AME Plasma Technology

APP *Advanced-Pyro-Plasma*

Tailormade solutions for disposal of hazardous waste material with possible energy generation by use of patented APP technology (Advanced-Pyro-Plasma)

A M E

Vienna, Austria

APP definitions (1)

Pyrolysis

Is the thermochemical decomposition of organic compounds at high temperatures (200 – 1000˚C) without oxygen. Through this process, besides mineral residues solid residual carbon is also left behind.

Oxidation

By using O2, H2O vapor of the entire inorganic solid residual carbon is converted into a gaseous substance at approx. 800 – 1000˚C.

Plasma

Is the description of the 4th aggregate state (after gaseous); Has usable properties as a medium:

- High temperatures (above 5000˚C)
- High energy density
- Ionizing effects

APP definitions (2)

All organic compounds introduced into the plasma are broken down into simple chemical building blocks (ions, molecules, radicals)
The specific properties of plasma are suitable for:

- Purification (cracking) of the hazardous gas contents:
  (dioxins, furans, tars or other higher hydrocarbons)
- Vitrification (slag formation of the material, contaminated minerality substances, heavy metals)
- Residual gasification of any remaining organic hydrocarbons

APP definitions (3)

According to the stated positive aspects of the APP process, it is a unique process of thermal utilization and disposal. In the sense of comprehensive environmental protection it contributes towards the solution of the ever-increasing waste disposal problem of hazardous substances (volume reduction of the material used by up to 95%)

The **focus** thereby is not on the energetic usage, rather much more on the disposal. High quality products are thereby created (e.g. synthesis gas, synthesis natural gas), which make a valuable contribution towards the energy independence of fossil fuels such as natural gas, curde oil and coal. A considerable reduction of the environmental burden is also achieved through this (above all CO_2 emissions, CH_4 emissions).

APP process benefits

Worldwide best exemplary successes from the APP process:

- Unique favorable energy balance
- Lowest power loss (approx. 15%)
- High gas purity – no tar and NOx
- Excellent plant performance “turn key“ (fast commissioning of the plant)
- Use of various plasma carrier gases possible
  (CO2, air, oxygen, nitrogen, natural gas, H2O steam etc.)
- Higher throughput capacity of input materials due to the possible combination of pyrolysis and plasma process or single use of plasma technology
- The APP process enables a complete elimination of hazardous waste
- Either ash is created as residual material or glazed material can be used as filling substance
- Mobile and modular structure of APP-plants enable high flexibility

