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A success, from every angle

While much of today's compact crawler-mounted excavator technology has been validated over time, there are still hurdles to overcome. Crawler tracks on an excavator often move over uneven ground conditions on a job site, working on slopes and hillsides. Excavators also dig close to walls and basement foundations in a sloped position. In either situation, the excavator's revolving superstructure, together with the boom, tilts slightly to the side, pulling the entire machine out of alignment.

Operating a compact excavator in this manner means higher operating costs, more time to complete tasks and an increased risk of damage to the revolving superstructure, cabin and boom that can cut right into your bottom line. In addition, the operator must be extra vigilant about site conditions and will often work at an uncomfortable angle for long periods of time.

So, what if the compact crawler-mounted excavator were reinvented? Could an innovative jig that enables the revolving superstructure to tilt via hydraulics with respect to the undercarriage improve operator comfort and machine performance? Engineers at Wacker Neuson 25 years ago certainly thought so. The result was development of Wacker Neuson's Vertical Digging System (VDS)



technology for compact excavators. Incorporating a maximum tilt of 15°, VDS compensates for the majority of slopes, slanted working surfaces, curbstone and sidewalk edges. VDS has a variable setting and the operator can easily activate it at any time via toggle switch in the cab.

Adjusting to height differences within seconds, VDS promotes precise movement and positioning of the bucket or attachment is easily managed in rough ground conditions. This feature often makes additional excavation unnecessary and considerably shortens time on the job site.

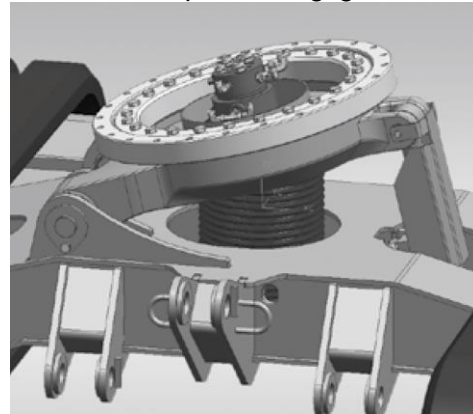
With VDS, the excavator can guide its bucket close to the wall without "rubbing the wall the wrong way" with the boom. This helps reduce or eliminate manual finishing.

The beginning of a big idea for compact excavators

The exclusive VDS technology is, by no means, new or just a short-lived marketing strategy meant to attract the public's attention at trade shows. In fact, VDS celebrated its half century anniversary in the spring of 2015.



VDS —or "Kippmatic" (Tiltmatic) as the system was called at its inception —was installed in some compact excavators for the first time in 1990 on a trial basis. With higher success on job sites than expected, VDS was soon offered as an option on several excavators of various weight classes. Some "old timers" in the industry still remember how these excavators received questioning glances as their revolving superstructure looked "strangely tilted" compared to the undercarriage. Despite initial doubts by end users, this new technology impressed many and quickly gained an excellent reputation on countless excavation projects.



The original name "Kippmatic" was not particularly well-received, because it refers primarily to the ability to vertically position the revolving superstructure and therefore the boom and attachment, which is usually the bucket. While useful for some work, such as breaker applications close to walls or the uncovering of pipes and utility lines, it is not the main purpose of the VDS technology. VDS addresses the tilting of the revolving superstructure and now has 25 years of application-proven respect on thousands of jobs as a sophisticated, reliable and safe technology.

Today's VDS kinematics between the undercarriage frame and the revolving superstructure use a reliable technology that, even after more than two decades, continues to improve with technical innovations.

The best kept secret in the construction industry

In countless situations on the job site, the ability to hydraulically tilt the revolving superstructure of an excavator at any time and then be able to reset it again after a few moments has proven to be extremely useful. That's why the majority of end users who have experience with Wacker Neuson's VDS technology could not live without it. However, there are many who are not even aware of VDS and its practical advantages.

According to one study, VDS is well-known to approximately two-thirds of all construction companies and rental yards in Germany, Austria and Switzerland. Applications where VDS is used include civil engineering, road and highway construction, sidewalk construction and building construction, as well as gardening and landscaping. While more than half of the people from this group can immediately say that "the excavator stands straight even in sloped ground conditions" and that a "leveling compensation" is present, not even ten percent of them know about the many other advantages of the VDS technology and its technical developments over the years. The fact that 90 percent of decision makers in construction companies are unaware of the full capabilities of VDS is



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alarming, because cost reductions and employee health and safety are usually their largest priorities.

Statistics show that construction companies that use excavators with VDS once will frequently order additional machines, due to the positive experience. A perfect example of this is a German company in the utility line construction and civil engineering sector. The owner and managing director purchased his first two compact excavators with VDS technology in 2005 without testing them in advance, because the many competitive unique selling points spoke for themselves. Today, all of this company's compact excavators are Wacker Neuson models equipped with VDS.



Gerhard Felßner, sales director of the Wacker Neuson partner Carl Beuthhauser Construction Machines in Rednitzhembach, Germany, has experienced this first hand. "VDS is unique," Felßner says. "Many customers who have purchased the system once will thereafter only use excavators with VDS. The ergonomics and economic efficiency pay for themselves!"

Due to the hydraulically activated VDS control, the revolving superstructure can be easily and variably adjusted in its tilt at any time by the operator via the toggle switch, regardless of the current application situation.

