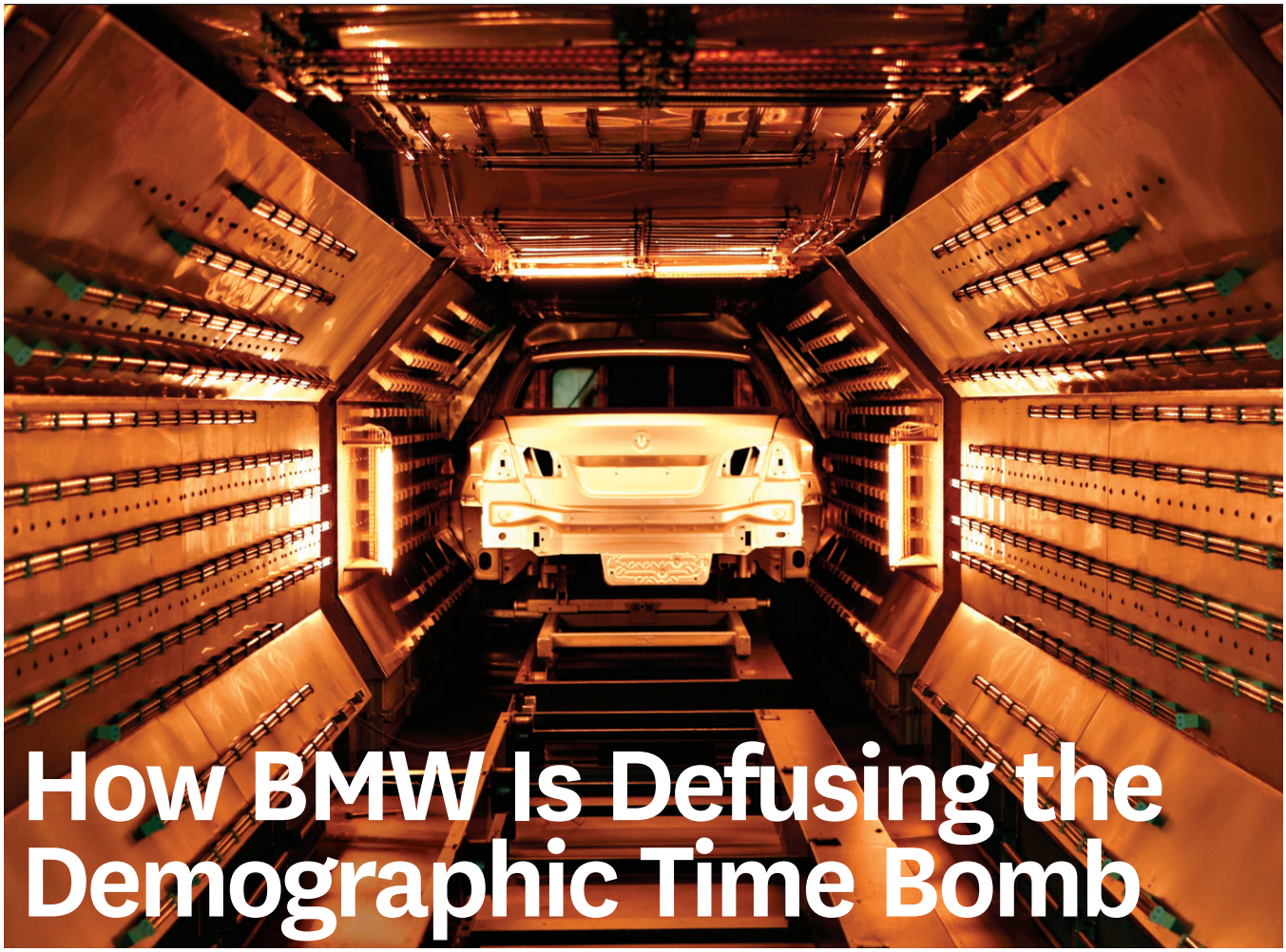
The Globe



How BMW Is Defusing the Demographic Time Bomb

The German car company has redesigned its factory for—and with—older workers. *by Christoph H. Loch, Fabian J. Sting, Nikolaus Bauer, and Helmut Mauermann*

