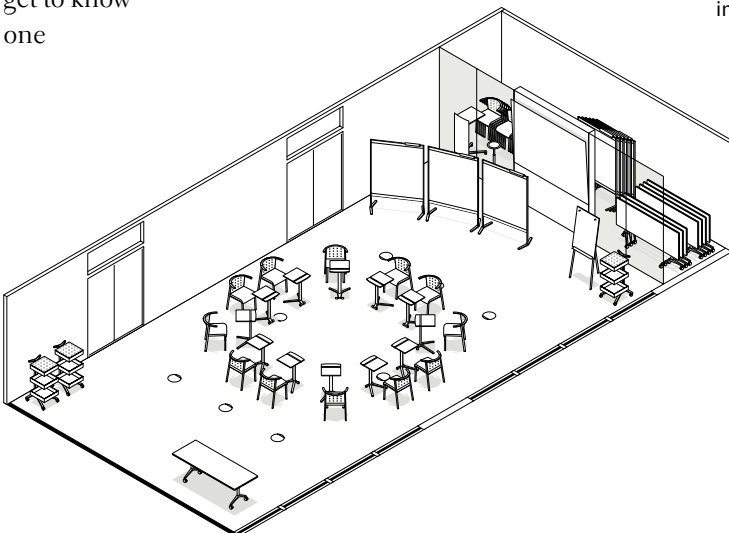
Workspaces and furniture should be just as flexible. Ideal are versatile tables for one person, or where several people can communicate with one another. It should be possible to extend, adjust the height of and tilt tables. Castors are practical so that several tables can be joined or nest into one another in a storage room when not in use. Chairs need to be flexible enough to accept as many postures as possible because the best posture's always the next one. Adopting another posture always means gaining a new viewpoint. While you're talking to someone, it shows that you're listening if you lean back.

A multipurpose workspace gives us the chance to become involved and include some physical activity. Movement isn't just healthy, it offers a new outlook on working requirements, broadens horizons and frees up space for new ideas. At the beginning of meetings, if attendees have to set up the tables, chairs, presentation materials and computers themselves, they get to know one

another better and hone their soft skills. The meeting is more beneficial as a result.

An American management maxim advises 'Building profit by putting people first'. Real practical skills are put to use that are generated when we engage with one another. If people are taken seriously, involved in shaping working environments and spend less of their time sitting or standing still, they're happier, healthier and more satisfied with their jobs. And in the end the work they do is more creative and more effective. 🚶

The idea of encouraging employees to take an active part in office life is the cornerstone of Wilkhahn's dynamic office-furniture concept, exemplified in the *Confair* range from 1994.



# ‘Physical activity planned from the beginning’

**Lars Klatte, partner at RKW Architektur & Städtebau, talks about modern activity-driven workspaces. And explains why responsible architects are justified in making people take artificially longer routes.**

In modern office spaces, we focus on employees who are nowadays becoming more and more nomadic and taking their workspace with them. But employees still lie at the heart of workspace design. Their operational ranges emanate in ring-shaped zones from desks in front of their screens. Their workspace includes adjacent areas, such as printers or photocopiers, a small kitchen or other functional rooms nearby. There might be conference or recreational rooms, event spaces or WCs beyond. And special areas even further away could include food and beverage facilities, a company kindergarten or gyms.

But how do we encourage people to be more physically active? When developing a complete office building, we can foster greater physical activity on the part of each office worker from the very beginning. For example, back in the 1990s with an office building (revolutionary at the time) for DB Cargo we placed the emphasis on maximum flexibility. We provided height-adjustable tables which were easy to move thanks to Teflon glides. As a result, staff members were able to adapt working conditions and styles to suit their current situations, for example with respect to

lighting conditions, or to communications needs. On a broader scale, we then provided different choices if people wanted to talk to one another. These ranged from the low lounge sofa to a high table that people had to actually physically go to.

## Creating visual contact and making routes longer

As a process in the building, movement and communication are just as important to us. By creating visual contact between the different departments and storeys, we cultivate communication between people. Empty spaces between storeys, or open stairwells to force people to take the stairs, play pivotal roles in the process. Successful examples are the ARAG high-rise building in Düsseldorf, the Debitel headquarters in Stuttgart, or the executive offices at EnBW City.

We’re also trying to encourage physical activity in other areas too. To achieve the goal, we’re making distances artificially longer. For example, at EnBW City we only linked various buildings with one another on certain levels. In other words, anyone wishing to reach the other building is forced to walk more and converge in a small space where they’re very likely to meet others. Consequently, we increase the likelihood of people meeting and talking to one another coincidentally outside the confines of their own departments.

Because even if the shortest path is the most convenient – it’s not always the best in terms of health nor is it in the interests of communication in modern office buildings. 🚶



Visual contact between storeys and departments in office buildings improves communication between personnel and open-plan staircases encourage more physical activity.









**‘Little’ brother?  
No way!**





⊖ Author Armin Scharf realises it's worth taking a closer look at how *IN*'s kinematic solution works.

