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BM TEST EQUIPMENT
- the safe choice

BM Newsletter

Eye-opening seminar about brake tests on agricultural vehicles, hosted by BM

On February 8, 2013, BM Autoteknik A/S hosted a seminar arranged by the trade association for the Danish Machine Pools and Contractors (DM&E) about the importance of testing the brakes on agricultural vehicles.

Challenge: To legalise agricultural vehicles

Initiator Poul Højbjerg from Hvornum Machine Pool opened the brake seminar with a short welcome speech after which machine consultant at the trade association, Mogens Kjeldal, raised awareness about safety, new and old regulations, and not least about the many challenges DM&E faces in their effort to make the agricultural vehicles of today legal for road use.

Commonly experienced brake problems

After a guided tour of the factory, Service technician, Per Larsen from BM Autoteknik A/S, gave a presentation about brakes and brake tests on agricultural vehicles.

Fig. 1 An agro brake test demonstration was performed on a slurry tanker from Hvornum Machine Pool.

Fig. 2 Per Larsen from BM Autoteknik A/S demonstrates the BM20200 Agro brake tester.

"The attendants were listening intensely, as practically everyone driving agricultural machinery, had experienced brake problems in their working lives. Previously, no one has ever been able to test and clarify the cause of the problem. Many tractor owners have experienced huge costs maintaining worn out tractor brakes. Most people had not considered that the trailers and agricultural machinery that are towed by the tractor can be a major factor in these costs because they do not brake sufficiently - or at worst do not brake at all", said Per Larsen.

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New ABB welding robot

BM has invested in yet another welding robot. The new welding robot is mounted on an 11 meter long rail system. This means that the two manipulators are positioned in line compared to the current robot where they are opposing each other.

The first manipulator can manage objects of 3.5 meters and the other objects of 5.5 meters. The current robot manipulator can hold 2.5 meters objects. The possibility of having 5.5 meter objects in the manipulator enables us to weld the frame for the BM20200 - even the model with roller lengths of 1600 mm.

The robot is expected to be up and running within a month.

The hard facts by the "number cruncher"

Torben Madsen, economic consultant at DM&E, presented a multitude of statistics that really shed some light on Machine Pools and Contractors' earnings and expenses, highlighting areas where money could be saved.

Convincing Brake Test Demonstration

After lunch the seminar continued in the BM production hall, where brake tests were performed on a slurry tanker and grass transporter, by courtesy of Hvornum Machine Pool. These are among the cleanest and best maintained machines; however, the brake test results were not convincingly good. The slurry tanker, which is less than two years old and has just returned from a workshop inspection, could barely meet the statutory requirements. The one-year-old, and also recently serviced, grass transporter failed to reach statutory requirements. Subsequently, the owner told the assembly that the brakes on the tractors that had been used extensively for towing these grass transporters, had indeed needed repairs and that towing this agricultural machinery might have contributed to the tractors' brake wear costs. The test results, therefore, very convincingly proved the importance of testing brakes on agricultural vehicles.

Fig. 3 Service technician, Per Larsen, shows the test results on a printout from the agro brake test.

Rewarding Seminar

There is no doubt that the participants found the seminar very educational, and they now realise how important it is to consider good quality trailer and towed agricultural machine brakes - especially when purchasing new machines. It is also important that the current vehicles' brakes are properly maintained, and possibly upgraded - not least in the light of economy, since it is a lot cheaper and far safer to brake, if all wheels assist in the braking.

In a press release (www.dmoge.dk, June 26 2012) Jørgen Jørgensen, chairman of DM&E Funen, has previously emphasised that:

"It is of great importance to DM&E that focus is now being put on maintenance and testing of brakes. Safety is vital to us and when it turns out that there are also very good economical reasons for having good brakes in order to avoid the expensive repairs on tractors, it cannot go too fast for the Agro-brake test to be taken into use."

BM Distributor: Autoverktyg in Borås AB (Sweden)

Autoverktyg was founded in the early 1960s and is based in Borås, Sweden.

The first BM4000 for heavy vehicles was sold in 1984 to the Armed Forces' Technical School in Sweden by the founder, Lennart Ringqvist, together with Benno Larsen from BM Autoteknik.

Autoverktyg was one of BM's first distributors of the BM20200. This was sold to the Swedish Police who needed a mobile brake tester for roadside inspection use. Making Autoverktyg one of BM's oldest distributors, working throughout Sweden. In 2007 Aina & Lennart Årebäck took over the business, and have since moved to new premises in order to offer the customers more than just the sale of products and spare parts. Their future plan is to also offer the customers professional training on how to perform brake tests on heavy vehicles, at their new facilities.

During 2013, an effort will be made to expand their staff by employing more service technicians in this field.

