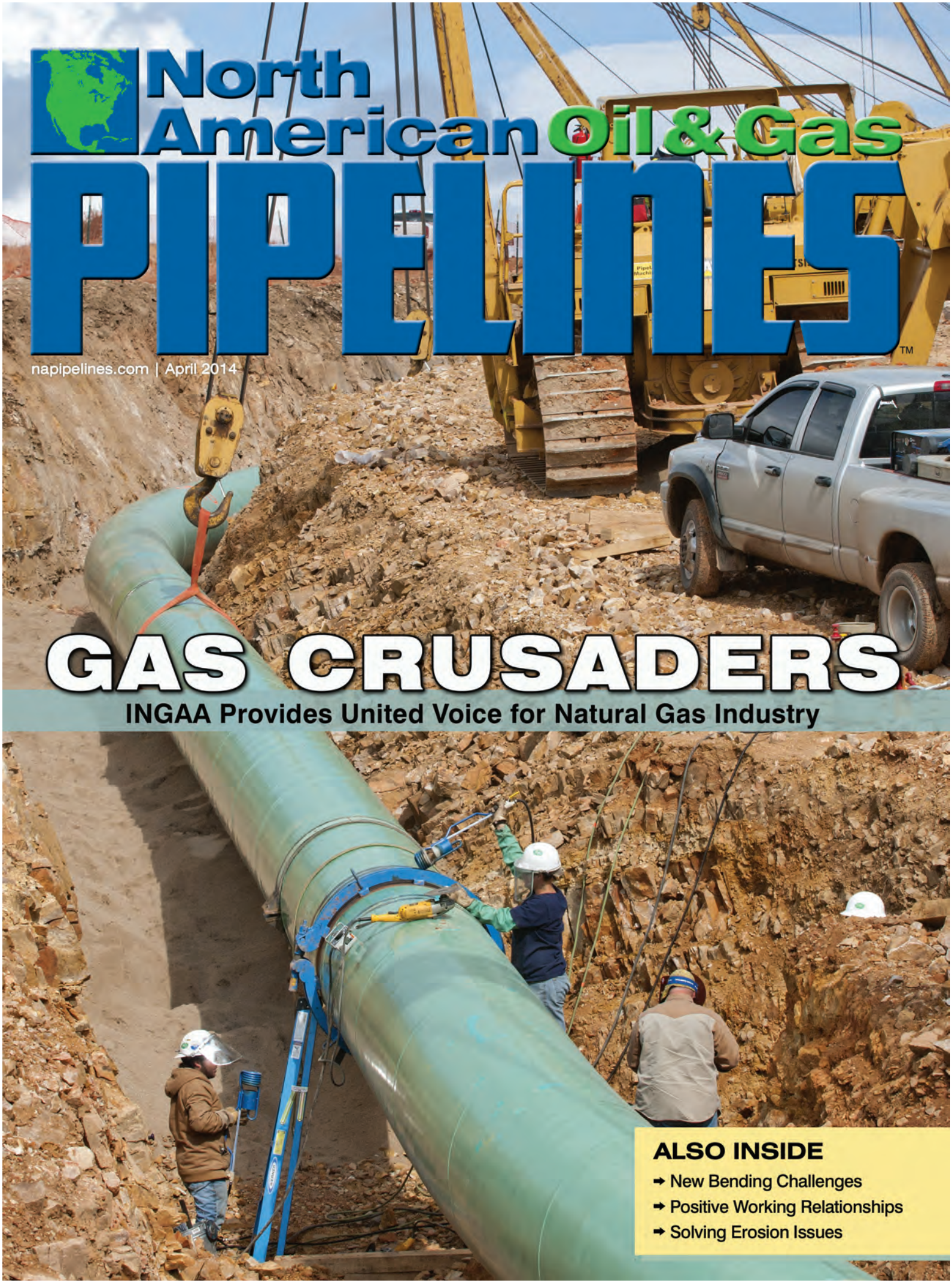

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Q&A GET BENT

Pipe Bending Machines Need to Keep Up With Modern Steel Specs

By NAOGP staff

Pipelines that carry precious oil and gas resources must be engineered with the strongest materials available to ensure safety and integrity. Thicker walled steel is used more and more to allow for increased pressure for long-haul systems.

