



How do you make a difficult job easier?

Wherever compaction is needed, BOMAG is there — for earthworks and asphalt for road, rail and airports, as well as in waste compaction. Those machines are heavy — the operator has to know what he's doing and he must have his machine well under control. The standards specify what and how, but BOMAG often takes this a step further, because safe operation and clear visibility are clear competitive advantages. That's why the world market leader has been optimizing the design of its vehicles with RAMSIS since 2000 — and can claim numerous successes in vehicle ergonomics. The responsible engineers are Thomas Klein and Stefan Kuhn.



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High demands on the driver

Compaction machines drive slowly and often operate in hot weather. Heat and walking pace speed make you sleepy, but perseverance is all-important in the construction industry: A truck driver can take a break every 3-4 hours, but the “compactors” are on the go from dawn to dusk. Hot asphalt can't wait. The driver must nevertheless always remain focused — on the one hand to avoid accidents and on the other to monitor and control his measurement instruments. And he can do this a lot better if the ergonomics are right.

Compaction for the global market

Using RAMSIS, BOMAG begins with a complete evaluation of its cabin design. The pool of test persons for this ergonomic optimization comes from the international RAMSIS database by Human Solutions. A lot has changed thanks to this survey. The driver still drives safely, now he can easily assume different positions, bend his legs or stretch out comfortably. This is achieved by beveling the cabin floor slightly. For the Japanese market, the seat setup is optimized in

such a way that even a small driver of 5' 3''* can still put his feet securely on the floor. These and all other subsequent adjustments have paid off. And BOMAG engineers know when they've won — because not one driver has complained since the workspace optimization was completed!

“A cabin can be made completely out of glass — and the driver still has poor visibility.”

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* 1.60 m



Vision in accordance with regulations and beyond

Construction machine cabins have long life cycles. Every 6–9 years, new models come onto the market — but the driver's workplace hardly changes at all. The dashboard on the other hand is very much alive. The abundance of instrument displays illustrates how complex compaction work can be. The temperature and the density of the asphalt are measured, for example. They show the driver how often he still has to drive over a section of the road. And the water level must always be in the green zone, because water prevents the asphalt from sticking to rollers and tires, damaging the asphalt surface. The driver must constantly keep a watchful eye on these and other measuring devices, but at the same time he must also know exactly what is going on outside. He has to see clearly for a close-range radius of five feet around the vehicle — and that means a person or object with a minimum height of 4' 11"*. That's what the norm

(standard) says ... but BOMAG targets 3' 3"*** distance and 3' 3"*** height, because the company believes that the machine should always be better than the norms. And this isn't only for safety reasons — the sooner the driver sees the ground, the closer he can get to buildings and other limiting objects. And that means less manual work and therefore time and cost savings during construction. Knowledge in the field of view quality at BOMAG is extensive. Interestingly, this has only partly to do with window size. While some competitors like to have the cabins equipped with all-round glass, BOMAG specifically eliminates obstacles that interfere with vision. Obstacles like equipment, for example. "What good is a clear view through the window, if you can only see a water tank and not the ground. A few millimeters can often make a lot of difference here," says Thomas Haubrich, Chief Designer, Driver Cabs and Cabins at BOMAG.

RAMSIS Module ISO 5006: norm-compliant design of the field of vision. The limit values of the norm and all analysis methods have been stored in RAMSIS. This creates an important time advantage, because necessary changes are detected during the conception phase and the results can be perfectly reproduced. Other norm checks: 2008/2/EC module and ISO 13564 module.

* 1.50 m; ** 1 m



Software versus test bench

The introduction of RAMSIS is tackled with a similar degree of precision. The designers want to be sure that virtual world and reality match. So they first check the RAMSIS values against the results of the physical test benches. The distant view, for example, produces an optimal accuracy result at a 40-foot radius around the vehicle. The BOMAG team is relieved. Digital ergonomics is an important time factor for the company, because the ergonomics test takes place much too late on the prototype. Anything that has to be changed after the conception phase comes with a heavy price tag. Digital analysis allows early optimization, enabling completely different solution scenarios. Since no risks are incurred in terms of time and cost, a lot more can be tried out and entirely

new concepts can even be approached. However, there is another important benefit attached for Klein and Kuhn: team coordination has become easier. The ergonomics designers can now use objective facts to convince the overall machine design team during the concept phase, rather than personal judgment. The discussions are much more focused and that also saves time.

“Since RAMSIS came along, we’ve hardly needed to change anything on the physical prototypes.”



BOMAG GmbH

BOMAG is the world market leader in the compaction technology sector and provides machines for soil, asphalt and refuse compaction, stabilizers/recyclers and cutters and finishers. The company, which is now part of the French Fayat Group has its headquarters in Boppard/Germany.

BOMAG in numbers

- Founded in 1957
- around 2,000 employees worldwide
- approx. 20 product groups
- 6 regional offices in Germany
- 11 subsidiaries worldwide
- 500 dealers in over 120 countries

