# Alexanderwerk

**Industrial Machinery and Plant Construction**
**Range of Product**

CATALOG

# the factory

In 1885 Alexander von der Nahmer founded the firm which he named after himself and later in 1889 changed to it's present name, Alexanderwerk AG.

The line of business was to be the manufacture and distribution of cast-iron requisites for industry and the home.

The firm of Alexanderwerk had already become well known throughout the world by the turn of the century through their range of household equipment and particularly through the cast iron mincing machines used for decades in every kitchen.

Production was then extended to include food processing machinery for meat distributors and larger kitchens. The knowledge gained of these processes was later to be the starting point of the development of special machinery for the chemical and pharmaceutical industry. After the second world war this area of business was resolutely extended and now includes the manufacture and distribution of shredder/grater machines, granulation machines, roller compactors for powdery bulk materials, rotary driers and complete plant design and engineering.

# Summary of the Range of Equipment

1

## Plant Construction

**ALEXANDERWERK designs and supplies processing plants for**

thermal decomposition

drying/cooling

compaction

granulation

**of chemical and pharmaceutical products with the following services**

project engineering

process technology

engineering technology

supply of plant equipment

turn key projects

installation and assembly supervision

and commissioning if required

2

## Compaction

**of dry, powdery or fine crystalline organic or inorganic materials from the range**

agriculture

chemical processing

pharmaceutical

food industries

and environmental protection

