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Stable ground

Soil stabilisation is big business in Belgium. Operating two integrated teams, the family-run Cloet enterprise uses tracked tractors to power the mixing cultivators. Steven Vale takes a closer look at some of the machines operated by the business, including a homemade self-propelled spreading unit.

The fact that 90% of Belgium is covered by either sand or a heavy clay mix means that soil stabilisation has become increasingly popular, a trend which has been boosted following new government rules which require all transported soil to be analysed for pollutants.

The regulation was phased in following a couple of environmental scandals, where a couple of construction companies were caught moving polluted soil around without cleaning it. Today, the introduction of the new rules means that it is a lot cheaper to keep muck on-site and find a way to make better use of it.

Soil stabilisation involves the use of either cement or quick-lime. Cement, which costs around £90/t, is used with sand and hardcore, whilst the more expensive quick-lime (£120/t) is for clay. Of course, muck types vary with the result that sometimes it is necessary to use a mix of both cement and quick-lime.

In use, although sand and hardcore are simply hardened by the cement, in the case of quick-lime the process is more complicated. Once it has been applied to the surface and thoroughly mixed, the quick-lime absorbs water out of the muck. This process creates heat, and further moisture evaporation. However, the third phase, the chemical reaction between the molecules in the soil and quick-lime is seen as the most important, as this allows the mix to be compacted.

Typical application rates for cement are 40kg/sq.m in sand, and 20kg/sq.m of quick-lime for heavy clay soils.

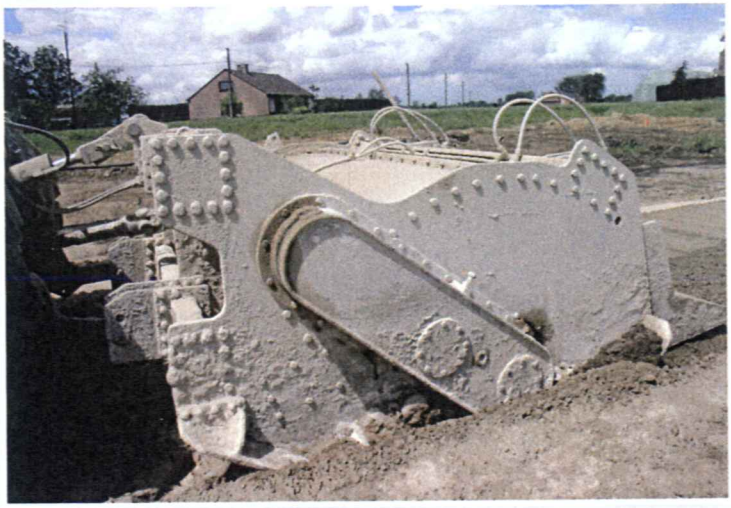
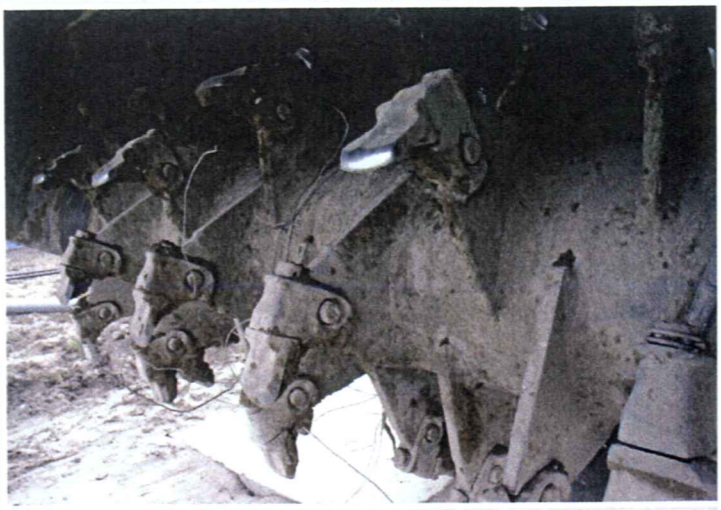
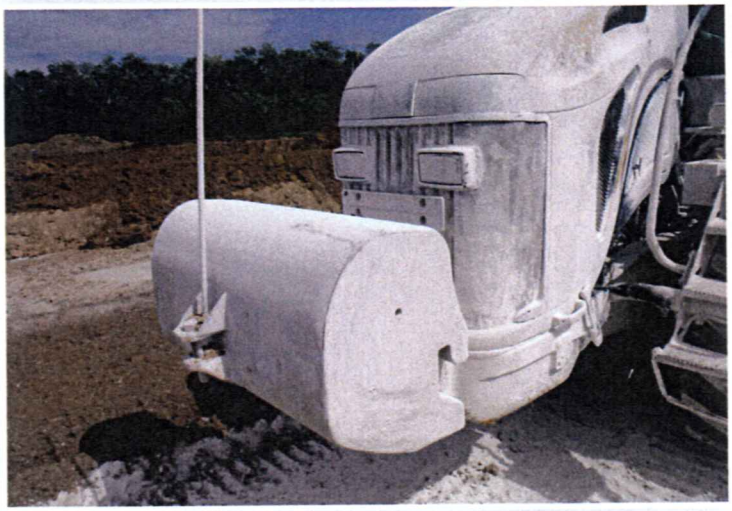
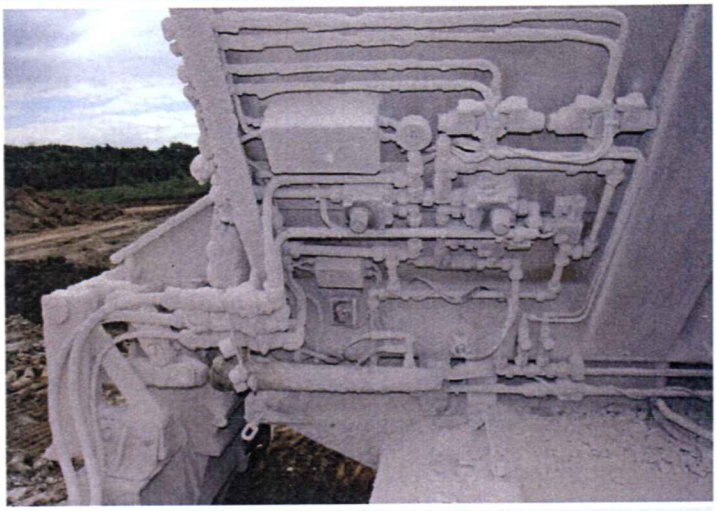
Operating within a 150-mile radius of its Pittem headquarters, Cloet has been involved in the earthmoving business for 40 years, but it branched into muck stabilisation just eight years ago.

