



## IMPROVING THE EFFICIENCY OF CEMENT SPREADING FOR COLD RECYCLING

Since cold recycling started in China the spreading of stabilizing agents has been carried out by hand. The rate at which the stabilizing agent is spread is calculated on a square metre basis with bags being laid out in a grid pattern on the existing road. Besides the time needed to mark out the area, time is wasted in loading the bags onto trucks, unloading them again, placing them in their designated spots, as well as opening and carefully spreading the powdered stabilizing agents. The cold recycling project in Xian provides a good opportunity to introduce all the advantages of the cutting edge technology offered by Wirtgen's system partner Streumaster.



Xian is well known as a tourist attraction in China especially its Terracotta Warriors and ancient City centre. Three of the many spots that attract Xian is well known as a tourist attraction in China attention are the city Wall, the Drum Tower, and the Bell Tower. Traffic passes through the city centre along the North-South Axial Road, known as Chang'An Nan Lu. Around 40 000 vehicles use this road every day and after many years in service rehabilitation of the road pavement was required. The Authorities looked for the most environmentally friendly technology that could be employed and chose the cold recycling technology from Wirtgen. The work was finally awarded to the Xian Management Bureau (XMMB), which already owns a Wirtgen WR 2500S cold recycler as well as other equipment from the Wirtgen Group.

### JOB DATA

The opportunity was taken to redesign the road by widening it to a total width of 40m with five traffic lanes in each direction, a 4m green coloured strip in the median and comfortable 3.5m pedestrian walkways on either side. The pavement design was for traffic loading in accordance with BZZ-100 and a maximum speed of 60 km/h. The existing pavement was recycled to a depth between 27 cm and 30 cm, and adding 30 kg cement per square metre. By reusing the existing materials in the pavement over a total area of around 370 000 square metres using Wirtgen cold recycling technology it was possible, according to Xian Management Bureau, to avoid removal and transportation of approximately 100 000 m<sup>3</sup> of material, approx. 6.600 Trucks.



## THE MACHINE STREUMASTER SW 16 MC AND THE ADVANTAGES

Using a high precision spreading technology firstly results in saving the quantity of stabilizing agent to be used. Another advantage is the reduction in time that results from not having to load, unload and physically spread the bags of stabilizing agent. The recycling of Chang'An Nan Lu used around 11.100 tons of cement. Using the manual spreading method with the bags of cement, each of which normal weigh about 25kg, a total of 444 000 of bags of cement was required. Assuming that each truckload carried 20 tons, it is necessary to load and then unload 800 bags per truck, requiring a lot of manpower and of course considerable time. Experience shows that it takes around 3 hours to load and unload 800 bags. That means that the total time just to load and unload cement bags for this project would take 167 days (assuming 10 hours per shift), or 7 months (24 working days).

In Xian the Streumaster SW16 MC was in operation mounted on a SX3255DR385 Truck from Shaanxi Automobile Group. The tank for the stabilizing agent has a volume of 16m<sup>3</sup> which is equal to approximately 20 tons of cement. Usually the cement is pumped directly from a silo truck into the Streumaster's tank. Taking into account that silo truck, pumping cement at 1 bar would be able to fit the Streumaster's tank in a maximum of 30 minutes, it can be calculated that the total time required to load the 11 100 tons of cement on the Chang'An Nan Lu job would be around 28 days. The Streumaster has a spreading width of 2.46 m and spreads the stabilizing agent at a speed of 1.5 km/h. it would therefore take approximately 10 days to spread the same 11.100 tons of cement on the total area of 370 000 m<sup>2</sup>. Considering the loading time of 28 days and 10 days to spread the cement, the total time taken using the Streumaster can be compared to the 167 days that it would take using manual labour.

Besides this huge time and cost saving, the Streumaster improves efficiency on the job – there is the distinct advantage that the stabilizing agent can be spread just when it is needed and there is no need to consider weather changes such as rain which can force the jobsite team to cover all the bags that have already been placed.

Another very important cost saving advantage using the Streumaster is that, in accordance with regulation authorities, on recycling jobs the Contractor, when using bagged cement (in this case 5%), has to add an addition 1% cement to ensure that the specified stabilizer content is achieved. This is to guard against stabilization agents that are lost by being blown away by the wind, or by poor accuracy of spreading on the road. When spreading the cement using the Wirtgen Streumaster the additional 1% cement is NOT required, which makes it possible to save a total quantity of 1 850 tons of cement. Based on a total area of recycling of 370 000 m<sup>2</sup> and a price of RMB 400 per ton for cement, the saving would be around RMB 740 000.