**Fewer parts, new materials, new processes and integrated functionalities – the *IN* chair is innovative in many ways and a prime example of how engineering and design can benefit from one another.**

**Author: Armin Scharf**

**A**nother office chair? Given the size and complexity of the market, you'd think there's nothing left to say about the subject. But the choice of products continues to grow rapidly and every new model promises to be ergonomically superior to everything that has gone before. On closer inspection, however, these innovations usually only go as far as variations on certain elements of the form, individual details of the design or specific materials. Or, looking at it the other way round, office chairs are so similar in terms of their advanced level of development that design seems like the only way to create any obvious differentiation. What's more, the mechanisms in the chairs that enable them to adapt to users' individual needs often consist of standardised bought-in parts. In the office furniture industry too, it has become the norm for product development to be interpreted as a process that involves nothing more than selecting components from suppliers' shelves.

In 2009, however, Wilkhahn came up with a genuine innovation that redefined sitting as an active process that focuses on a combination of relieving strain and promoting movement. After investing five years in its development, the company presented *ON*, a premium-segment chair that moves in three dimensions and encourages the user to perform minimal movements of the pelvis (the body's centre of strength and mobility) without making him feel precariously balanced or tired. The movements it stimulates are modelled on walking – a kinematic principle that Wilkhahn calls Trimension. Besides providing a new sensation when seated, this approach also breaks with traditional ergonomic theories that aim to provide maximum adaptation and support for a certain body in a certain sitting



position. Trimension means three-dimensional, dynamic, non-stationary sitting – which prevents the degenerative changes in the body that can be caused by physical inactivity.

### ***IN* is like *ON* – just different**

Now Wilkhahn has come up with another Trimension chair: the *IN*. The company sees it as a counterpart to *ON* rather than an evolutionary development. So whilst the *IN* concept uses many of the insights gained from *ON*'s development, it nevertheless takes an independent path as far as its engineering is concerned. According to its developers, *IN* takes a different approach to achieving Trimension. That doesn't just apply to its kinematics but to its materials and appearance as well: *IN* looks considerably more athletic, more dynamic and younger than its 'big' brother. While the dimensions, classically modern looks and pricing of *ON* are mainly aimed at front offices and the upper echelons of the hierarchy – up to and including executive level – *IN* was developed as a task chair for the mid-price segment. This goal could only be accomplished by means of an independent engineering approach, a reduced number of parts, new process technologies and a different perspective on materials. As a result, *IN* manages to achieve the high standard of three-dimensional dynamics defined by the Trimension principle in a simpler but no less effective way.

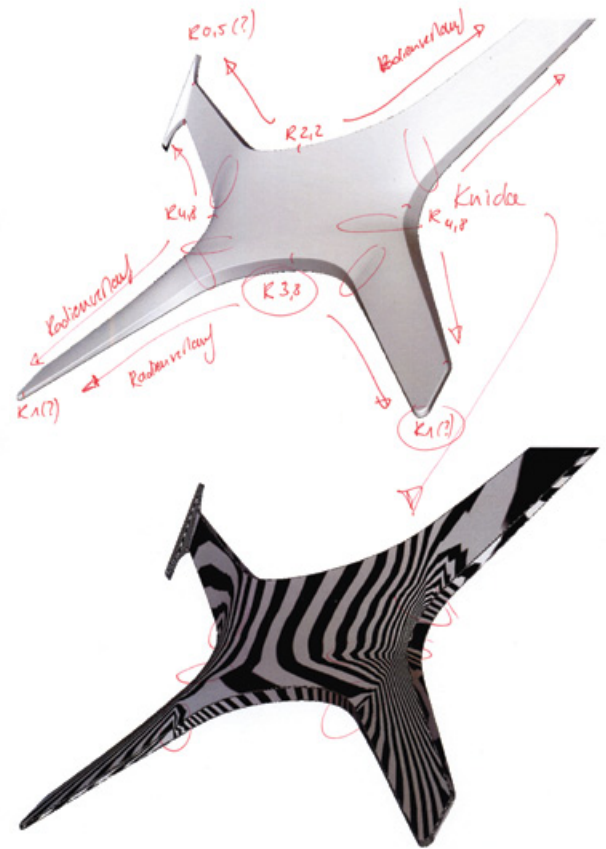
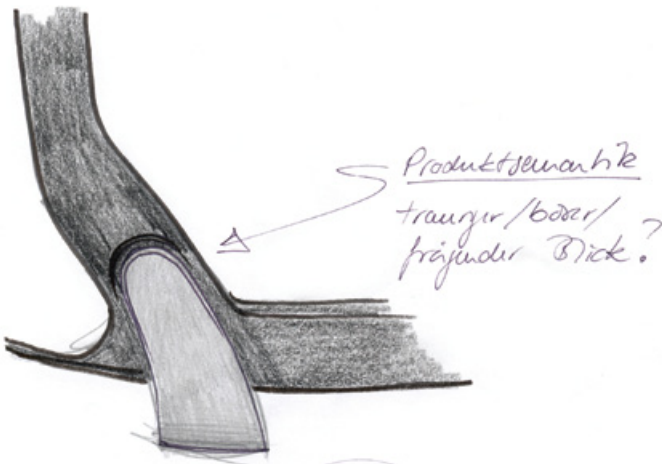
Preliminary designer Carsten Gehner, developer Henning Zöhner and the design team headed by Michael Englisch spent more than three years working on this new implementation of Trimension. Once again, it was Wilkhahn's legendary *FS* model with its flexible shell that