Whilst it was not the first company to get into this work, it claims to be the first to buy machines that are specifically suited to smaller jobs. During the early days, the business operated with the German combination of a Fendt farm tractor and Gutzwiller cultivator. However, director Diederik Cloet soon realised that whilst the tractor was powerful enough, it had difficulty to stay on top of the ground in wet conditions.

"We used to have to pull it with a Cat bulldozer," he says.

He considered a dedicated self-propelled spreading and mixing unit, but decided that a drawback here was that the machine needed to be pulled out of work to refill the hopper.

This Cat Challenger is one of two operated by Cloet. This 55-series machine has just had its tracks replaced after 5000 hours.

Opposite Page, left to right from top: Working at a width of 2.5m, the Gutzwiller GM250 cultivator operates to depths of up to 50cm at speeds of 500 to 550 metres per hour.

In the worst case scenario when working on really tough ground, the cultivator tips may need replacing at the end of a single working day.

Weighing in at six tonnes, the Gutzwiller mixing unit required Cloet to add two tonnes of extra weight to the front of the Challenger MT 765.

Cement and quick-lime not only set hard in the ground, they also set hard on the vehicles. A diluted acid substance is required to remove it.

To ensure even stabilisation, each particle of sand or clay needs to be coated with cement or quick-lime down to depths of up to 50cm.

Stones are a major problem for deep mixing work. Here, the GM250 mixer is assessed for damage after striking a big stone.

Powerful hydraulic cylinders are used to control the working depth of the Gutzwiller GM 250. The rotor operates at speeds of 300rpm.

Powered by a 210hp Mitsubishi engine, this Japanese-made IHI 70 tracked carrier has a hopper capacity of seven tonnes.

This Page: This self-propelled vehicle is the result of marrying a Streumaster hopper/spreading unit to New Holland parts, e.g. the cab and engine.

After looking at a self-propelled Bomag mixing unit, he decided against it as it was still on wheels. He felt that the best way forward was to look at a tracked tractor as the power source.

He considered the Case IH Quadtrac, but decided against this, as it is not fitted with a creeper transmission.

"We need to operate at speeds as low as 500-550m/hr," he adds. "Mixing is everything with muck stabilisation. Every particle has to come into contact with the cement or quick-lime. The aim is to ensure that the muck remains in the machine for three complete cycles of the mixing rotor. There are no short cuts. It has to be done properly and at the correct speed."

In 2001, after looking closely at another Fendt tractor, this time a 310hp 930, he took the plunge and bought a brand new Cat Challenger 55. Offering an output of 290hp, he felt that the tracked vehicle best suited his requirements.