**by mechanical compaction/ densification using roller compactors**

**with subsequent size reduction to a defined granule size if required**

3

## Granulation/Forming

**of moist or pasty materials in**

chemical

pharmaceutical

metallurgical

food industries

**by perforated dies or orifice plates followed by subsequent drying**

4

## Size Reduction

**of moist or dry, organic or inorganic materials in**

chemical

pharmaceutical

food industries

**by means of shredder/grater machinery, pin breakers, cam breakers and worm screw machines (worm extruders)**

5

## Drying Cooling Calcining and Roasting

**Alexanderwerk designs and supplies**

**Rotary driers for indirect heat treatment of chemical and pharmaceutical products for**

cooling

drying

thermal decomposition

roasting

**using heat carriers**

water

steam

thermo-oil

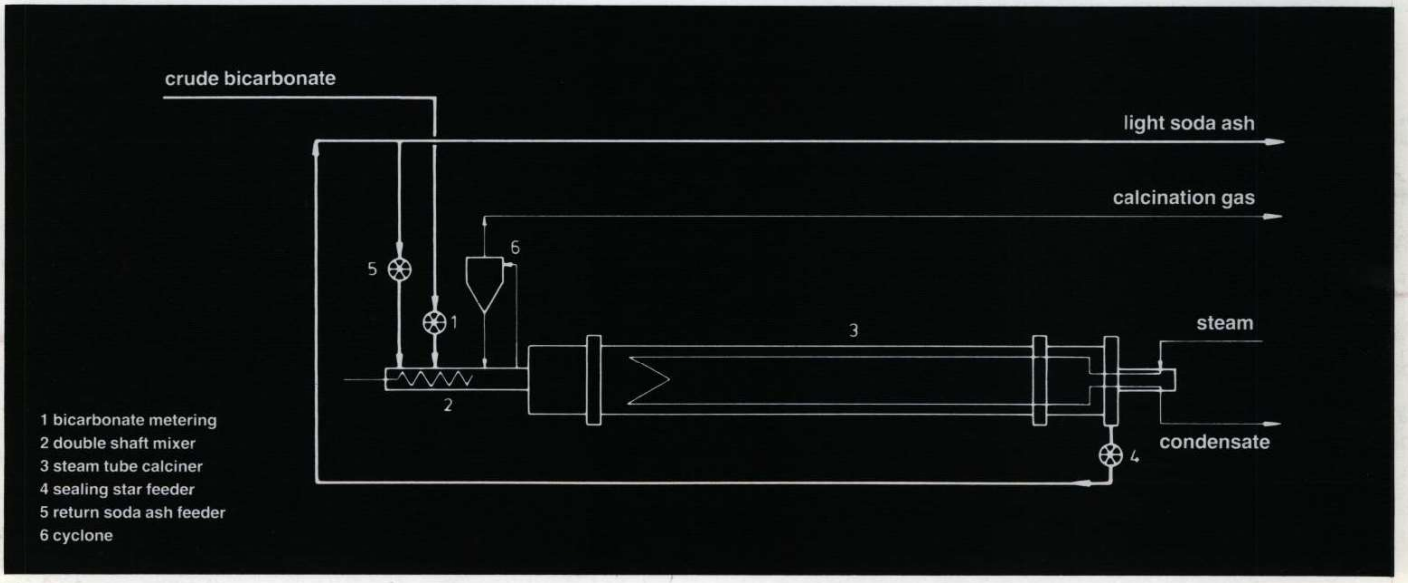
molten salt

up to reaction temperatures of 500°C

# Plant Construction

## Steam Tube Calciner Plants

Struthers Wells – Alexanderwerk System
for processing of sodium bicarbonate into calcined soda ash




To the moist sodium bicarbonate from the filter and centrifuge, a corresponding amount of dry recycled soda ash is added in the double shaft mixer (2). This is to prevent any build up on the surface of the heat exchanger. The partially hydrated sodium bicarbonate and soda ash mixture is continuously fed to the calciner (3) and converted to sodium carbonate (calcined soda ash).

Steam is used as the heat carrier. The steam requirement (neglecting heat loss through radiation) depends exclusively on the heat consumption of the thermal reaction.

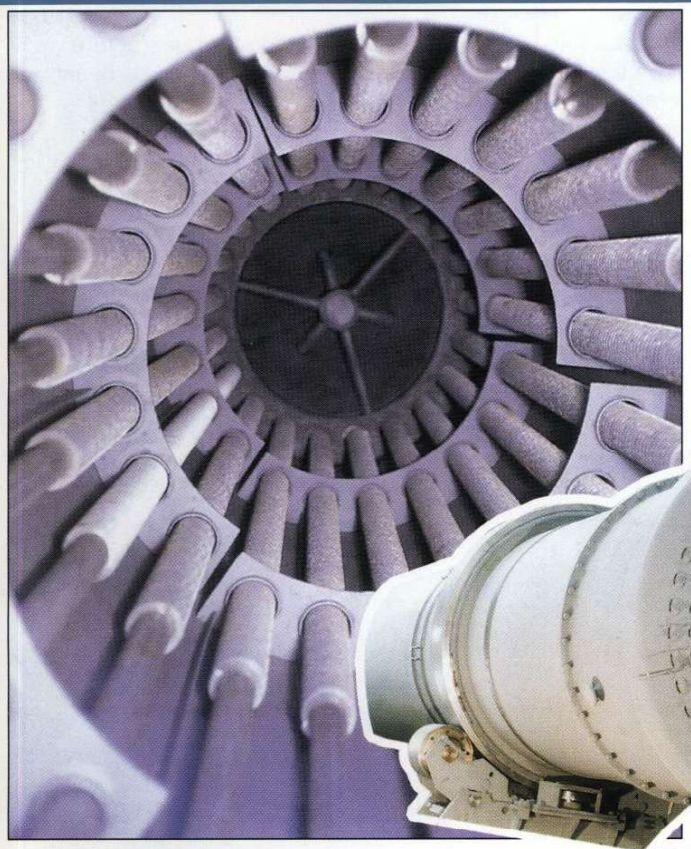
**The steam tube calciner plant is characterized by:**

- a high specific output for a relatively small space requirement
- optimum use of the heat carrier
- a high $CO_2$-concentration in the calcining gas
- high operating safety