served as the basis for the development, especially when it came to the kinematics. Before that, however, the team used a rustic-looking steel platform to arrive at an approximate solution for the mechanism, which was then verified in combination with the *FS* shell – because *IN* owes its agility not just to its mechanism but to the elasticity of its seat and backrest system as well. But first it was a question of finding a solution for what is more or less hidden from view by the seat. The design of the mechanism is based on just a few elements: two swivel arms, the front assembly and a central spring.

### **The trial-and-error principle**

Ultimately, it is the two die-cast aluminium swivel arms that are responsible for the chair's agility – at the front, they are connected with the front assembly via an axle in the vicinity of the knees and then sweep backwards to end behind the seat shell at the height of the user's hip joints. However, rather than keeping the shell in a fixed position, these points of attachment keep it mobile by using ball





Initial studies for /N still reveal that the swivel arms have formal links to ON. The seat shell is only held by the two swivel arms at the back and the centre torsion joint at the front.

and socket joints. A torsion hinge on the front assembly keeps the front of the shell in position whilst nevertheless permitting rotational movement and three-dimensional tilting of the seat halves. And because the swivel arms can move independently of one another the seat, along with the backrest, can twist to the side as well – thus conforming perfectly to the Trimension principle. A central, conically shaped spring between the front assembly and swivel arms serves as a restoring force. The tension of the spring can be adjusted to body weights of anywhere between 45 and 140 kilograms simply by turning a knob. This relatively simple mechanism serves two purposes: it is in line with the principle of using as few parts as possible and responds directly to the dynamics of the user's body. The fact that the pivot points are geared towards the body's movements

precludes any distracting relative movements between the seat and backrest, thus preventing annoying 'shirt-pull' or 'shirt-push' effects. At the same time, the complete synchronicity of every movement made and every posture adopted makes a significant contribution to *IN*'s high level of comfort.

After developing and checking this kinematic principle on the steel dummy, the Wilkhahn team took it to the next level, refined its look and feel and topped it with an *FS* seat shell. Only then was it possible to test whether and how the mechanical solution actually meets the requirements of dynamic sitting. Because despite the computer-based development phase, it was essential to put the dummies through the trial-and-error process. What's more, the quality of the innovation would probably not have been







⊖ *IN* evolved from a rough steel dummy to a modified *FS* chair to the perfect product.

⓪ *IN* doesn't need an extra lumbar-support component, as the backrest's mesh fabric does the job in the right places – which was the concept in these early developmental stages already.

feasible had it not been constantly optimised on the basis of the physical object. That also applies to the second key aspect of the design: the seat shell with integrated backrest frame.

Its ability to deform – the key feature of this component – could be simulated and determined by means of complex calculations based on the finite element method, but here too it was apparent that a series of concrete tests was the only way to ensure a reliable interpretation of the results.

### Highly integrated components

It took a good year of testing to find the optimal dimensions for the shell and backrest frame: ‘An elaborate process involving a lot of loops,’ according to Carsten Gehler. That’s hardly surprising in view of the fact that the shell was to be rigid yet capable of deforming – but obviously only within a predefined range rather than at random. Designed as a complex, one-piece injection-moulded element, its controlled flexibility is the result of a lengthy modification process: in collaboration with the specialised external producer, the team repeatedly fine-tuned the positioning of the internal ribbing, the thicknesses of the walls and the distribution of the glass-fibre reinforcement. All with the aim of reducing the number of parts and creating the shell and backrest frame as a single piece. As a result, the choice of materials was based on extensive research with forays into other areas of industry. The seat and backrest element, for instance, is the first case where Wilkhahn has used two-component technology for injection moulding. This process is normally used to combine low-grade plastics with a high-quality surface finish. In this case, however, the partial addition of glass fibre serves to integrate different degrees of rigidity and elasticity within a single component that has a totally homogeneous surface. The additional lumbar support also consists of a high-tech plastic that is otherwise mainly used for structural elements in the vehicle industry. The thermoplastic elastomer is highly flexible and can tolerate a high number of load changes without fatiguing – precisely the right properties for a hard-wearing, height-adjustable lumbar support. Besides controlling its deforma-



⊕ The technology is based on the two aluminium swivel arms which act on a central, conical and adjustable spring.

⊖ Tests above and beyond the standard require the seat shell to withstand 400,000 stress cycles with testing equipment especially developed for Trimension.





① The ribs on the lumbar support, made of high-tech plastic, follow the lines of force and ensure that it returns to its original shape when in a relaxed state.

① *IN*'s components work hand in hand; here the bellows around the knob to change the spring tension are a mix of hard and soft areas in one.