The existing Fendt tractor was relieved of its duties and the Gutzwiller cultivator was coupled to the Challenger. The gamble appears to have paid off, as the only major maintenance task was to replace the tracks after 5000 hours last winter. He is confident that the machine will easily clock up 12,000 hours - provided that the driver continues to clean the cooling system every day.

"Muck stabilisation leads to a lot of dust," he says. "The driver has to blow out the radiator at the end of each day without fail. The air filters need replacing twice as quickly as normal."

The tracks aside, one of the things he likes about the Challenger is that because it does not take a lot of power to drive it, there is plenty left over to operate the tined rotor.

"The drawback to dedicated self-propelled muck stabilisers is that most are hydraulically driven. This takes a lot of power which does not leave much for the mixing unit."

Of course, in addition to making the radiators and air filters work overtime, a big problem with cement and quick-lime is that they give the paint a real beating. Although all the machines have to be cleaned off every two to three weeks when they pass by the main base, the machine's exterior condition is not too good by the time it's due for part-exchange.

"When we sold the Fendt 924 we had to pay for a complete respray," he adds, "and new rubber seals around the doors and windows. I do not expect the Challenger to look too good when the time comes to replace it."

Coupling the mixing unit to a tracked tractor might have solved the problem of getting stuck, but the spreading unit was still coupled to a tractor, and this too frequently needed to be pulled by a bulldozer.

In the end, the German-made Streumaster spreading hopper was removed from the chassis and built on to the rear of a Japanese-made IHI self-propelled tracked dumper unit.

However, although the concept was good, the spreading unit and hopper were simply not designed to fit the body. In the end, they purchased a new body for fitting to the IHI machine and used the existing hopper and spreading unit as the base for a home-made, self-propelled spreading machine.

A used cab, 210hp engine, wheels and tyres were sourced from a local New Holland dealer. Cloet then set to work to make the chassis and develop the in-house self-propelled machine some four

Left: This 20-tonne Hamm Compactor is one of three operated by Cloet and one of the few machines on the fleet bought second-hand.

Below Left: A Komatsu D61- PX dozer prepares a 40cm layer ahead of the spreading unit. It is four years old and clocks up about 1200 hours a year.

Opposite: Cloet is generally subcontracted in by bigger muck-shifting companies for soil stabilisation work using their fleet of specialised machinery.

years ago. Offering a seven-tonne hopper capacity, the result is still in use today.

Clearly, Mr Cloet is a big believer in tracks.

"I am toying with the idea of buying a bigger 10-tonne capacity IHI 100 next year," he says. However, even though he agrees that it will offer improved outputs, he is also concerned that it is a heavier machine.

"Even heavy tracked vehicles can get stuck in really tough conditions."

Of course, the addition of a second spreading unit meant that another mixing unit was needed. Impressed by the performance of the original Challenger tractor, the firm bought a second. They are now produced by Agco, owners of Massey Ferguson, following their purchase of the product rights from Caterpillar. Cloet opted for a brand new 350hp MT 765, which is coupled to the biggest and heaviest cultivator in the business - a Gutzwiller GM 250.

Do not be fooled into thinking that Cloet opted for the Challenger simply because it offers a cheaper alternative to a dedicated self-propelled mixing unit, such as the 450hp Bomag MPH 121. According to Mr Cloet, the Challenger/Gutzwiller mixing unit has a similar price-tag of around £210,000.

"It was not a price issue," he says. "We simply look for the best machine to suit our particular application."

Although the new Gutzwiller mixing unit still offers a working width of 2.5m, this machine weighs in at a hefty six tonnes. According to Mr Cloet, the standard front weight fitted to the 350hp Challenger tractor was simply not big enough, so the business set to work to develop a two-tonne version.

A feature of this mixing unit is that once lowered to the ground, it is trailed on two skid units.

The working depth of the points is controlled by hydraulic rams located on each side of the machine, which alter the height of the rotor. These allow a precise working depth to be maintained at anything up to 50cm, a full 10cm deeper than the other three machines.

However, impressive as it may sound, this machine has not been without a few problems.

"The slip-clutch on the gearbox does not work properly and is a major headache. During the first six months of operation, we broke two gearboxes on the unit! We are often called to work on some stony ground. Sometimes the stones can be buried out of sight at depths of 30 to 40cm. If the machine hits a stone then the slip-clutch needs to work."

Although he is not a big fan of dedicated self-propelled mixing machines, he adds that a benefit is that the mixing rotor of machines such as the Bomag MPH 121 is hydraulically driven.

"This provides a much safer stone protection system."