Fields of application of the APP process

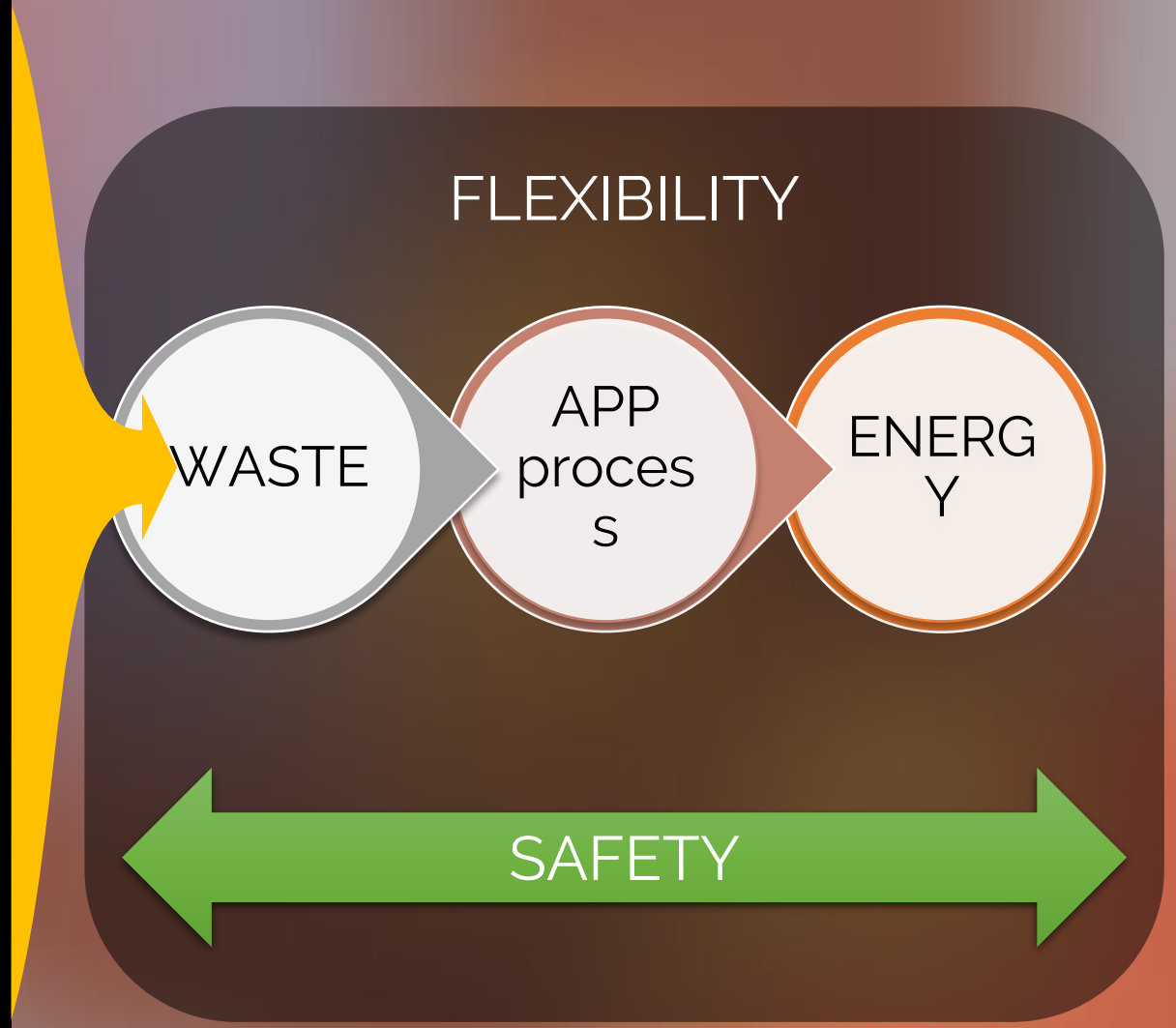
The innovative aspect of APP technology is not the plasma itself or the idea of “substance decomposition“, but rather:

the synthesis of mass substances to form valueable energetic and/or substantive raw materials.

Besides classic biomasses (e.g. wood, straw, …) critical substances can be also transformed into a suitable state (gaseous, combustible, homogenous and pure) for utilization n gas turbines or combustion engines.

A wide field of application for the APP-process for:

- Contaminated wood (e.g. sleepers)
- Critical biomasses
- Sludges from sewage plants industry (e.g. papermills)
- Crude oil sludges, toxic residues from refineries
- PE-materials
- Hospital wastes
- Medical wastes (e.g. expired medicals, lack batches from medical industry)
- Toxic chemical wastes
- Filler cakes (highly toxic) from waste incineration plants
- Asbestos materials
- Carbon materials
- Electronic wastes
- etc.



Application example of the APP process in the field of hospital and medical wastes

As is can be seen in the system layout the supplied waste is separated into liquid and solid and sterilized in an upstream sterilization unit. The fraction is shredded according to the WHO regulation and fed into the plasma reactor. The liquid phase can be drained after sterilization. The loading unit and the shredder are automatically sterilized, so that they are always germ-free and contamination of the environment is excluded. Also in the event of maintenance or when the system is shut down a previous sterilization enables to work safely. Worldwide no other disposal system offers such a security. Depending on the desired capacity and composition of the waste a horizontal rotary tube reactor instead of a standing reactor equipped with plasma can be used.