Fundamental design decisions at Wilkhahn are a matter for the boss. In an interview, President Dr Jochen Hahne (on the left) tells designreport's editor-in-chief Lars Quadejacob that he was involved every step of the way with *IN*'s three-year development.



tion, the fine ribbing on the inside of the component also reduces the amount of material required. By the way: the lumbar support isn't actually necessary as the varying densities of the mesh back already provide sufficient support. However, it is used in order to comply with the standard governing the height-adjustability of backrests. Besides its striking good looks, the three dimensional knitted polyamide textile also performs an important function and is thus another vivid example of the chair's highly integrated design. Produced from a single piece of fabric, the mesh features welted edges that are inserted into a groove around the back of the frame, making it easy to replace should the need arise. Finally, *IN* is also designed to offer the best possible ecological prospects – it uses smaller quantities of materials, is designed for long service – which includes reparability – and, wherever possible, is made of mono-materials that can be easily separated for recycling at the end of its useful life – criteria that have been standard at Wilkhahn for the last 25 years. With *IN*, the mechanism concept, the processing technology, the quality of the materials and finishes and a design that has been fine-tuned right down to the last detail merge into an independent and totally new look that mirrors the key innovation: maximised seating dynamics with minimal strain. Just like in the automotive industry, where breakthrough innovations initially take hold in the top-end segment and are then successively scaled down based on the experiences gained, Wilkhahn has succeeded in transforming the groundbreaking seating dynamics of *ON* into a solution geared towards a broader group of users: the new *IN*. 🌱







**Rigid  
yet  
deformable**







**There's more to Trimension than just the mechanics – in the case of *IN*, the principle only works in conjunction with the combined seat and backrest. Flexible yet rigid, the big, one-piece injection-moulded part is a high-tech component that genuinely deserves the name.**

**Author: Armin Scharf**

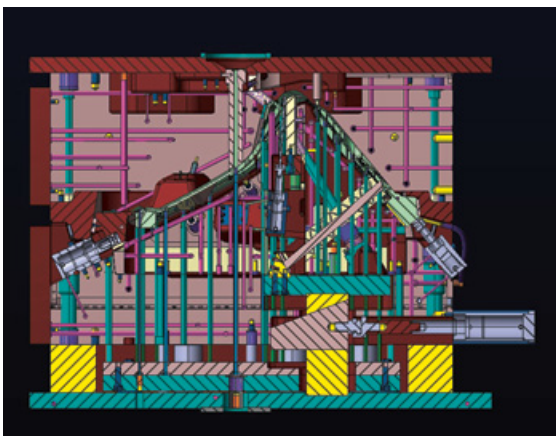
**I**t weighs 2.8 kilograms and is injection-moulded in a one-shot process – the mere dimensions of the combined seat shell and backrest frame are challenging enough in themselves. But this particular part of the *IN* chair – which, in the finished product, is largely hidden by the seat cushion and mesh back – testifies to the intelligence of the developers involved in other ways as well. Their brief: to come up with a shell and back which, in line with the Trimension principle, are capable of deforming but nevertheless rigid enough to support the body's dynamic sitting posture. A contradiction? Only at first glance: the different properties are required in different areas of the component. However, that doesn't necessarily make the solution any simpler because the big seat shell and backrest were to be produced as a one-piece element – an approach that is both efficient and economical.

There are various ways of tackling these requirements with injection moulding technology – by for instance partially increasing the thicknesses of the materials and incorporating bracing elements. This allows the mechanical properties to be varied to a certain degree – although not to the extent required by the highly dynamic *IN*. The other option is to work with two materials. Although in principle this two-component injection moulding process is not new, it tends to be used for smaller products – like toothbrushes with soft-grip handles.

But the backrest shell of *IN* is obviously in a totally different league – especially as it was to be produced with just one gate and the shortest possible cycle times. The combination of materials is anything but simple too:

*Nylon 6* serves as the basic material and is used both in its pure form and with a high proportion of reinforcing glass fibre – the latter in places where greater rigidity is required. Obviously the two materials don't flow into the parts of the mould where they are needed all by themselves, which meant conducting extensive simulations, analyses, test shots and optimisation loops. Wilkhahn's developers spent about a year varying the many process parameters in order to achieve the required shell construction. In collaboration with a company that specialises in injection moulding and usually produces high-end products for the automotive industry, the team eventually succeeded in establishing a consistent process. This involves injecting the *Nylon 6* component first, immediately followed by the glass fibre-reinforced component under high pressure – their distribution in the complex mould, which is equipped with a great many slides, corresponds precisely to the loads the component is subjected to. In addition, there is ribbing inside the seat shell that helps improve stability and reduce weight – because less mass means smaller amounts of materials, lower transport costs and more convenient handling.

In actual fact, along with the new mechanism, it is the seat shell that constitutes the key innovation behind *IN*: without this masterpiece of process and materials engineering, it would have been quite simply impossible to create the chair in its current form. And whilst the user doesn't actually see all this because it is concealed beneath the visible comfort layer, he very definitely feels it. 🍷



① Diagram of the highly complex injection-moulding tool.