The Streumaster SW 16 MC mounted on a Truck from Shaanxi Automobile Group, Typ SX3255DR385 powered by an 276 kW, WP 12.373 N Engine and equipped with all wheel drive for all terrains.



## PRECISION OF THE ADVANCED SPREADING TECHNOLOGY



Spreading a width of 2.46 m



Spreading the remaining width of 0.82m



Consistent spread rates regardless of travel speed are the key to precise spreading. This is guaranteed by the Streumaster's electronic control system, which is located in the control terminal in the truck cabin. This system links the conveyor chain, transverse augers, metering feeders and control terminal and results in a high level of accuracy. The control system re-calculates the required spreading rate within microseconds and ensures that the chosen spread rate is always correctly applied. The stabilizing agent can be spread up to a width of 2.46m by three individually controlled reading bars, each with a width of 0.82 m. Depending upon the requirements, each of the single spreading bars can be closed off.

## COLD RECYCLING, COMPACTION & PAVING

After successfully spreading the cement using the Streumaster SW16 MC, the Wirtgen 2500S Recycler recycles the existing pavement to a depth of 30cm, with a working speed of 6.5m per minute. Meanwhile the Streumaster spreads the next section with cement, ready for recycling.

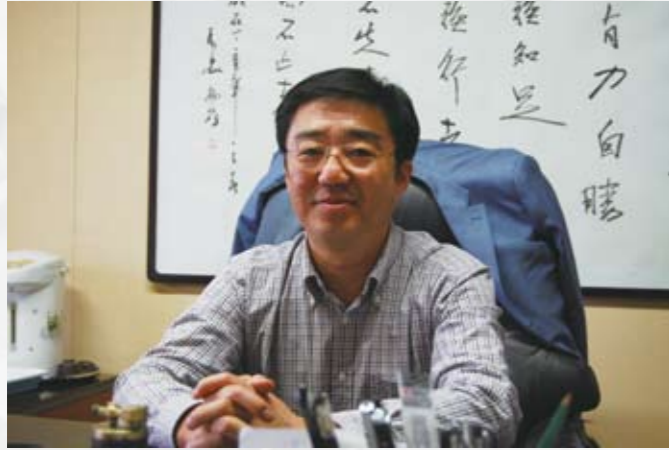


A Hamm 3625 HT single drum compactor with Hammtronic and operating weight of 25 ton, using an amplitude of 1.95mm on the 2.22m wide drum, was sufficient to compact the 30cm thick recycled layer

Last but not least a Voegele S-1803-2 paver with an AB 500-2TV screed was used to pave the wearing course. This powerful wheeled asphalt paving machine, equipped with ErgoPlus and 6X6 drive (all wheels are powered) ensures a perfect and even wearing course.



## INTERVIEW



Mr. Gang, first of all thank you very much for your time. You are the Managing Director of the Xian Municipal Management Bureau and have been a loyal Wirtgen Group customer for many years. Can you tell us why you choose products from all of the Wirtgen Group brands including Wirtgen GmbH (Milling Machines and Recyclers) Voegelé AG (Asphalt Pavers) and Hamm AG (Double Drum Rollers and Compactors) for your fleet of machines?

I have been engaged in municipal work for more than 20 years. With the development of the economy, the demands upon municipal roads become higher and higher. On the one hand, we have many existing roads that need to be widened, upgraded, and repaired; and on the other hand, we also have many new roads that are planned to be built. The characteristics of municipal road repair and maintenance are: busy traffic, many job sites, limited working time, and the need for high quality. It follows that the requirements for machines include: reliability, less breakdowns, easy operation, and simple service and maintenance. In essence, machines from the Wirtgen Group can meet our construction requirements.

**XMMB is using all the core technologies of the Wirtgen Group including cold GREEN MIX Technology/Cold Recycling (Wirtgen GmbH), the Dash 2 Series of the Ergoplus/Pavers (Voegelé AG) and Oscillation and Hammtronic from Hamm AG. What is your experience with these technologies and what are the benefits you get from them?**

We have the new Voegelé-2 pavers, and the feedback from our technicians and operators is that they break the mould of traditional pavers with easy operation, easy control of paving parameters and good ergonomics.

As there is no risk of resonance during compaction when using the Hamm oscillation roller, it doesn't affect the surrounding buildings, municipal pipe-lines, cable-lines, and bridges. Use of this machine for compaction work does not affect people near a job-site, so it is particularly suitable for municipal road repair and maintenance projects.