Pipe bending machines must therefore be able to handle these stronger grades of steel to shape the pipe to the proper specifications to fit approved rights of way.

Maats Pipeline Equipment helps supply the industry with high-quality equipment. The company has partnered with Liebherr components to build some of the strongest pipe bending machines on the market. *North American Oil & Gas Pipelines* spoke with Paul Waanders, international sales manager at Maats, to better understand the changing demands for today's pipe bending machines.

Q What is the typical life cycle of pipe bending equipment?

As bending machines work relatively low hours on pipeline construction projects, the typical life cycle of a well-maintained bending machine can be as much as 35 years. It is important that the machine is used within the limits set by the manufacturer and that maintenance is performed as prescribed.

Q What bending equipment specifications are most common on large-scale transportation pipeline projects?

Generally, pipe bending equipment is selected by the pipeline construction companies, based on the pipe specifications (diameter and wall thickness). If, according to the specifications, the machine is up for the job, it will be used, whether the machine is new or older.

Q What are the leading concerns when working with today's steel pipe specifications?

The common problem with (older) bending machines nowadays is to keep up with the ongoing development in project design and steel specifications and, following that, the wide variety in steel pipe specifications used in projects. Most bending machines are not designed to handle the wide variety and increasing quality of steel specifications, resulting in various problems, errors and costly downtime.

The above is why the Maats bending machines have been designed for bending the maximum loadable pipe size with a wall thickness of 1-in. for X100 steel quality. This means that they are suitable for virtually all pipes that are currently available commercially and that there are no practical concerns for bending any steel pipe nor limitations for designing a cross country pipeline to the highest available specifications.

Making the force available to bend high quality pipe steel is of course vital, but with modern techniques in hydraulics it is not a problem to obtain enough hydraulic force. The actual difficulty is in the strength of the machine frame. A common failure with bending machines is a cracking frame as the stress on some parts of the frame becomes increasingly higher when bending pipes with large wall thicknesses and high steel grades. This model (see p. 36) shows the stress calculation that Maats had carried out by specialists. As a result of computer modeling that showed the stress placed on the pipe bending machine frame, engineers at Maats decided to require a higher strength steel quality for the frame. With that high standard, it leaves no doubt that the machines can bend the range of pipe specifications without any problems.

Q How have oil and gas pipeline integrity regulations in North America changed pipe bending operations?

It is not so much the integrity regulations, but more the more stringent health, safety and environment (HSE) rules and policies. One of the health issues we tackled is the noise emis-

sion (OSHA 1926.52). Placing the engine opposite the operator's platform and in an isolated cabinet resulted in a noise emission of 72-86 dB(A) (according to 2000/14/EC) at a distance of 1-m, resulting in an even lower level at the operator stand. The surplus in power also means that the machine will be running at idle for most of the time, resulting in a lower noise level.

On the safety side we made an extensive risk analysis resulting in the addition of:

- The machine layout ensures no high pressure hoses in the operator area to make the operator's job safer.
- A rotating beacon that is always on when the machine is in operation, to warn the personnel working in the machine area.
- A safety lever, this lever has to be raised when leaving the operators platform. By raising the lever, all hydraulic functions of the bending machine are disabled. This means that the machine has no functionality when there is nobody on the operator platform. This prevents unintended movement of the machine and reduces the risk of severe injuries.

Q What considerations must be taken into account when working with coated pipe?

Pipe coating generally is the most vulnerable part of the pipe during a bending process. When bending heavy wall pipe with increased bending forces, the risk of damaging the coating only gets bigger. To avoid coating damage it can be helpful to use coated bending sets (with special coating that can withstand higher bending forces) and to use bending sets that do not have any sharp edges.

Q What are the top maintenance concerns for pipe bending equipment used on oil and gas pipeline projects?

As bending machines generally work low hours, the maintenance is minimal. The engine has to be serviced according to intervals specified by the manufacturer and more importantly, the machine should be kept clean and well lubricated, especially the moving parts. Sand, mud and rock can cause severe damage to the moving parts, to hydraulic hoses and to pipes and pipe coating. Because of the "oversized" layout of the Maats bending machines the machines will hardly be used to its full potential, meaning less stress on the steel frame and less wear of the engine.