In June 2007, Nikolaus Bauer, the head of BMW's 2,500-employee power train plant in Dingolfing, Lower Bavaria, was worrying about what looked like an inevitable decline in the productivity of an aging workforce in the years ahead. With two of his production managers, Peter Jürschick and Helmut Mauermann (a coauthor, with Bauer), he developed an innovative, bottom-up approach for improving productivity that the company is now testing and refining in plants in the United States, Germany, and Austria. The goal is to incorporate it across BMW's global manufacturing organization.

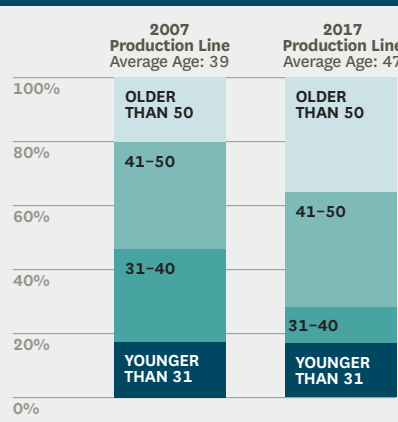
BMW's problem was that the average age of the plant's workers was expected to rise from 39 to 47 by 2017. Because older workers tend to call in sick for longer periods and in general must work harder to maintain their output, bearing the full brunt of the demographic shift would threaten the plant's ability to execute BMW's strategy of enhancing competitiveness through technological leadership and productivity improvements.

BMW has not been the only company with this concern. Corporate leaders, politicians, and labor economists in most developed nations are worried about the consequences of demographic change in their labor markets, which increasingly consist of older workers. In the United States, for instance, the population older than 65 will grow from 12.5% in 2000 to 16.6% in 2020 (the corresponding numbers for Germany are 16.4% and 21.6%, and for Japan 17.1% and 26.2%). This trend will prove expensive: Across the developed world, the

PHOTOGRAPHY: BMW

A Pilot Production Line

In anticipation of an increase in the average age of workers at a BMW plant, a pilot production line was staffed with workers with an average age of 47—representing a year-2017 mix of employees.



health care costs for a person over 65 are roughly three times the costs for someone between the ages of 30 and 50.

Traditional approaches to the problem include firing older workers or forcing them into early retirement. But this is not an option for companies like BMW, which earn their workforce's commitment by being dependable employers, and it is certainly not an option for an entire nation: Wave after wave of early retirements in the 1980s and 1990s increased the ratio of retired to working citizens, making the financing of retirement more difficult. Another approach is to move older workers into jobs that are less physically demanding, but this is not an option if there are not enough young workers to take their places. Nor is it a solution at the national level, where such a move could be interpreted as discriminatory. To complicate BMW's problem, the company was the largest employer in Lower Bavaria, so a decision to lay off or reassign older workers would have political consequences.

Let's see how Bauer and his colleagues resolved this apparent dilemma.

The Line

To arrive at their solution, Jürschick and Mauermann chose one of the plant's production lines for a pilot project. The line's foremen, Günther Stadler and Kurt Dickert, staffed it with a year-2017 mix of workers—that is, workers with an average age of 47. (See the exhibit "A Pilot Production Line.") Stadler and Dickert then worked with the people on the line, supported by senior managers and technical experts, to develop productivity-improving changes, such as managing health care, enhancing workers' skills and the workplace environment, and instituting part-time policies and change management processes. The direct investment in the 2017 line project was almost negligible, approximately €20,000. But the 70 changes increased productivity by 7% in one year, bringing the line on a par with lines in which workers were, on average, younger.