Autoverktyg has 5 key customers: Bilprovningen (the National Vehicle Inspection Company), The Police, The Armed Forces, Scania and Volvo and also supplies hundreds of smaller workshops with heavy vehicles brake testers. Autoverktyg has also delivered brake testers for Scania Chassis Lab and Volvo's test lanes for trucks.

Truck and Bus customers make up about 80% of the company's sales. Autoverktyg also sells and services equipment associated with work on the vehicle's wheels, i.e. brake lathes, jacks, etc.

Company web site: **www.autoverktyg.se**

Never mind the price!

BM Newsletter introduces a new theme - BM TechTalks

Drawing attention to key advantages

BM endeavours to produce high quality equipment when compared with the industry standard. However, when a customer is comparing equipment from BM and other manufacturers, it can be quite difficult for him to recognise important differences in quality and design. To achieve a sale it is sometimes important to be able to draw the customer's attention to some of the key advantages of BM equipment.

Brochures and other literature can only take us so far. References to other customer sites, and the value of your after service team helps. Your knowhow supported by customised software for national regulations brings us even further toward success. But when all is said and done, it can sometimes be difficult to pinpoint to the customer, what is actually behind the statement "BM equipment is high quality and better designed".

Highlighting the quality elements

BM's quality assurance system, together with our cutting edge manufacturing facilities can provide some of the arguments. We, therefore, occasionally present in our newsletters BM's investments in new high-tech manufacturing equipment. Using robots and other high-tech CAD/CAM manufacturing equipment unquestionably increases the quality, and consistency of the equipment is improved.

However, we still have not targeted the core of the quality issue, i.e. we still have not actually highlighted the quality element of the equipment to the customer.

We have, therefore, decided to present a number of articles under the theme "**BM TechTalks**", which will dig deeper into the technical benefits of BM equipment. Our aim is to present these often unnoticed technical details that ensure high quality and design.

We hope this information can be a valuable tool in your sales and will allow you to better substantiate the quality of BM products to your customers and enable them to differentiate between BM equipment and other manufacturers' equipment.

Making the better deal

Vehicle test equipment is a long term investment, but the lifetime cost of a purchase is not often taken into account during the purchase.

We hope that this information will help the customer realise that with BM equipment he will probably make himself a better deal.

BM TechTalks - BM53000 play detector

BM builds its own play detector

In 2006 BM needed to add a play detector to its range of equipment. Previously, machines constructed by other manufacturers had been used as OEM equipment. The machine that we used to sell was no longer available and BM had a major contract to fulfil.

Inspecting the machines on the market, it was soon obvious that there were no machines that would fulfil BM's needs; this was due to poor construction, inadequate design, and low specification. BM, therefore, decided to build their own, and typically for BM the design specification was to exceed that of the other machines on the market.

Designing a class leading machine

Play detectors, although superficially simple, are very difficult to design. They need to contain huge reciprocal sideways forces under heavy load, yet move these with precision. BM knew the limitations of the play detectors already available and set about designing a machine that would become the class leader.

PTFE sliders solves bearing problem

Containing the loads, but moving with precision was the first hurdle to overcome. Traditionally rollers and bearings had been used to allow the plates to move, but these very soon wore out in the harsh environment, point loads from the support bearings causing wear problems in the beds, rust due to the damp atmosphere under the plate, in cold countries road salt accelerates the problems, quickly destroying bearings.

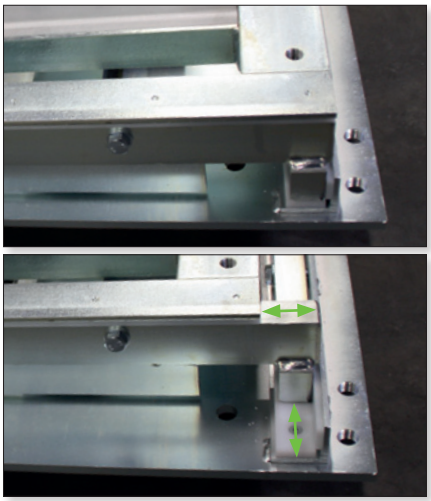

Fig. 4 Top photo shows plate in its central start position. Bottom photo shows the movement of the plate in different directions by means of PTFE sliders.

BM used PTFE sliders to overcome the bearing problem; the sliding beds could now be supported along their full length with no point loading and the PTFE is impervious to rust, salt and chemicals.

The PTFE sliders are also self lubricating, so they do not deteriorate if not greased or oiled. The sliding mechanisms are maintenance-free throughout their lifetime. This alone was a major step forward in play detector design.

Small bed design fits into other sub frames

Because the design of bed was so efficient, it could be made smaller, allowing it to fit inside the sub frames of many other manufacturers' machines. This made it an economical choice when replacing a worn out play detector, as ground work was eliminated or minimal in many cases.