Recycling techniques will be used more and more in the future. Many roads in Xi'an were built 10 years ago. Nowadays, increased city traffic is putting a lot of pressure on city roads but we have to try to produce as little construction waste as possible. So, we are trying to reuse as much as we can of the existing pavement material to reinforce our roads and recycling machines from Wirtgen meet our construction requirements exactly.

**Nowadays when we drive through Xian, we can see ongoing construction on almost every corner. What are your projects for 2009 and 2010 and what are the highlights?**

Yes, we plan to repair 51 city roads with a total investment of around RMB 1.5 billion. The emphasis is on the repair of the central north-south axial road.

**We have noticed that among this long list of projects there are many recycling projects and jobs in the city. Can you tell us more about this?**

For the repair project on the central north-south axial road, we are using two Wirtgen WR 2500 S recyclers to recycle a 22-28 cm base course with cement. The total recycling area is 370,000 m<sup>2</sup>. Using recycling methods, we can reduce construction waste by 100,000 m<sup>3</sup>. To ensure construction quality, we can increase construction efficiency, reopen roads to traffic as quickly as possible, make large-scale savings on construction costs, and reduce environmental pollution.

In 2008, during the overhaul of the north ring road, we also used WR 2500 S machines to recycle the base course with foamed bitumen. This is a typical application of your GREEN MIX TECHNOLOGY.

**Why did you choose GREEN MIX TECHNOLOGY/cold recycling for this inner city project? And where and when did you first hear about it?**

Years ago we started to investigate road recycling methods. We sent personnel to look for information, learn about the process and visit other job sites. From 2007, we started to do trials. As I mentioned before, recycling has many advantages, such as being environmentally friendly, cost saving, etc. Other reasons are:

- Environmentally friendly machines and environmentally friendly technology efficiently reduce construction waste.
- Long-term use of the road base course.
- It strengthens the road base course.
- Many fresh materials such as cement, foamed bitumen, bitumen emulsion, water, and aggregates can be added to strengthen the base.
- High construction-efficiency, ensuring that the work is finished on schedule or even earlier.

**GREEN MIX compared to 100% hot asphalt resurfacing saves a lot of energy, bitumen, truck-loads etc. This also helps the environment. What does this mean to you?**

Yes, compared to traditional methods, recycling technology can reduce costs such as transportation, materials (new base course material and surface asphalt), and reduce air and noise pollution. Less transportation is very important for city construction projects. So, in our case, we have saved on costs.

**The Central Government of China is pushing environmentally friendly technologies in many areas all over China. What is your forecast for GREEN MIX Technologies/cold recycling?**

Our government strongly emphasizes environmentally friendly recycling projects with construction waste reduction and sustainability. Sustainability and reuse are our targets. The recycling market has just begun. As more and more companies consider recycling in their future projects, the recycling market will become bigger and bigger.

**Also with milling machine technologies, we can see more updated technology. You recently purchased a brand new Wirtgen W150 which was newly introduced at the Bauma China international trade fair in Shanghai. As you are using Wirtgen Milling machines ranging from the small W 35DC up to the big W 2000, what is your opinion of this new machine?**

According to my operators, there are many reasons why this model is the best cold milling machine:

- Easy to operate, high milling accuracy, high milling evenness, and a milling depth of up to 30 cm in a single pass.
- High milling speed.
- Low fault ratio.

**As we are talking about new machines, you were also one of the first contractors in a municipal area in China to buy a Voegelé S-1803-2 Asphalt Paver which is the largest available wheel paver. Your S-1803-2 with Ergo Plus is also equipped with a 6/6 drive at your request. Why did you insist on this drive system?**

That's easy to answer as this is a requirement for our construction projects:

- With all-wheel drive, the traction is much better and it can easily push a tip truck full of asphalt.
- Whether on the surface course or on the base course, with an all-wheel drive there is no pushing of paved material, thus ensuring an even pavement.

**What is your opinion of the Hammtronic control System on your Hamm single drum roller 3625?**

Just as the oscillation drum has a high compaction rate and wider application than a normal vibration drum, the Hammtronic control system not only ensures compaction quality but also reduces running costs. This system can maintain the setting speed and the setting frequency automatically. It has an anti-slip control and an automatic engine speed control. This makes operating the roller more relaxing.

**Now we come to our last question.**

**Mr. Gang, as a final decision maker, an industry expert and the Managing Director of XMMB, what is your advice to our readers in terms of making a successful machine purchase and the right choice of partners from the supplier side?**

Good machines can ensure construction quality and make sure construction schedules are met. This is truly worthwhile in the long run, so it is important to have the right partnership that offers all the support required for our daily work. Think long term!

**Thank you for your valuable time Mr. Gang.**