

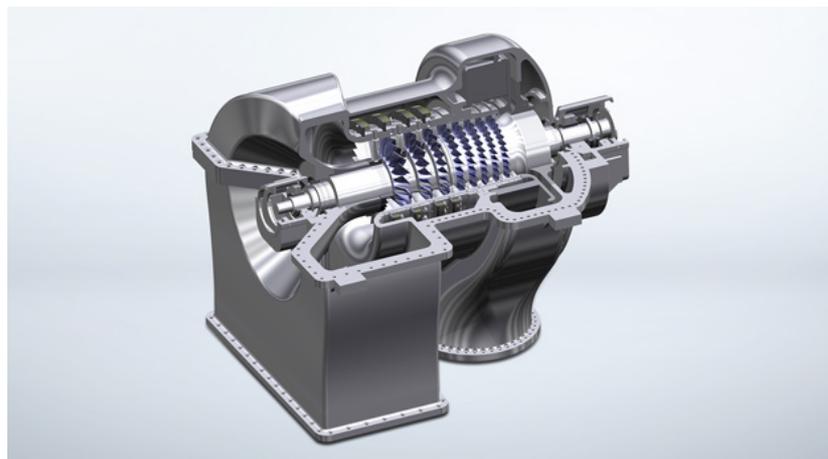
## **The next level of fertilizer production: Lowering CAPEX and OPEX for nitric acid plants with the NAMAX concept.**

What if a well-established production process in your industry instantly reaches a new level of flexibility and efficiency? Nitric acid production did - with a comprehensively optimized turbomachinery concept called NAMAX that has been introduced by MAN Diesel & Turbo. The solution by the Germany-based turbomachinery system provider means that one of the most demanded feedstocks in today's industry can now be produced more efficient, and with much more flexibility for producers.

An initial project from MAN Diesel & Turbo with licensor thyssenkrupp Industrial Solutions now marked the entry of NAMAX into the fertilizer market, meaning that the long-standing dual pressure process for nitric acid production has now been taken to another level of efficiency. The MAN concept introduces a machine type that is new to the fertilizer branch, but has been proven in other demanding branches. Altogether, the well-referenced technology combines a bunch of advantages.

### **Raising efficiency for the process as a whole**

NAMAX forwards a well-established production process like nitric acid in a way that is quite rare in today's industry. Several percentage points of enhanced efficiency are only one advantage of that next-generation concept. In a nutshell, it allows to customize the centerpieces of nitric acid production to the individual needs of each owner or operator, and to deliver and commission such efficiency technology even faster.



(Figure 4 - Axial Flow Compressor AG-MAX1 with radial inlet.jpg)



### **MAX1 - most modern compressor technology, substantially proven**

With an AG-MAX1 as air compressor of the NAMAX nitric acid train, MAN has introduced the most modern technology of axial compressors to the fertilizer branch. Initially developed for the demanding air separation branch, MAX1 technology has already proven its robustness and efficiency in a double-digit number of projects in Asia and Africa. As centerpiece of the NAMAX concept, it has now entered the fertilizer branch, where it also provides its advantages: robustness, efficiency and power density. In other words: more out of less.