The line, which was centrally located in the plant, produced rear-axle gearboxes for medium-sized cars and was operated by 42 employees. This relatively small line was one of the most labor intensive in the factory. It had started in 2003 with a per-shift volume of 440 gearboxes, which was slated to rise to 500 in 2008.

There was strong initial resistance to the project, which was quickly nicknamed the "pensioners' line." The younger workers already on the line felt they would suffer from an influx of less productive people, while older workers elsewhere in the plant feared that they would become much less productive if they were taken out of their comfort zones and assigned to the pilot line. To many workers, the project seemed like yet another top-down initiative that left them with no choice but to adapt. Stadler and Dickert had concerns of their own—namely, that BMW would reduce work-speed rates and performance goals and downgrade IT systems in an effort to accommodate the perceived deficiencies of older workers.

To head off opposition, Jürschick and Mauermann consulted the plant's Workers Council. This turned out to be not only smart politics but also a practical move for the project's success. The council referred the project team to an earlier study on worker productivity at BMW that had identified a basic framework for change along five dimensions: health management, skills, the workplace environment, retirement policies, and change processes. The framework was theoretical, but it gave the team ideas about the issues they'd need to address to improve the productivity of older workers. It also enabled them to get a handle on the productivity problem. The study had used a standard questionnaire, the Work Ability Index (WAI), which assesses and scores the fit between a worker's ability and the demands of specific jobs. The analysis of 100 worker–job combinations in the rear-axle department revealed that the *average* productivity score decreased with age, as expected, but the *variation* increased: Some workers remained fully productive, while others experienced a strong decline. Thanks to these findings, Jürschick and Mauermann went into the project understanding that productivity declines are not as inevitable as aging.

Stadler and Dickert, meanwhile, held many one-on-one conversations with workers, explaining that the pilot line would not be a soft assignment for part-time preretirees; it would be subject to the same ambitious productivity and quality standards as other lines. They also appealed to the workers' pride: "We need *your* experience and skills to pull this off, and it's important for the future of this plant. Our jobs are at stake!"

In the end, the project team persuaded 20 workers already on the line to stay and enlisted 22 more—with the promise that they could return to their old positions after

one year. In October 2007, both the line's shifts were staffed with a mix of workers reflecting the plant's projected 2017 demographic composition.

The Process

The project piggybacked on a companywide health awareness initiative. In November 2007, the company organized an information day—concerning personal nutrition and health management—in which more than 10,000 workers, out of the 19,000 or so in all Dingolfing plants, participated. As part of that, the project team organized a self-diagnosis that awarded positive points for habits such as regular exercise and negative points for smoking or being overweight.

Stadler and Dickert then organized kickoff workshops for the project, during which they asked workers to describe their aches and pains and what they would change on the line. These workshops pushed workers to take charge of their well-being and of the project. Every idea raised was taken seriously, so employees felt secure enough to brainstorm freely. The team encouraged workers to write their ideas on cards and pin them on a board. People appreciated this way of communicating. One employee commented, "The old forms of the continuous improvement program required a lot of writing. Completing these forms killed me. I used to be a farmer. Writing things down is hard for me."

Every worker received a "budget" of five points to allocate among the ideas—a simple process that yielded a prioritized action list for the project team. "None of the ideas came from the top," Mauermann says. "The managers and foremen deliberately abandoned control: We refrained from evaluating, criticizing, or rejecting single ideas. The employees came up with their own ranking."

Management's willingness to quickly implement ideas further increased buy-in among workers. One foreman commented, "Idea generation really took off when a workstation got a wooden floor. People from neighboring lines laughed at first, but after only one day it became clear that it helped. At the end of the day, your knees were not aching. This *showed* us that the 2017 project could make sense."

After this, the workers took charge, and the project team focused on executing their ideas. The team called in an ergonomist, a safety officer, and process engineers for support, but the workers did most of the work themselves—some of it on their own time. They became increasingly proud of their involvement in the process.