② How 2.8 kilos of polyamide disappear. Pure *Nylon 6* is injected first, immediately followed by the fibreglass-reinforced component for the more rigid parts of the shell.





**Edgar Itt**  
motivational coach, bronze medal winner  
in Seoul 1988 in the 4×400 metre relay

‘I’ve always loved sports. From way back in my childhood to my career as a top athlete. Nowadays, I spend a lot of time at my desk, so I’m happy to have a chair that mirrors all my movements. It allows you to move your pelvis, just like you do when you’re running hurdles’.





## Quality is always an experience

**How do you visualise the freedom of movement and dynamism you get from an office chair? Designer Michael English reveals which details of the new office chair IN translate its aesthetic and functional qualities into particularly striking form.**

**Interview: Kai-Uwe Scholz**

**designreport:** Mr English, what comes to mind when you think about the look of your new office chair *IN*? Michael English (laughs): Broad shoulders and a narrow waist.

**That's an ideal more usually applied to the human figure. What does it have to do with an office chair?**

The relatively wide dimensions in the upper part of the backrest convey a sense of comfort and security to the user at visual level – it's pretty much the same effect as a wing chair. The silhouette tapers down towards the pivot points and where the backrest merges into the seat, which cre-

ates a sense of lightness and elegance. It's this central area with the two swivel arms that contains the main element of the chair – the flexible mechanism that's responsible for its three-dimensional movements.

**Rather like the human hip. So do form and function make a happy couple?**

When design does its job: yes! Although *IN* is narrower than its 'big brother' *ON*, it still has an extremely comfortable look and feel. Both chairs make you feel as if you're sitting in them rather than on them, rather like an armchair. We want to convey what we've achieved with Tri-



⊖ Kai-Uwe Scholz (left), Michael Englisch

mension at visual level too – i.e. optimal freedom of movement in three dimensions combined with secure, steady posture.

#### **So what's the crucial feature?**

It's the shell and backrest frame combination that yields to the body's movements that makes the chair so very mobile. It's made of a two-component material: highly flexible plastic guarantees the necessary flexibility. And the glass fibre material that is embedded in certain parts of the seat during the production process provides stability in all the right places. This enables us to achieve stability and flexibility in one and the same component. *IN* fits like a glove, yet lets the user keep changing his sitting position. With *IN*, there just aren't any 'wrong moves'.

#### **What else is special about *IN*?**

Basically, its appearance says it all: because of its smaller format and organic forms, it fits in with any setting – it even looks at home in the modestly sized offices you find abroad, and especially in Asia. The product even works in a home office. Because the design vocabulary is organic rather

than angular, it conveys a softer look and feel that's equally attractive to men and women. At the same time, *IN* adds an athletic, modern touch to the everyday working environment.

#### **How did you manage that?**

For instance by coming up with a slender, frame-based design for the backrest. There's also an optional adjustable lumbar support shaped like an X lying on its side, which means we comply with national and international standards and classifications. But we also incorporated exactly the same supporting structure into the cover, which is made of form-fit knit.

#### **What's form-fit knit?**

It's a knitted cover with varying densities and thus an interesting alternative to a mesh-covered back.

#### **Why's that?**

Whereas mesh fabric has a homogeneous structure and the same elasticity all over, form-fit knit doesn't just perform various static functions by means of its varying den-

sities and reinforcements, it makes those functions visible too. *IN*'s covered backrest supports the full load all by itself, yet it's so slender it reminds you of the strings of a tennis racquet ...

#### **... whereas *ON* had a compact backrest that made it look heavier.**

Yes. *ON* really is quite a bit heavier. More like an armchair than a chair. And it's modern in a more classic way as well. But *IN* is also available with a two-layer backrest that has a 20-millimetre-thick layer of foam in between and angled lines of stitching above and below the lumbar support. That's also very comfortable, but as compared to the single-layer form-fit knit it conveys more luxury and doesn't have the lightweight look of a tennis racquet or a sports shoe anymore.

#### **Nowadays racquets and sports shoes are produced in all sorts of colours. Does the same go for *IN*?**

The basic model comes in black, light grey, turquoise, red and orange – colours that give *IN* a fresh, cheerful look. Coordinating the frame colours with the colour of the backrest cover is new for office chairs. But we can also combine the covers with other seat fabrics from the Wilkhahn collection or pad the chair as required. If a customer wants the chair in black and red or his corporate colour, he can have it.

#### **And leather wouldn't work?**

That would kind of contradict *IN*'s athletic, lightweight character. By the way: the flexibility principle is also reflected in the optional seat depth adjustment feature, which allows the seat to be lengthened or shortened by up to five centimetres.

#### **And how does that work?**

By means of two sliders on the sides of the seat that allow the front edge to be rolled up or extended. The way the seat depth adapts to different thigh lengths is wonderful for people who are particularly tall or short – with a conventional 'flexible' office chair, all they can do is push the seat forwards or backwards.