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Application example of the APP process in the field of hospital and medical wastes

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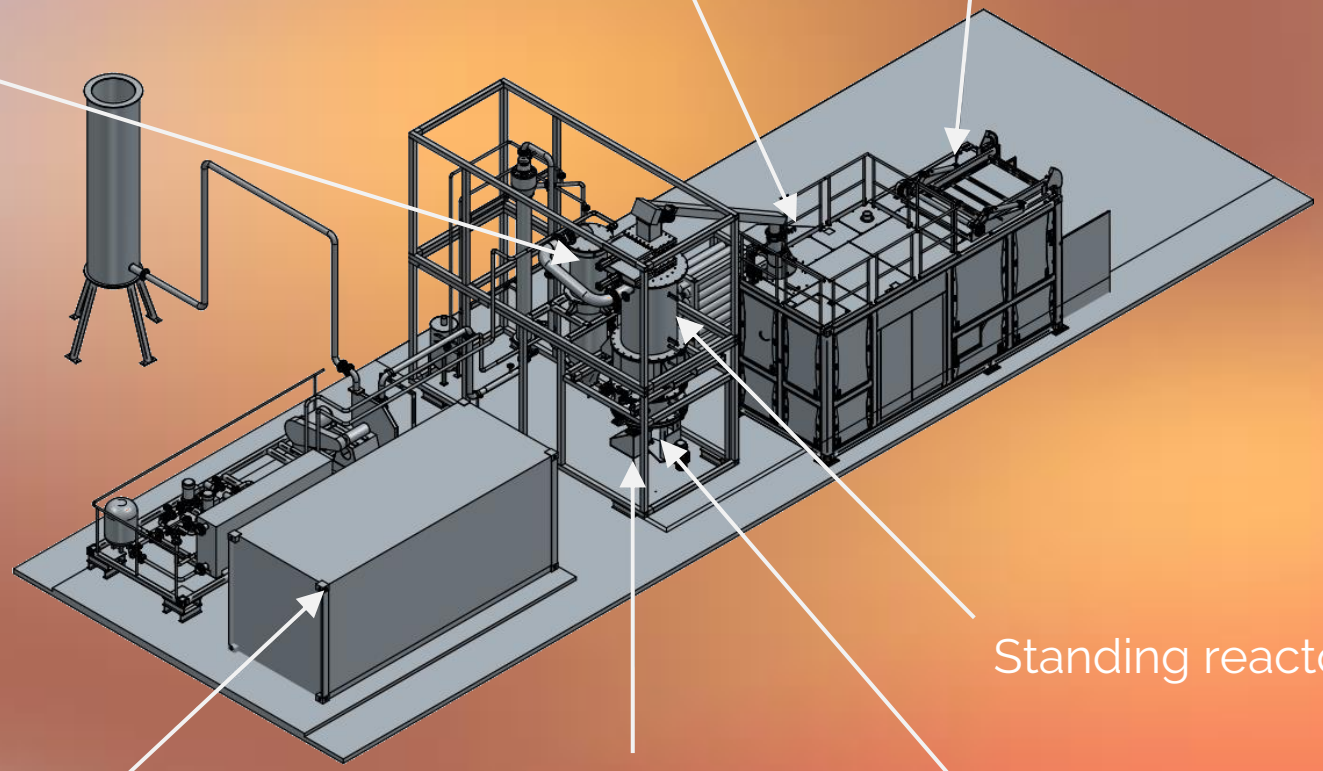
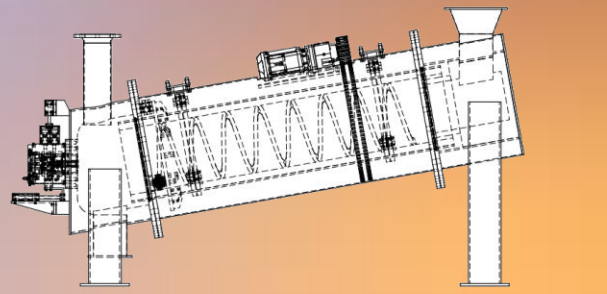
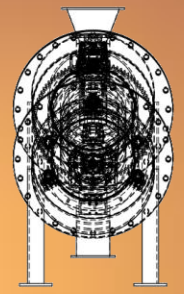
The shredded material is gasified in the reactor by means of plasma and the arising syngas is available for further use (e.g. for electricity generation or as thermal energy). The current emission limits of the Firing Regulation for waste treatment plants in Austria, in the FRG and in the EU are strictly adhered to or undercut. According to the information system the respective emissions actual values during operation of the APP process can also be called up online. The processing capacity depending on the input material is designed for 1-2 tons per hour. The system is planned for 24/7 operation.