### **Eliminating the gearbox – less losses, more flexibility**



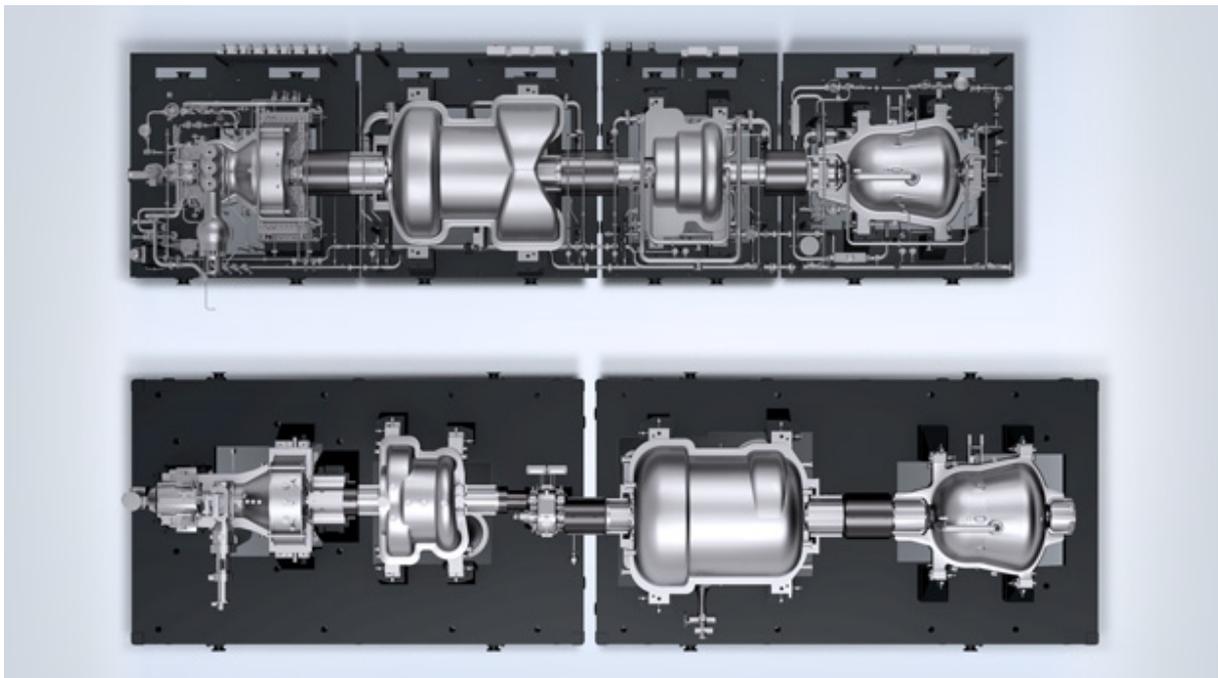
(NAMAX Seitenansicht.jpg)

With all machines in the train now being able to run on the same rotational speed, there is no longer a need for an intermediate gearbox. The benefits are clearly not only understood by engineers: no frictional losses and more flexibility in terms of arranging the machines, e.g. as above: steam turbine, air compressor, NO<sub>x</sub> compressor, tail gas expander which also can be designed as a hot gas expander. And even an optional motor-generator can be arranged to the sole needs of each plant.



### **Before and after – scaling down the footprint**

Less equipment with higher power density lead to the machinery trains being up to 15 % shorter and 30 % narrower than the standard hitherto - a significantly reduced footprint that does not only imply less space consumption within plants. And with an overall efficiency that has been improved by several percentage points, it is also the CO<sub>2</sub> footprint that has been scaled down.



(Figure 7 - Comparison of conventional train configuration (top) with NAMAX.png)

### **All from one source – including eased commissioning and service.**

The NAMAX concept combines core machines from one single OEM source to a complete well-balanced machinery train. Starting from a basic configuration with various engineered options, it allows to individually customize the package including additional instrumentation and auxiliaries, such as air filter or integrated oil system. As well, the modular approach facilitates transportation and commissioning, mainly resulting in temporal benefits. So a better package can be delivered, set up and commissioned faster – even for revamping existing plants.

All this has led to a first project with licensor thyssenkrupp Industrial Solutions, [announced by MAN](#), marking the entry of NAMAX into the fertilizer market.



### **MAN Diesel & Turbo for the branch of fertilizer:**

As one of the leading turbomachinery providers for various branches, the company has provided turbomachinery equipment for around 180 nitric acid plants worldwide, also including the world's largest plants. Together with its expertise in production technology for ammonia/urea, it stands as the leading provider for the globally represented branch of fertilizer.

Learn more about solutions, products and services by MAN Diesel & Turbo for the fertilizer industry – whether it is [ammonia/urea](#) or [nitric acid](#), as well as the OEM's own service provider [MAN PrimeServ](#).

If you want to know more about the NAMAX concept, or other solutions for the fertilizer industry, get in contact with MAN Diesel & Turbo:

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