#### **But that's not the highlight of the design!**

No, for me the real highlight is on the back of the chair, where the two swivel arms merge with the seat. There are ball-and-socket joints that are embedded in the glass fibre-reinforced parts of the seat shell and screwed into the swivel arms. That kind of connection is always a very demanding design challenge. We came up with an extremely neat solution for this area of the chair – and not just in terms of the engineering. It looks great as well – even including the way the edges are finished. In the same colour, the backrest frame and swivel arms look as if they're

made from a continuous, single piece. There's nothing additive about *IN*'s design. On the contrary: it's based on a highly integrative concept. That's why the two central joints in the middle, where the backrest meets the shell, are marked with buttons with the word 'Trimension' on them to visualise the chair's incredible agility.

**You're evidently very proud of it.**

And we're also proud of the harmonious proportions we came up with for the backrest and seat (including the forward tilt mechanism, which can be activated as required). Or the fact that the armrests are an organic extension of the swivel arms and are attached as far back as possible so

that they permit freedom of movement rather than obstructing it. But ultimately, every single element of the product is a translation of our philosophy: sit and move however you like – we've got the right chair for you. It's called *IN* or *ON*, is steady, looks attractive and feels good whatever position you choose – a chair that permits 3D sitting at its best. It's that simple.

**And is there anything you'd like to say about the base?**

Oh yes. You might think one five-star base is very much like another, but with *IN* we upended the rectangular cross sections of its arms ...

... whereas with *ON* they're horizontal.



⓪ A remarkably simple solution with piping to attach *IN*'s backrest cover.

⓪ An impressive result. Carsten Gehner (on the right) in charge of product development, explains the technical concept behind *IN*.

⊖ Different levels of elasticity can be integrated into fabrics made of form-fit knit, to aid lumbar support for example.



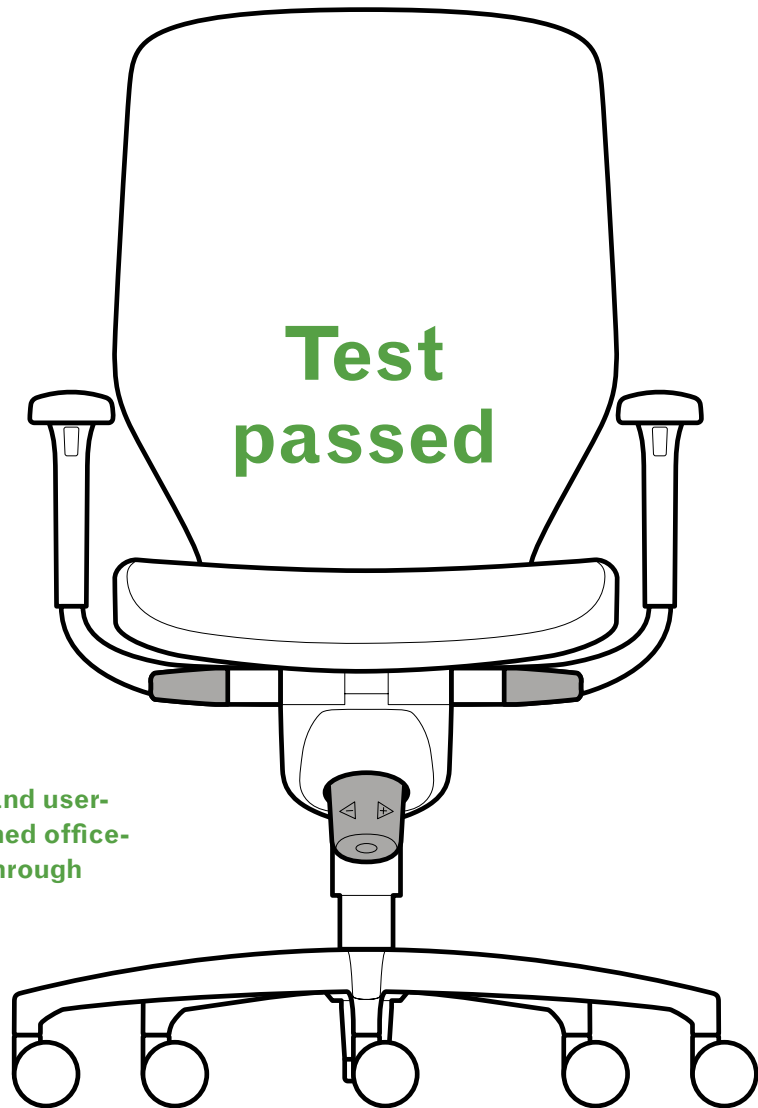


That's right. But this solution looks a little lighter and is structurally efficient too. The individual arms also rise slightly towards the middle of the base – which looks more dynamic than if they were totally flat.

**So it's not just carefully calculated from an engineering perspective, the aesthetics are very deliberate too. Is that what makes the individual qualities of the product merge into such a harmonious overall quality?**

Quality is the result of paying careful attention to every single detail of the design as a whole. And ultimately, quality is always an experience. 🚫





**When it comes to range of motion and user-friendliness, internationally renowned office-chair expert Levent Çağlar put IN through its paces. Here's his test report.**

### What does the *IN* chair aim to achieve?

The *IN* task chair follows in the footsteps of the *ON* chair in delivering three-dimensional movement. It does so more simply and less expensively. In terms of design, the three-dimensional motion technology is not as apparent when you look at the chair as is the case with *ON* – which *IN* doesn't look like.