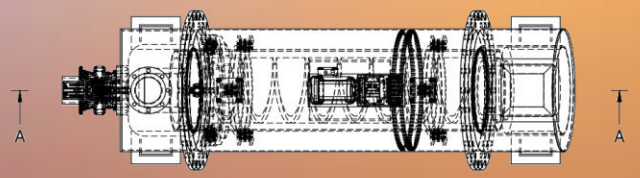
Design of plant for hospital and medical waste

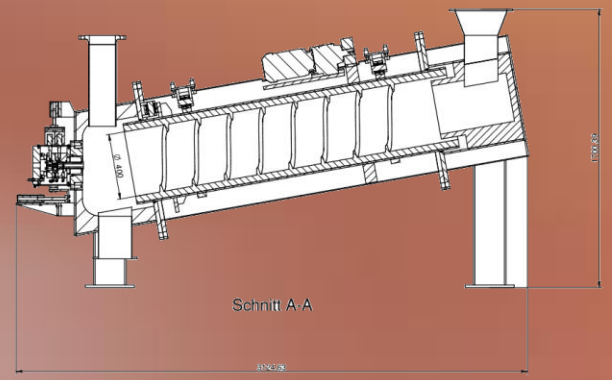


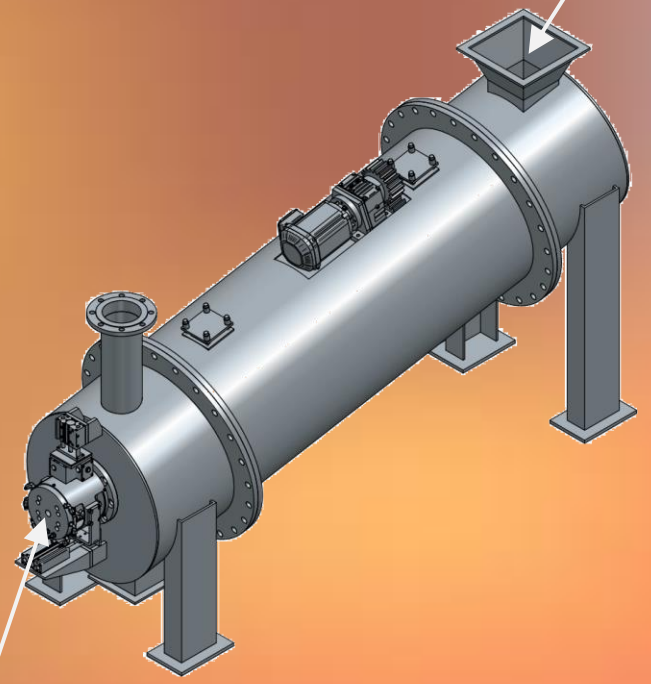
Alternative construction to standing reactor: rotary tube reactor