Stones are not the only unseen problem facing the mixing units, as the area around Ieper in Belgium, where Cloet is regularly employed, is littered with unexploded shells from World War I.

When working in this area, the company fits a set of ripper tines working to depths of 70cm to the rear of the Challenger to pull these to the surface. There are so many unexploded incendiary devices in the area that the Belgian Army has created a special bomb squad. Construction companies and farmers finding such devices simply call a special telephone number and the device is subsequently collected for safe detonation.

"If we work in the Ieper area then we are 100% sure that we will uncover some form of unexploded device."

About 90% of Cloet's work is as a sub-contractor for other construction firms, with one company excavating and transporting the soil, whilst a Cloet Komatsu D61- PX bulldozer, quick-lime spreader, mixing unit and compactor do the rest.

Once tipped at the required area, laser technology is used to bulldoze the soil in 40cm layers.

Then, the quick-lime is applied over the top by the IHI 70 and mixed in by the Challenger MT 765/Gutzwiller GM 250 combination. Finally, after the compactor has done its job, the bulldozer is called back in again, and the process is repeated again and additional 40cm layers of muck are added.

"During an average eight-hour working day the machine can mix 3000 to 3500cu.m of muck," he says. In a good day, where the land is well prepared, this can increase to as much as 4000cu.m. The hard conditions at this site mean that 2500cu.m a day are the limit."

A Hamm compactor purchased at a Ritchie Bros sale last year completes the job. Weighing in at 20

tonnes, and operated for 500 hours a year and the biggest of three compactors operated by the business, he bought the one-year-old machine at a Moerdijk sale. He says he paid just £42,000 for it - less than half the price of a new one!

However, he suggests that buying used kit is not a company policy.

"This is only the third machine in 10 years that we have bought at a Ritchie Bros sale. The compactor is not a complicated machine. The Challenger, on the other hand, is a highly complex vehicle and a vital part of our business. I would not entertain the idea of buying a used one."

It is interesting to note that Cloet runs no fewer than 50 powered machines, operated by a staff of just 20.

"We are not a big company but we are very flexible. We can change from job to job quickly and most of our staff are able to operate at least two or three machines."

As an example, he points to the spreading unit and the compactor. "One operator is able to spread the quick-lime ahead of the mixing unit and then compact it afterwards."

He adds that the company is not interested in big jobs. "There are plenty of big construction companies out there that are willing to work for a low price. There are also a few big muck stabilisation companies, but these are not interested in the smaller jobs. We manage to complete some of our jobs in a day or two. This is not interesting for the big firms. What's more, the big construction companies are happy to provide us with the work because we are not looking to compete with them in other areas of their business."

So, where does all the cement and quick-lime end up? Well, according to Mr Cloet, most of the quick-lime produced in Belgium during the past two years has been supplied to stabilise the land ahead of the TGV high-speed rail link, which is currently one of the biggest construction projects in the country.

Although most of Cloet's work is on small road projects and industrial sites, there are exceptions.

"Some of our most well-known work includes stabilising the land for the new Ikea facility in Brussels, an extension for the Volvo truck plant in Gent, and stabilisation work in the Port of Antwerp and Gent."

Providing the purchase of the new IHI 100 spreading unit goes ahead, then the company will operate with three spreading machines next year. Furthermore, although the company now owns four mixing cultivators - Dutzi, two Gutzwillers and a French Rota Dairon, only two are used.

"We are considering putting one on the back of a New Holland 260hp 8970 tractor next year to create a third team."

"We can change from job to job quickly and most of our staff are able to operate at least two or three machines"

I asked him if he is considering the purchase of yet another Challenger tractor.

"Yes, but not for two years. This year we are busy constructing a new head office. Then in 2006 we are looking to buy a new spreading unit. We are a small company and can only invest in one major item a year."

So, has he made the right decision to purchase the Challengers? He says that although they have not helped in attracting new work, they do help him to get extra work from an existing client.

"Initially, the price is the determining factor," he says. "Then, when contractors get to know us and what we do, they very often call us in for work in heavy land conditions."

The business has grown steadily over the past eight years and looks set to handle 6000 tonnes of quick-lime and 5000 tonnes of cement this year.

Working on an application rate of 40kg/sq.m, the two Challengers currently mix 440,000cu.m of muck a year.

He makes no secret of the fact that he is looking to increase this figure and has just signed a contract to take 25,000 tonnes of quick-lime over the next three years.

"This means that we know our cost price for the next few years. Five months into the deal we are well on target."

Finally, the increasing interest in muck stabilisation in Belgium has attracted newcomers to the business.

"Fortunately, the increasing market is able to absorb these," concludes Mr Cloet.