The standard *IN* chair comes with adjustable seat height, chair tension, lumbar support and armrest height. The backrest can be locked in an upright position or left free to recline with or without forward seat tilt. Optional functions include additional height-adjustable lumbar support, seat depth adjustment and 3D armrests.

### Three-dimensional movement

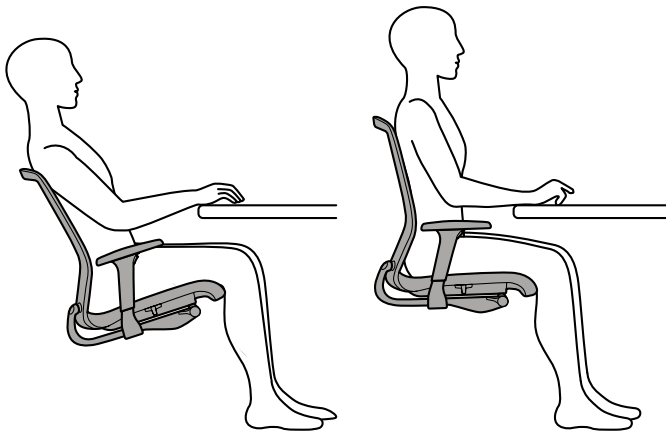
The human body is designed mainly for walking, not for sitting for long periods. When walking, you move the joints and muscles around your hips and pelvis in three dimensions. The Trimension three-dimensional movement of the *IN* chair promotes movement of the same joints and muscles. The movements you can make in the chair are smaller in amplitude than would be the case if you were walking. However, you can move each hip in three dimensions, up, down, forwards, backwards, to the left

Ⓞ Ready to go with just three controls for adjusting the height, stopping tilting or activating forward tilting, as well as the distinctive knob to set the counter pressure.

and to the right. These movements cause your spine to change position. But the movement of the backrest, with its good pelvic support, prevents your pelvis from rotating backwards and stops you from slouching. The backrest also maintains synchronised support for your lumbar and thoracic regions with every move you make.

The human body needs to keep moving so that its joints and muscles stay in tune and its metabolism is stimulated enough. Movement improves blood circulation and oxygen intake, both of which increase concentration and alertness with consequent benefits to mental and physical work. A static posture places strain on a particular group of muscles. These quickly become fatigued and make you feel tired after a while. Changes in posture allow time for groups of muscles to recover and prevent you from feeling tired. Once the *IN* chair tension is correctly set, Trimension motion allows you to make micro-movements in three dimensions almost effortlessly while maintaining constant back support. As your body wants to keep





⊖ The backwards tilt, increasing the opening angle while lowering the seat pan at the same time, is perfectly in tune with bodies.

moving, it will make these micro-movements without you consciously needing to think about them, so you will continue to feel comfortable.

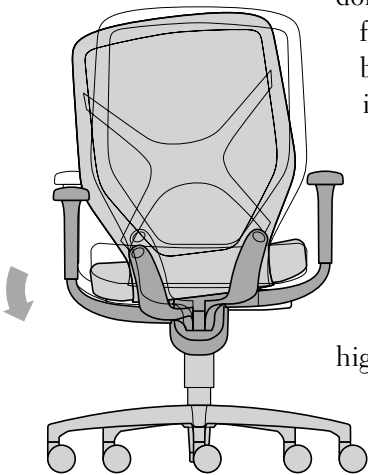
*IN* feels most dynamic when you engage the forward tilt option. If you do lock the backrest, you lose the dynamic benefits of the chair but the generous waterfall still permits you to open the angle a little between your torso and thighs.

### Using forward tilt

If you want to sit upright or lean slightly forward while working at a computer, the forward tilt lets you stay more alert by widening the angle between your thighs and torso, so you can open up your chest and increase your oxygen intake. You need to put the tension on a harder setting so that the backrest will stay with you and you can adjust the tilt with little effort. If you do this, you can easily tilt forwards to the angle you feel most comfortable with, using just a small shift of your body weight. You won't have to press your feet onto the floor to stop you sliding forwards. As the seat has a very downward sloping front edge that provides a generous waterfall effect, you

don't need to tilt the seat very far forward to achieve a comfortable open angle. In forward tilting positions, the full length of the backrest will always stay in contact with you, providing good lumbar and thoracic support. To use the forward tilt effectively, you need to raise the seat height slightly higher. If you then want to get as close as possible to the desk, the armrests may not go low enough to slide under the desk, so you will have to opt

for armrests with sliding arm pads. If you set the tension correctly, you really don't need to lock the backrest to work comfortably in upright or slightly forward-leaning postures.