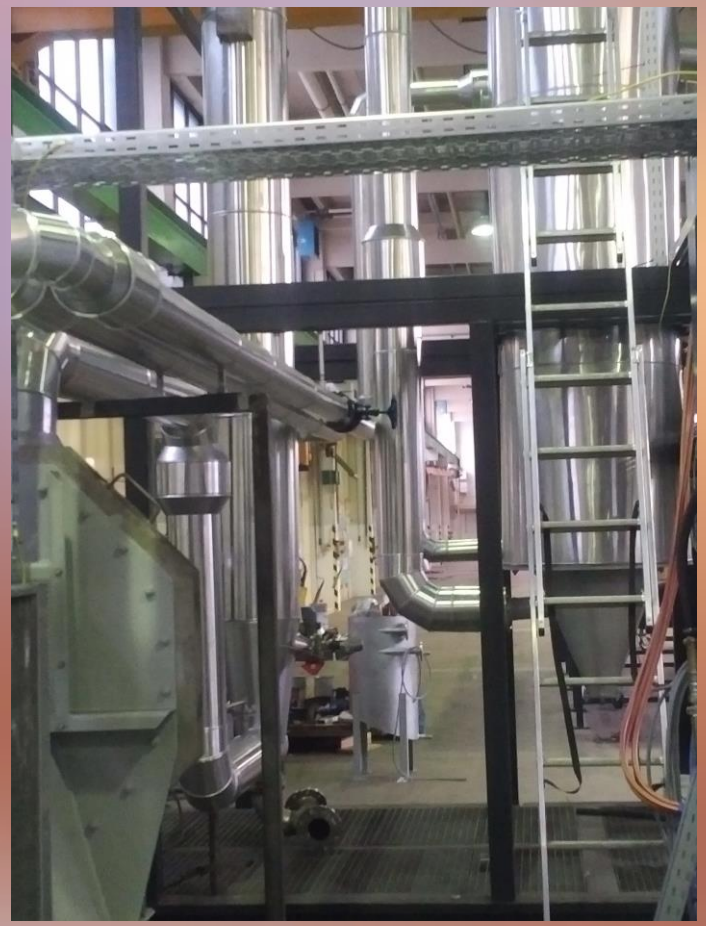


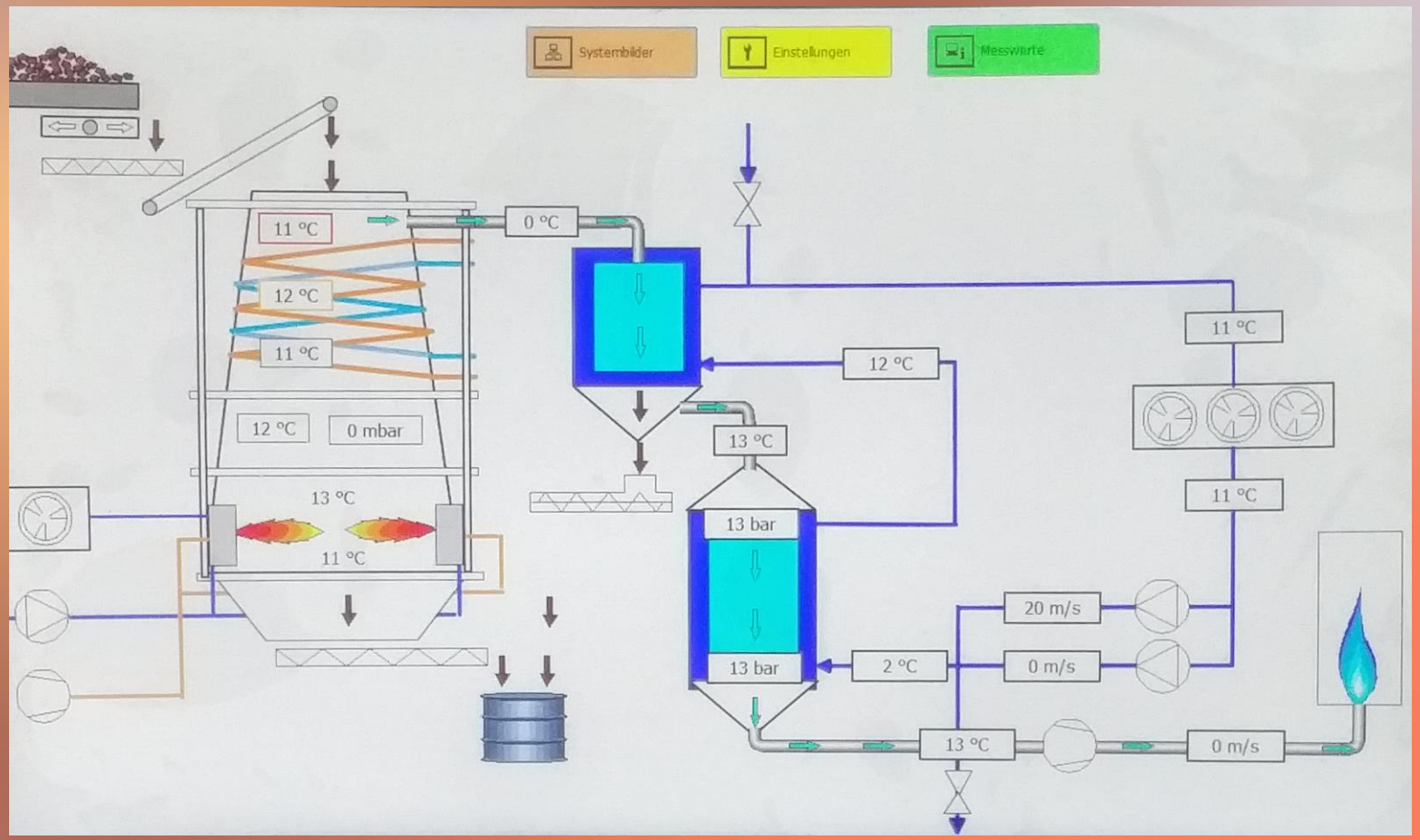