VDS technology has also been time-tested and proven beyond the borders of Germany and Europe. "I use this machine about 90 percent of my time on the job," notes Brian Slaughter, owner of Concrete & More in Dallas County, Iowa, USA. "It is extremely flexible. And due to the VDS system, I work much faster. The revolving superstructure

stands upright on hillsides, I can dig vertically and the walls are straight. I would definitely buy an excavator with VDS again."

Excavate only the amount of material necessary

In traditional trench excavations performed on a slope or hillside, the boom is tilted to the side. This means that more material needs to be removed in order to achieve the same trench width at the bottom as there is at the top. An excavator equipped with VDS ensures that the vertically positioned boom excavates the required trench profile as precisely and accurately as on a level surface.

As a result, the VDS ensures a tremendous savings of excavated material and time of up to 25 percent. For example, a VDS excavator working at a 15° gradient on a 100-meter long trench that is 0.6 meters wide and 1.25 meters deep, excavates only 75 m³, while a conventional excavator must excavate 100 m³. A

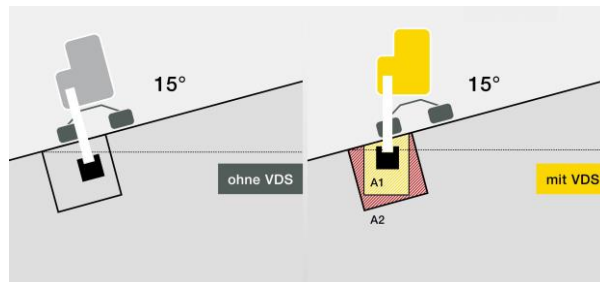


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simple graph and illustration of the reduced scale trench cross-section clearly demonstrate the dramatic savings.

What's more, the additional excavated material—in this case, at least 25 m³ of the earth—must be stored somewhere, possibly even loaded and transported to another location and, later, the unnecessarily large trench profile will require backfilling. This 25 m³ of

additional backfill must be compacted layer by layer, increasing time and cost for rammers, vibratory plates or boom-mounted plate compactors.



As a further benefit, the significant labor and time savings for excavating and backfilling the trench with a VDS-equipped excavator ensures considerably less bucket and machine wear per meter of trench application. This reduces maintenance and spare parts costs. But the long list of VDS advantages does not end here.



If the machine, specifically the swiveling axis, is at an angle, an additional torque demand is generated. Due to the VDS, a compensation of the revolving superstructure swiveling axis is possible in an exact vertical position.

If the swiveling axis of the excavator is slanted, the machine and its load demand additional torque to maintain performance. This is very pronounced among the increasingly popular group of short and zero tail excavators, due to the disadvantageous location of their center of gravity. Wacker Neuson's VDS technology compensates by putting the revolving superstructure swiveling axis in an exact vertical position. No additional torque is needed. The result? No loss of swing power, no drifting of the revolving superstructure, a more accurate positioning of the attachment or the load as well as more fuel savings and more efficient work.



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Comfort and speed advantages

Without a doubt, VDS technology offers benefits beyond machine performance. This includes ergonomics. In a Wacker Neuson excavator equipped with VDS, the operator always sits upright and straight when working for days along slopes, providing a comfortable position that results in less fatigue and strain on the spinal column. Operators who frequently work with VDS excavators often report that they can't go without the comfort of this technology.



Despite the zero tail, the operator would have to work very carefully and therefore slowly without VDS so that the revolving superstructure does not hit the wall. Such work is accelerated considerably, thanks to the VDS technology.

Working along walls "within touching distance", whether with trench excavators and backfilling, when uncovering basement walls for reconstruction work, or in gardening and landscaping, is often impossible without VDS. When tilted, the highest point of the revolving superstructure of the machine – the cabin or the boom – may "rub the wall the wrong way". Not only can this happen when swiveling, but also with a straight revolving superstructure (i.e., with the boom in the undercarriage's longitudinal axis). VDS eliminates this problem, improving speed and efficiency on the job site. In addition, the excavator operator has less worry that the revolving superstructure and boom will be damaged when performing such work close to buildings and walls. This is another major advantage of the VDS that, although it is less known, has a very positive impact in everyday practice.

Greater load carrying capacity, fewer operating hours

For lifting work, a conventional crawler-mounted excavator that is tilted slightly



forward due to the uneven ground conditions will tip over much more easily forward than in the horizontal position. With VDS, the revolving superstructure is immediately brought into the horizontal position, which allows for considerably higher load carrying capacities and increases the stability by a considerable 20 percent when on a 15° gradient when fully extended. Whether handling a load hook on the backhoe bucket or with



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an attached load on the quick coupler system, VDS offers extra stability and even increases the load carrying capacity.

Due to the considerable time savings (often up to 25 percent in trench applications and pipeline construction), fewer hours of operation are also required for many kinds of applications with VDS. Service can be reduced by several hours, including routine maintenance for the engine and changing filters and oil and for the undercarriage. This, in turn, saves labor and spare parts costs per meter of trench application.

Resale value of the excavator also increases with VDS, but by no means just through the appreciation with the additional VDS technology. With fewer operating hours required for each excavated kilometer of trench – often 15 to 25 percent fewer operating hours when working on the edges of streets, curbstones and along building walls – a VDS excavator has a higher value than an excavator owned for approximately the same amount of time.

There is, obviously, much to consider when purchasing a compact excavator, including applications, job site conditions, operator comfort and eventual resale. The addition of Wacker Neuson's VDS technology is not only of benefit in the short term, but over the duration of the machine's lifespan. This time-proven technology has come a long way since its introduction 25 years ago and it continues to demonstrate positive return on investment for equipment owners, from every angle.



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