Q How are higher strength steel pipes changing maintenance needs for bending machines?

The answer does not lie in maintenance. When a machine has to work beyond its capacity, there is an increased risk of damage to vital parts and the frame could very well crack under the pressure. Of course visual inspections become even more important to monitor the machine, but there is not a way to prevent big problems by adjusting maintenance intervals.

As per the previous answer, Maats bending machines are sized for current and future pipe standards. This means that the machines are up for any job. There will be no need for any change in maintenance, even when pipe specifications change during the typical life cycle the machines.

Q What other considerations must be taken into account when working with modern pipe specifications?

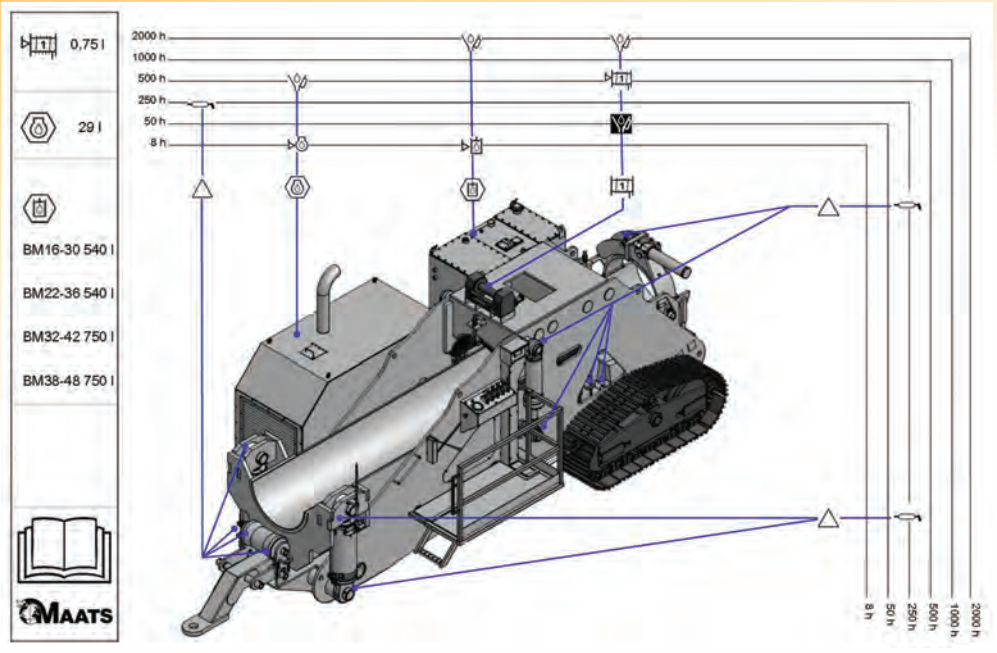
It is extremely important to use equipment that is meant for handling the required pipe specifications.

When a machine is purposely designed and built to handle the modern, high quality pipe specifications, the machine will perform without a problem, but due to the development in pipe specifications over recent years, more and more older machines are no longer suitable on today's pipeline construction jobsites. Many machines have been designed in a time when pipelines were built in X52 material, nowadays X70 is the standard and pipeline operators are testing X90 and X100 qualities.