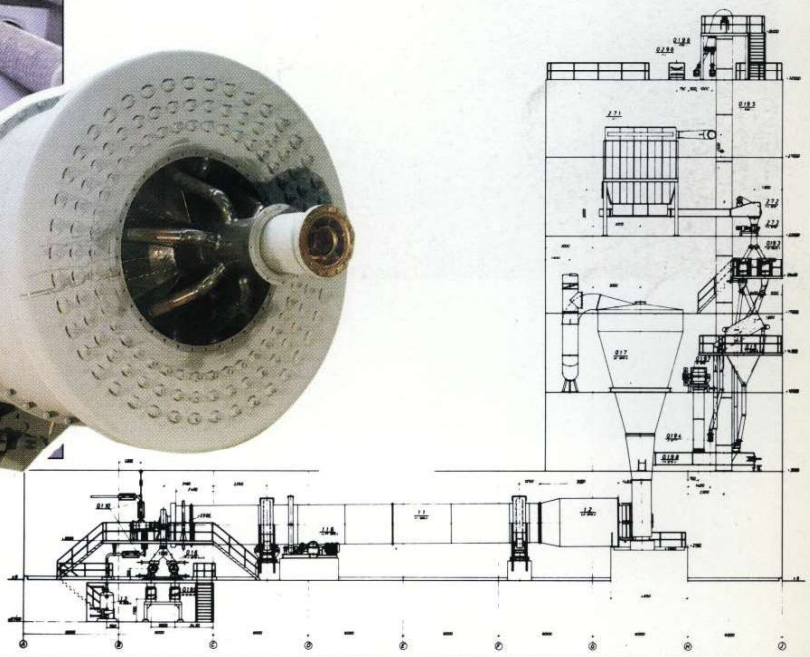
**Specific output values:**

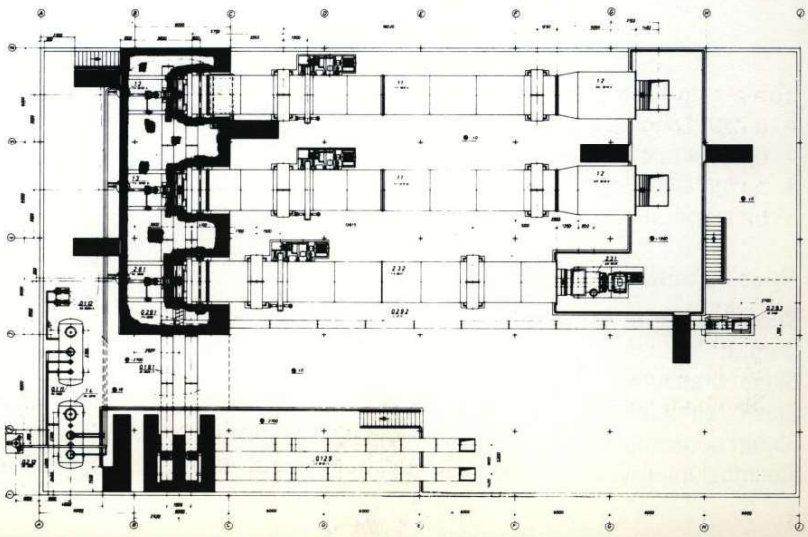
- Output: 50 – 800 tons light soda ash/24 hours
- Steam pressure: 10 – 45 bars
- Steam temperature: 180 – 300°C
- Steam consumption: at 12% bicarbonate moisture 1,3 t/t light soda ash
  at 16% bicarbonate moisture 1,4 t/t light soda ash
  at 20% bicarbonate moisture 1,75 t/t light soda ash