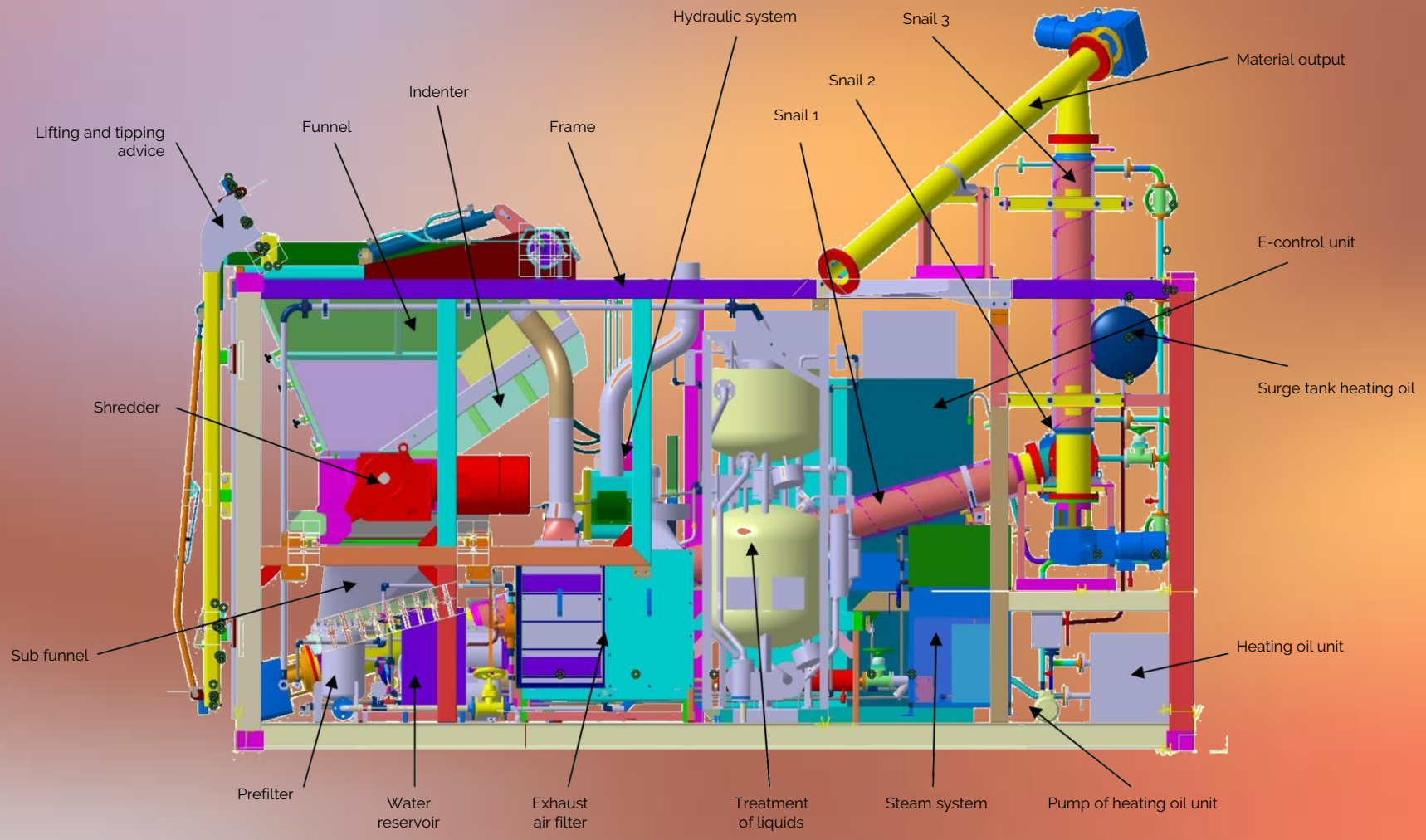
Prototype APP-plant (1)