The Changes

Many of the ideas implemented in the 2017 line were physical changes to the workplace that would reduce wear and tear on workers' bodies and thus the likelihood that workers would call in sick. The new wooden flooring together with weight-adapted footwear, for example, reduced joint strain and exposure to static electricity jolts. The line workers also installed special chairs at several workstations, which allowed them to work sitting down or to relax for short periods during breaks. The first model they brought in was a barbershop chair. After trying it out, the workers, with the help of an engineer, improved the

2017 Ergonomics

Workers on the 2017 production line made 70 changes to workplace equipment that reduced physical strain and the chances of error. The total cost was €40,000 and a few hours of maintenance time. Examples include:

Wooden flooring
Cost <€5,000
Reduces knee strain and exposure to static electricity jolt

Barbershop chairs
Cost <€1,000
Enable short breaks and alternating physical strain (workers can stand or sit)

Orthopedic footwear
Cost <€2,000
Reduces strain on feet

Angled monitors
No Cost
Reduce eyestrain
Done in two hours maintenance time

Magnifying lenses
Cost <€1,000
Reduce eyestrain and minimize sorting errors

Adjustable worktables
No Cost
Ease physical strain and facilitate personnel rotation during shifts
Done by maintenance within normal hours

Large-handled gripping tools
No Cost
Reduce strain on arms
Project with university students

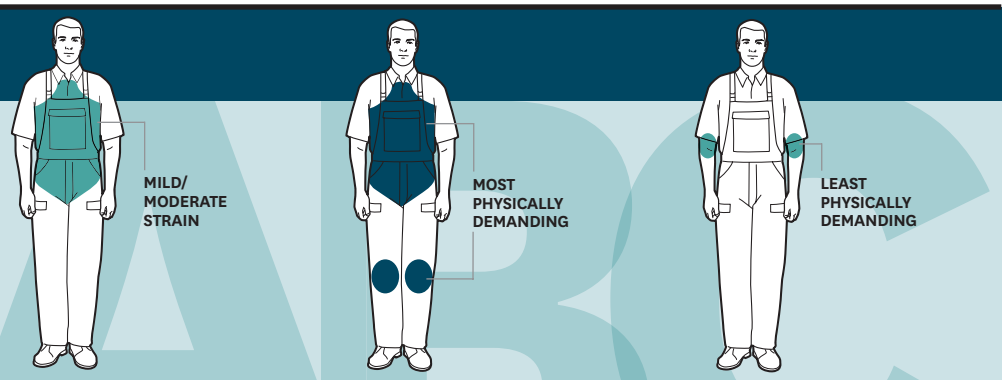
Stackable transport containers
No Cost
Ease physical strain and facilitate personnel rotation during shifts
Modification of containers already developed for a new-product introduction

Larger typeface on computer screens
No Cost
Reduce eyestrain and minimize sorting errors
Done by maintenance personnel during normal hours

Manual hoisting cranes
Cost <€1,000
Reduce strain on back
Total cost of cranes shared with university to support a master's thesis

Ergonomically Optimal Job Rotation

As part of an effort to maintain the productivity of older workers on a BMW production line, management analyzed the degree of physical strain experienced at various workstations. A involved mild or moderate strain, B was the most physically demanding, and C was the least. It was decided that workers could stay at workstation A for an entire shift but that they should rotate between B and C to reduce the possibility of injury.



WORKSTATION A
MILD/MODERATE STRAIN
MAXIMUM 6 HOURS PER SHIFT
Assembly of drive flange and pinion

WORKSTATION B
MOST PHYSICALLY DEMANDING
MAXIMUM 3 HOURS PER SHIFT
Fitting workpiece carrier with casting housing and bearings

WORKSTATION C
LEAST PHYSICALLY DEMANDING
MAXIMUM 6 HOURS PER SHIFT
Assembly lid of rear-axle differential

chair's shape and composition, replacing its plastic cover, which caused sweating and chafing, with a leather one. New seats were then developed with a chair maker for a total cost of less than €1,000.