# 1



inside view of a
steam tube calciner





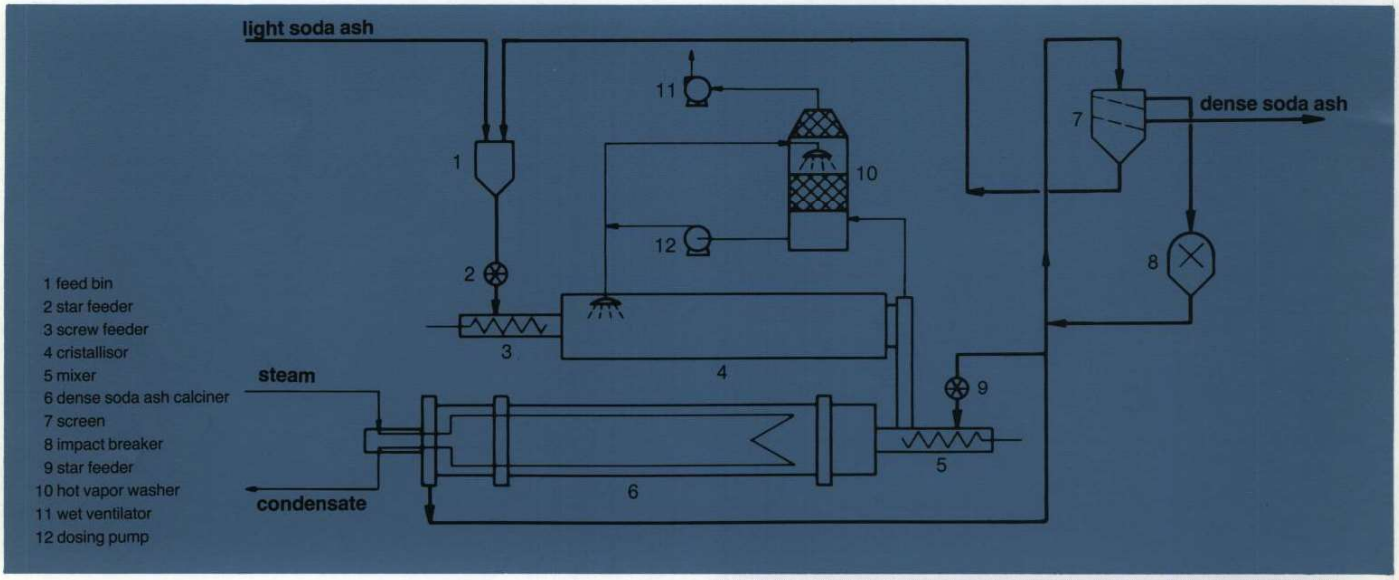
steam tube calciner plant
for light and dense soda ash

# Dense Soda Ash Plants – Alexanderwerk System –

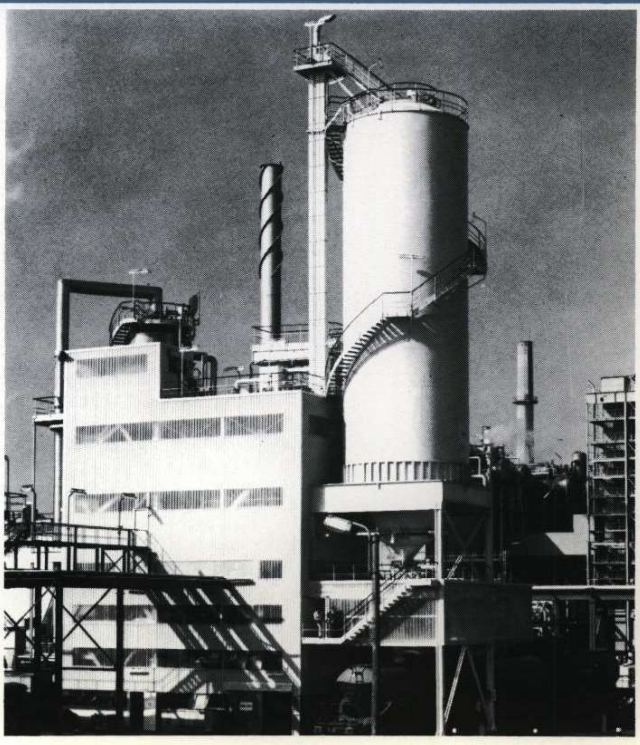
the processing of light soda ash or monohydrate

## Monohydrate Process

Monohydrate of sodium carbonate forms in the crystallisor on the addition of water. The monohydrate has a stronger crystalline structure than the water-free sodium carbonate. If the water of crystallisation is driven off in the steam tube calciner plant, then the crystalline structure remains. As a result, dense soda ash is obtained after suitable disintegration, which is differentiated from calcined soda ash by it's higher density and coarser particle size.