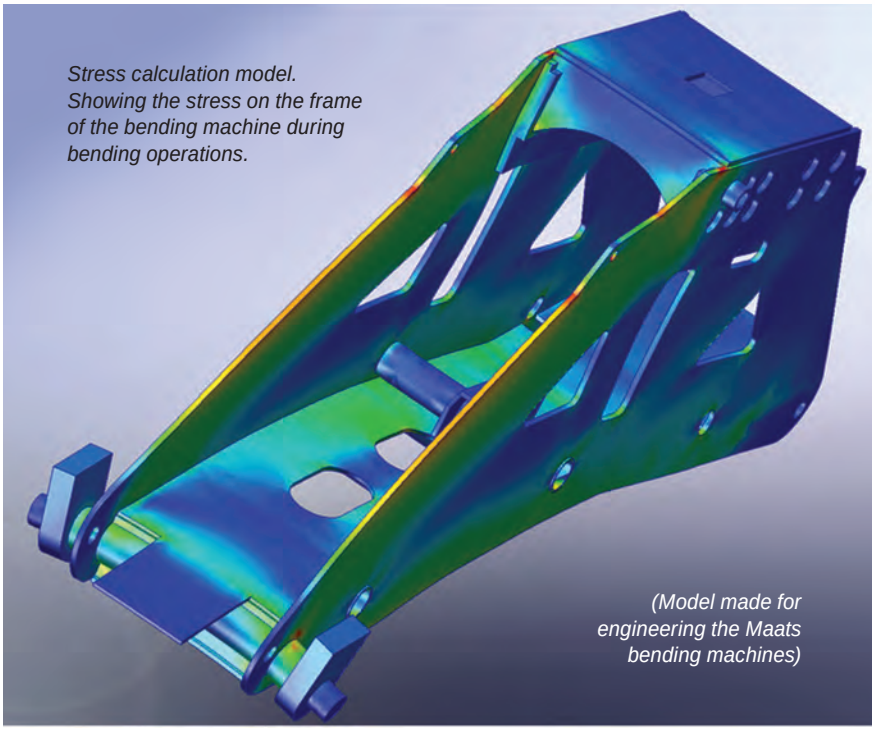
The BM22-36 is one of the bending machines in the Maats bending program, which ranges from 16 to 60 in. The Maats bending machines are designed to be ready for future developments in steel pipe specifications. With a capacity of bending up to 1 in. wall thickness at X100, the Maats bending machines are capable of bending pipe with specificataions beyond the current requirements. As pipe specifications keep developing and bending machines have a long lifecycle, the Maats bending machines, with this "oversized" layout, are ready for upcoming developments in pipe specifications.

The rotating beacon is an extra safety feature on Maats bending machines. It is switched on as soon as the safety lever is set to working position to warn personnel working in the machine area.

The safety lever is an extra safety feature on the Maats bending machines. The safety lever secures the machine from making any unintended movements.



An example of a typical Bending Machine lubrication-chart. The drawing indicates all general lubrication points and intervals. Combined with the guidelines stated by the manufacturer, lubrication is one of the most important things for maintaining a bending machine.



Stress calculation model. Showing the stress on the frame of the bending machine during bending operations.

(Model made for engineering the Maats bending machines)

The use of increased pipe specifications means that machines more often are working on the limit of their abilities. This results in a shorter life cycle, an increased chance for damages and costly repairs and also in potential hazardous situations on a jobsite for people working on and around the bending machine.

The change in pipe specifications is due to:

- Use of higher pressures to cover greater distances.
- Different ("new") gases and fluids like carbon dioxide and methane.
- New techniques that allow a choice for more challenging pipeline routes (mountain ranges).
- Increased infrastructure, which results in more need for rail, road and water crossings, often with heavier wall pipe.
- Increased infrastructure, where pipelines are being planned closer to urban or environmentally vulnerable areas, safety regulations make heavy wall pipe obligatory.
- Calculation programs becoming more and more accurate, resulting in a variety in wall sizes on the same project.

With these changes, it's important for pipeline contractors to make sure their bending equipment is up to the challenge of handling stronger pipe.

BENDING HISTORY

This is what experience looks like

POWER: The Maats bending machine program ranges from 16 to 60 inch. The robust and reliable Maats bending machines have the capacity to bend pipes up to 1 inch wall thickness x100 of the maximum loadable pipe-size. The Maats bending machines are the strongest available in the market.

OPERATION: The layout of the machines is simple, operating the machine is easy. Machine settings can be easily controlled and if required easily adjusted.

MAINTENANCE: Built with mainly Liebherr components, all major parts have a proven track record as components build on heavy duty construction machinery. Service, maintenance and the odd repair is easy. Service and spare parts can be easily obtained from your local Liebherr dealer, anywhere in the world.

MAATS PIPELINE EQUIPMENT

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