

ON-SITE PRODUCTION IS GOOD FOR THE ENVIRONMENT

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N₂

NITROGEN IN SELECTIVE, WAVE OR REFLOW SOLDERING

WITH THE HELP OF AN INNOVATIVE GAS GENERATION WASTE HEAT CONCEPT, N₂ GENERATION BECOMES A DECARBONIZATION SYSTEM AND PROTECTS THE ENVIRONMENT AND YOUR WALLET AT THE SAME TIME. IN-HOUSE GENERATION IS ALSO PART OF THE SUSTAINABILITY STRATEGY, WHICH LEAVES A SIGNIFICANTLY LOWER CO₂ FOOTPRINT.

Nitrogen (N₂) is used in electronics production because it creates a protective atmosphere that prevents oxidation during soldering and thus ensures optimum product quality. Thanks to the latest technical innovations from Inmatec, the on-site generation of N₂ offers the possibility of making production much more environmentally friendly. N₂ self-generation will also be part of the sustainability strategy, as it leaves a significantly lower CO₂ footprint than a LIN (liquid nitrogen) supply.

Profitability and productivity are the primary goals of every company. Therefore, companies are always looking for ways to reduce costs in order to increase their competitiveness. At the same time, the legal requirements in terms of environmental protection and decarbonization are increasing, which is usually associated with increased costs. But what at first glance looks like competing goals turns into a win-win situation in practice with N₂ self-generation, from which companies derive a double benefit.

Requirement for lead-free soldering

Nitrogen is used in particular in the context of selective, wave or reflow soldering processes. The inert gas displaces the oxygen in the systems and prevents oxidation in order to achieve high-quality soldered connections in electronic assemblies. Contamination through the formation of dross and whiskers and the corresponding consequential damage (e.g. short circuits) are effectively avoided, and the consumption of solder and flux is reduced. In addition, the use of nitrogen, in accordance with the RoHS (Restriction of Hazardous Substances) directive of the EU, is a prerequisite for soldering lead-free solders.

The nitrogen required for this can be produced on site in an environmentally friendly way. An N₂ generator uses PSA technology to adsorb nitrogen from the ambient air in the desired quantity and quality. The compressed air used is generated by compressors. The disadvantage here: the majority of the electrical energy supplied is converted into heat by the compressor and evaporates without any effect. The solution would be an innovative gas generation waste heat concept that lowers the electricity requirement and at the same time makes the generated thermal energy usable.

Hydrogen and heat recovery save energy

The production of nitrogen requires different amounts of compressed air. While conventional systems require a compressed air factor of 12 to 14, new types of PSA systems only consume 6.7 - 7.0 m³ compressed air per m³ (N₂).



The turnkey system provides a combination of an energy-efficient IMT PNC nitrogen generator, an NKat hydrogen catalyst for generating nitrogen and an N₂ product tank.

With the help of an NKat hydrogen catalyst, the amount of compressed air required is significantly reduced. In the two-stage process, "raw" nitrogen is produced with a purity of 99.9%, and then with the help of hydrogen, a purity of 99.999 - 99.9999% is produced in the second step. In this way, larger quantities of high-purity nitrogen can be produced with a significantly reduced compressed air requirement (compressed air factor from 3.0), whereby up to 70% of the amount of electricity required by conventional PSA technologies can be saved.

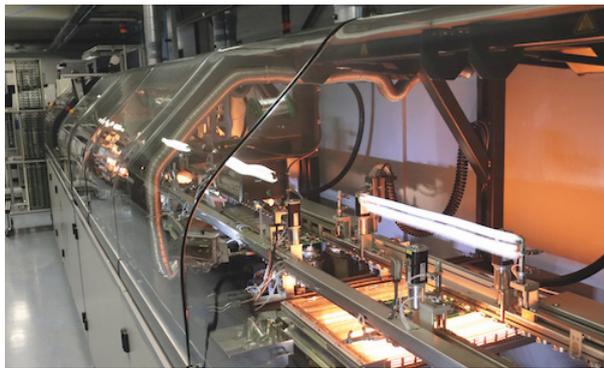
In addition, the waste heat from the air compressor can be recovered in order to improve the energy balance of self-generation. Using heat recovery technology (WRG), the waste heat is used as warm air or hot water to heat rooms and processes.



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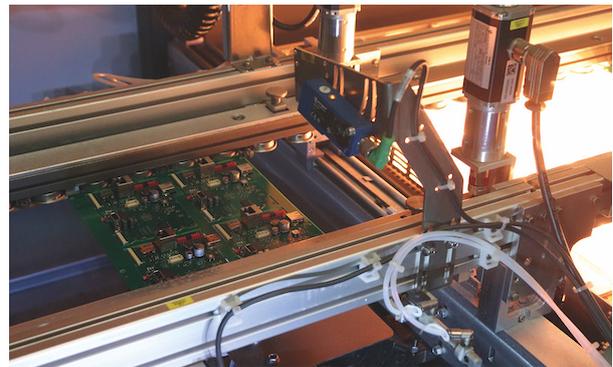
Sustainable action

Legal guidelines encourage the change towards more sustainability. Companies are increasingly following the ESG guidelines of the EU, which call for sustainable action in ecological, social and legal (governance) areas. The federal government's national climate protection law provides for greenhouse gas emissions to be reduced by 55% by 2030. In addition, greenhouse gas neutrality is to be achieved by 2050. Investments in resource-saving and environmentally friendly technologies to reduce the CO₂ footprint (decarbonisation) of industrial processes and to protect the climate are becoming an essential factor for long-term corporate success. In order to achieve these goals, governments are setting economic incentives across Europe. The Federal Office of Economics and Export Control (BAFA) supports companies by promoting energy efficiency and process

heat from renewable energies in the economy (EEW). The basis for this is the CO₂ saving that is achieved through an investment. For this purpose, the energy consumption of an energy-saving system is compared to a „conventional“ nitrogen generation system.

An example shows the funding and energy saving potential:

An electronics company that produces e.g. 100 m³ of nitrogen per hour with a purity of 5.0 consumes 527,200



The N₂ cover over the solder bath prevents oxidation from contact with oxygen.

KWh of electricity per year (e.g. IMT PNC 9700 nitrogen generator without NKat, compressed air requirement 659m³ / h, 283tCO₂ / a). With a turnkey system (IMT PN KomPack 100 incl. NKat hydrogen catalyst, compressed air volume 300m³ / h, 129tCO₂ / a), on the other hand, only 240,000 KWh of electricity are consumed per year. The resulting CO₂ savings amount to 154 tons per year and are funded with a one-off grant of up to 107,800 euros (depending on the size of the company, 500-700 euros per ton of CO₂ saved), which are paid out as a non-repayable grant. The company is also reducing its ongoing energy costs by 55%, permanently saving 63,000 euros per year. By using additional heat recovery technology, heating costs can also be reduced. In this case, these savings amount to a further 18,400 euros per year, so that in total an economic cost reduction of 81,400 euros is achieved - every year.

Decarbonization of industrial processes leads to cost savings

The development of a two-stage process for the production of high-purity nitrogen makes a significant contribution to the decarbonization of nitrogen supply in industry. If the waste heat from compressed air production is also used, funds in the six-figure range can be raised, which makes it easier to switch to products with a low carbon footprint.

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