Some of the measures addressed both ergonomic and quality concerns. Installing vertically adjustable tables meant that workstations could be adapted to each worker's height, reducing back strain. It also facilitated job rotation during a shift because the tables could be quickly adjusted to suit incoming workers. Similarly, the installation of flexible magnifying lenses helped workers distinguish among small parts, reducing eyestrain and mistakes. All told, the line implemented 70 small changes in design and equipment that improved ergonomics at various workstations. (For examples of some of the changes, and their cost, see the exhibit "2017 Ergonomics.")

Design and equipment changes were complemented by changes in work practices. The line introduced job rotation across workstations during a shift in order to balance the load on workers' bodies. (See the exhibit "Ergonomically Optimal Job Rotation.") There was some initial resistance. One worker commented, "I was against it. You always think the person preceding you on the machine doesn't do as good a job as you can. But we quickly saw that time passes faster, we see better how the people around us work, and we can help one another."

In addition, a physiotherapist developed strength and stretching exercises, which he did with the workers every day for the first few weeks. This provoked some teasing from the other lines, so many on the 2017 line were reluctant to perform the exercises. The breakthrough came when Stadler recruited a volunteer from the group, who fetched his colleagues at the beginning of breaks and performed the exercises with them.

The Results

As noted above, the capital investment for the 2017 line project amounted to about €20,000, which included time spent by the ergonomist and physiotherapist as well as Bauer, Jürschick, and Mauermann. The wages covering attendance at workshops amounted to almost €20,000, bringing overall costs to around €40,000.

What did BMW get in return? The line achieved a 7% productivity improvement in one year, equaling the productivity of lines staffed by younger workers. The line's target output was increased to 500 units per shift in mid-2008 and to 530 units per shift in February 2009, in keeping with the plant's ambitious goals. After the productivity increase, four workers were reassigned to other lines, but no one, including the initial skeptics, wanted to leave. The 10 defects per million quality target was achieved after three months. Current performance stands at zero defects. Absenteeism related to sick leave, maternity leave, preventive health care, and rehabilitation stood at 7% during 2008— higher than elsewhere in the plant but typical for this mix of older workers. By June 2009, absenteeism had dropped to 2%, below the plant average.

BMW now touts the 2017 line as a model of productivity and high quality in its internal communications. Follow-up projects were instituted in Leipzig (Germany) and Steyr (Austria), in the final car assembly plant on the other side of Dingolfing, and in the U.S. plant. As BMW has rolled out this approach, it has made sure to address the specific conditions of the workplaces involved while it transfers the worker-led approach to identifying and applying changes. The precise numbers are confidential, but these extended tests show results similar to those in Dingolfing.

THE 2017 line project is a remarkable case of distributed organizational problem solving. The plant's top management raised the issue, the production managers ran an experiment, and the line workers created the solutions. It's an approach that will become a critical capability for global companies. Introducing and scaling environmental technologies and penetrating new markets in Asia are challenges similar to the one Nikolaus Bauer faced: Managers can articulate the problem and choose from among solutions, but they are not necessarily a good source of solutions. For those to emerge, frontline employees need the freedom to experiment. As companies come to grips with the strategic challenges ahead, the brainpower of their workforce may be the most important differentiating factor.

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Christoph H. Loch (christoph.loch@insead.edu) is a professor at Insead in Fontainebleau, France. **Fabian J. Sting** (fabian.sting@insead.edu) is a postdoctoral research fellow and the manager of the Industrial Excellence Award competition at Insead. **Nikolaus Bauer** (nikolaus.bauer@bmw.de) is a vice president and the plant manager, and **Helmut Mauermann** (helmut.mauermann@bmw.de) is a manager, at the BMW power train plant in Dingolfing, Germany.

ILLUSTRATION: JASON LEE