Automatic test sequence with one button

The decision was taken early on to take the control away from the operator and run an automatic test sequence on an inbuilt processor board. This at first looks over the top for a machine with simple controls, but the benefits are very soon obvious. The traditional way to control a play detector

was to have simple switches mounted on a hand control, connected by cable to a relay circuit board. To control the machine press one switch for one direction, press another for the other direction. This, however, had many drawbacks. The machine was fatiguing to control over long periods, and there was a risk of RSI (Repetitive Strain Injury) due to the repeated actions, the operator concentrating on controlling the plates rather than inspecting the vehicle. Controlling the plates was also difficult, as even loading in different directions was difficult to achieve manually.

The new BM design using a processor board removed all of these problems in one stroke. A customisable test sequence allowed for a one button test, just hold one button down to run the test sequence, no more thumb fatigue, timed strokes allowing even loading of the axle in all directions.

Of course BM did not want to limit the play detector, so manual buttons are included, along with single plate movement, and in phase and opposing phase movement options.

Automatic self centering plates

Another problem with traditional manually controlled play detectors is that the plates have to be manoeuvred back to their central position after testing, ready for the next axle. This time consuming activity is not really conversant with modern high throughput vehicle testing. BM already had a processor board fitted to their new design, so it was an easy step to add sensors and a logic program to locate the central start position for the plates. The BM machine would now automatically move the plates back to their central start position as soon as the test button was released.

No cable control - less damages and hazards

The hand control has traditionally been an unreliable part of a play detector, the cable control meant that the control had to be stored in the pit, this made it susceptible to damage and from damp in this harsh environment, the cable is easily damaged and make up a trip hazard. BM then removed the problems caused by the connection cable, by adding a radio transceiver to the processor board, no more trip hazard, no more cable damage and the control can now be stored outside the immediate test area. A powerful built in LED lamp then perfected the hand control.

Digital hand control - no voltage sparks

There is also the danger to users of the pit if there are explosive gases from petrol spills, etc. The heavier than air fumes can build up in the pit and the traditional plate movement switch can cause sparks when operated as it switches the voltage on and off. BM designed their hand control to function by means of a digital signal inside a sealed membrane keypad which means that no voltage is switched on and off. No sparks are, therefore, generated by the BM hand control.

Top plates secured with 45° taper bolts

Securing the top plates to the sliding frames has been a problem on many machines. Up to 4000 kg of side thrust, repeatedly pushing sideways through the clamping bolts, has in the past caused the bolts to come loose, shear and wear the threads on the bolts and in the mounting holes. BM overcame this very easily, not by fitting bigger and bigger bolts as others have, but by securing the top plates with 45 degree taper bolts, which provides a self-locking and securing system, which means that there is no need for high clamping pressures to lock the top plates in place.

Fig. 5 Top plates secured with 45 degree taper bolts.

Balancing ram diameter and oil pressure

The importance of the correct balance between ram diameter and oil pressure is essential for long life and efficient operation. BM found that some machines had shafts on the rams that have a much bigger diameter than the BM. They *look* much bigger and more purposeful, but unfortunately must run at lower pressure, which can introduce its own problems. The large diameter rams look impressive, but their underlying weakness is that they need a high volume of oil to fill the cylinder every time they move. This makes the setup susceptible to restrictions in oil flow rate, as it is necessary to move a lot of oil at low pressure to move the ram.

BM took a great deal of care to optimise the best balance between pressure and volume of oil moved, higher pressure and less flow. Subsequently, the BM53000 has a much sharper action than some other machines, making their operation seem sluggish in comparison. This distinction is very important for play detection, since a sharp contrast in direction change is important to detect play within a vehicle's suspension and steering components.

The high pressure/low volume BM system is also much less susceptible to changes in viscosity due to temperature, and therefore will perform with a similar action whether it is a cold winter's morning or midday in the middle of summer. The BM53000 will give consistent testing throughout the year.

Dip galvanised or electroplated finishes

To complete the design, all surfaces in the beds are either hot dip galvanised, or electroplated; these finishes far outperforming the painted surfaces of many rival machines. Galvanising is a self healing finish that hardens with age, and withstands the dragging of tyres across the surface far better than paint.

Available as on ground machine

Also, almost uniquely, the play detector is available as an on ground machine, either to eliminate installation groundwork, or easily transportable as a portable machine.

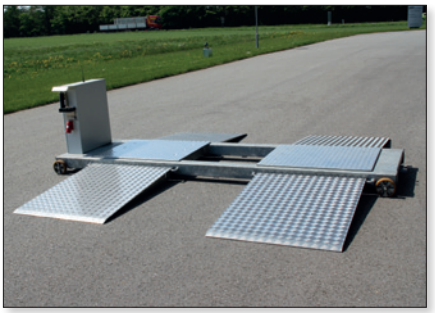

Fig. 6 BM53000 On ground model.

Proven class leader in all markets

Since its introduction in 2006 the play detector, named the BM53000, has proved to be the class leader in all markets, the authorities in many countries using it as the benchmark for play detector approval into authorised vehicle testing stations.

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