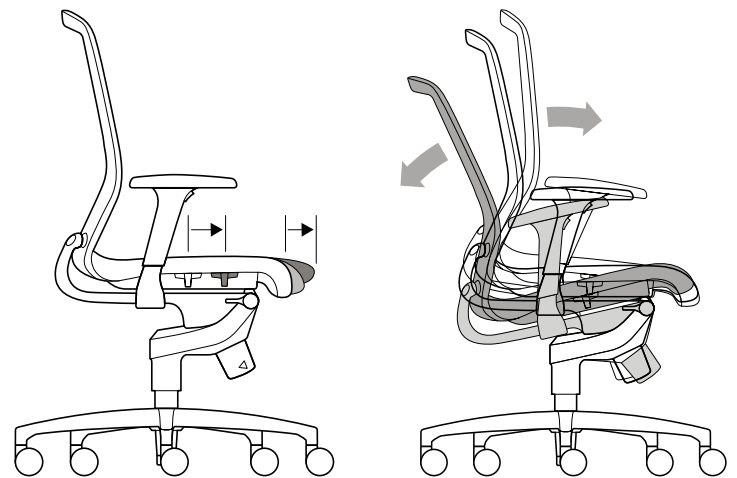


### Usability

The levers operating seat height and tilt are fairly easy to reach under the sides of the seat, but the armrests can get in the way. As a result, depending on arm length you might have to lean sideways to reach around them. You need to practise with the locking lever to tilt the seat until you've learnt to lean slightly backwards to alternate between forward tilt and horizontal seat positions, or to lock the chair.

You can adjust the Trimension tension to match a very wide range of body weights by turning a knob underneath the seat. The knob is a long way below the seat and back from its front edge and can therefore only be reached by leaning way forward while you're sitting down. Women in particular might feel awkward doing this, especially if they're facing other people. The knob is a ridged cylinder 6 cm in diameter and 7 cm long. It turns smoothly, but could be too large for small hands to grip.

For sitting with a forward tilt you need to put the tension on a harder setting so that the backrest stays with you. When reclining, you may wish to use a lighter tension so



⊖ Your body maintains its centre of gravity even when you lean sideways or rotate your hips.

⊙ Seat-depth extension is easy and practical to change.

⊙ The chair can be tilted forwards by up to 5° at the touch of a button.

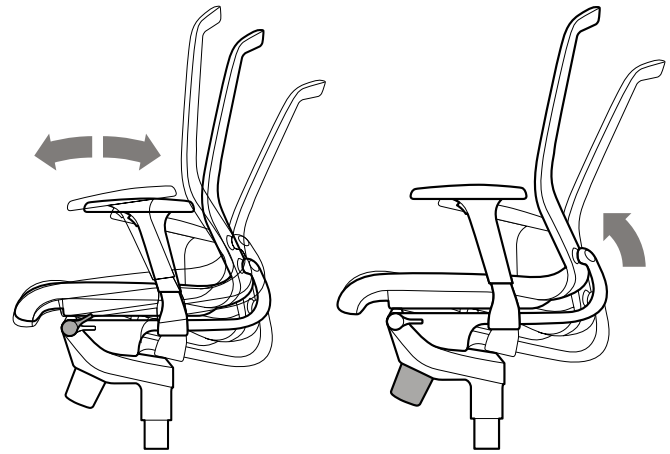
you don't have to push hard against the backrest to lean back. The difficulties in adjusting the tension may dissuade you from doing so. They also make this chair less suitable for multi-user workstations.

The large tension knob which is flexibly mounted in bellows and sticks forward at a sloping angle is the most prominent feature of the *IN* chair when viewed from the side. It detracts somewhat from the slim pleasant look of the backrest and seat, and harks back to earlier designs. The lumbar adjustment device is easy to reach and slide up and down. It delivers effective lumbar support for a wide range of people. The wide seat fits a good range of people but slim users may find the width between the fixed arm pads too great so should use the 3D armrests.

### Comfort

Overall the *IN* chair feels very comfortable and promotes dynamic sitting successfully. The upholstered seat pad is firm, but soft enough not to create any pressure points. Your ischial tuberosities sink in so you remain in the seat without sliding forward when you tilt.

The wide backrest provides comfortable support, with firmer weave in the lumbar region than elsewhere. The top supports the whole width of your shoulder blades. However, at waist level the width may cause slimmer users to hit their elbows on the rigid frame when they move their arms back. 🚫




- ① A huge range of dynamic motion, from  $-12^{\circ}$  to  $0^{\circ}$  and up to  $+5^{\circ}$  opening angle in the seat and up to  $28^{\circ}$  tilt in the back – with a side-ways tilt of the seat and back of up to  $13^{\circ}$  from the horizontal.
- ② For people weighing from 45 to 140 kilos, the knob in the middle adjusts the counter pressure in all directions moved in.

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Levent Çağlar is an internationally renowned expert for office chairs who heads the Ergonomics Unit at the UK Furniture Industry Research Association. He also chairs European standards committees.

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Edwin Owen  
group manager of metalworking/surface engineering

‘I’m constantly on the go between my office and the production department. And *IN* makes me even more energetic. When you sit on it and move about, you don’t notice that the chair follows your movements. That’s what I call high tech that’s not apparent at first glance. Just like the technology behind our office downlights that we make in Lüdenscheid’.



**GERMAN  
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