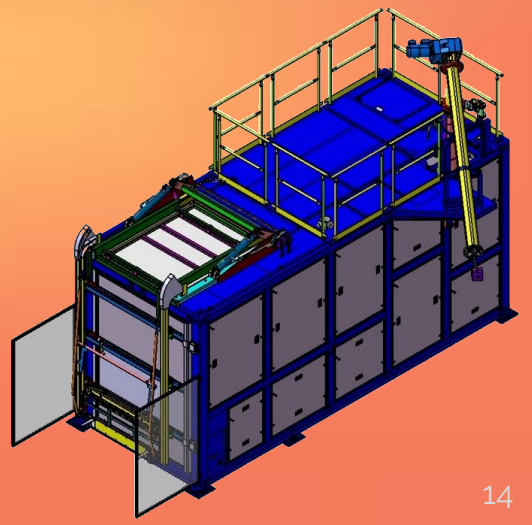
Prototype APP-plant (2)





Design of sterilization unit





AME Plasma-patents

- **Patent Nr. 516 178**
  Verfahren und Vorrichtung zur Erzeugung von Synthesegas aus kohlenstoffhaltigen Abfallstoffen
- **Patent Nr. EP 1 558 709 B1**
  Verfahren zum Vergasen von Kohlenstoff enthaltenden Substanzen durch ein Plasma
- **Patent Nr. E 501 235-1**
  Verfahren zum Vergasen von Kohlenstoff enthaltenden Substanzen durch ein Plasma
- **Patent Nr. 517 861**
  Anlage zur Verarbeitung von radioaktiv kontaminiertem Material mit einer Mehrzahl von Anlagekomponenten
- **Patent Nr. 518 474**
  Verfahren zur Erzeugung von Synthesegas

österreichisches patentamt

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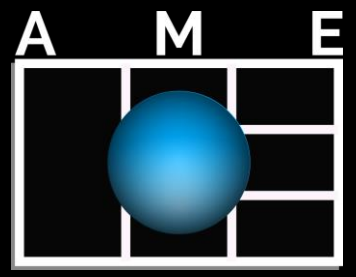

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THANK YOU