Dense soda ash plant BASF Antwerpen
Output: 85 t/24 h
Particle size: 0,2 – 1 mm



**Specific Output Values:**

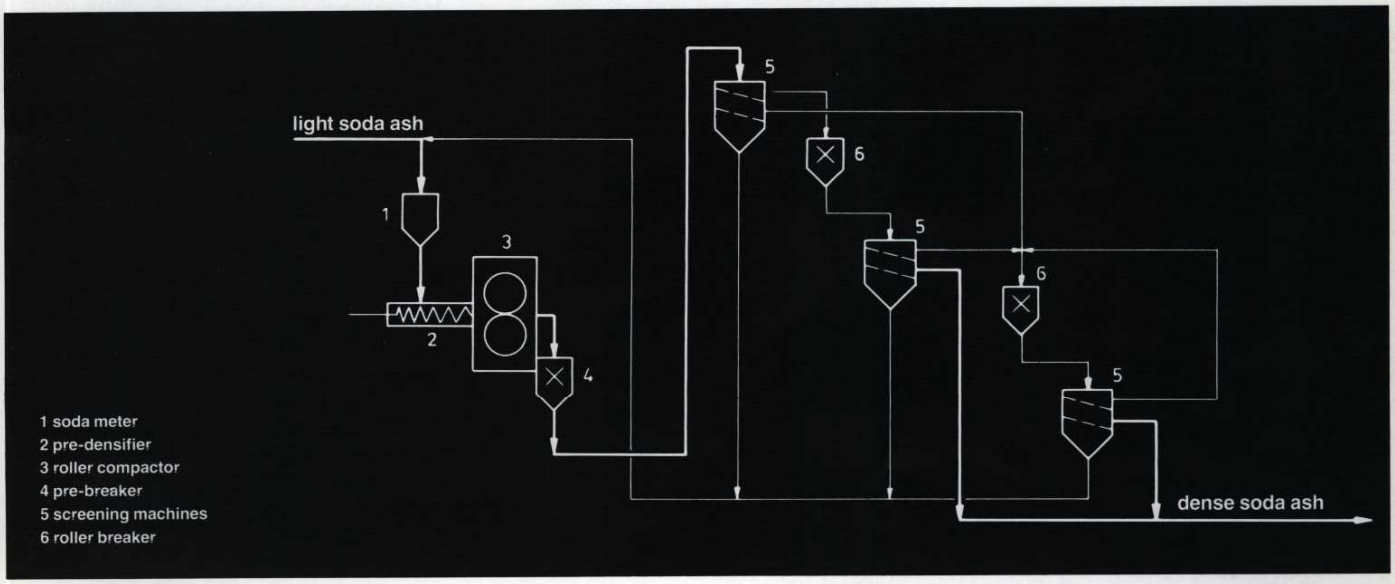
| | |
|---|---|
| Output: | 100 – 1000 t dense soda ash/24 h |
| Steam pressure: | 10 – 20 bars |
| Steam temperature: | 180 – 200°C |
| Steam consumption: | 0,6 – 0,65 t/t dense soda ash |
| Electrical energy: | 20 – 25 kWh/t dense soda ash |

## Mechanical Process

## (Densification)

Dense soda ash is produced by the mechanical compaction of light soda ash. The process consists mainly of the following stages: pre-densifying, compaction, size reduction and sifting.

Pre-densifying equipment, roller compactors with infinitely variable roller pressures, breaker units and screens are used.




Dense Soda Ash Plant Inowroclaw/Poland
Output: 3 x 550 t/24 h
Particle size: 0,2 – 1 mm

**Specific Output Values:**

| | |
|---|---|
| Output: | 50 – 500 t dense soda ash |
| Roller pressure: | 3 – 4 t/cm roller length |
| Energy consumption: | 40 – 25 kWh/t dense soda ash |
| Bulk density: | > 1 kg/dm³ |
| Particle size: | 0,1 – 1 mm |
| | 0,3 – 2 mm |
| | 0,5 – 5 mm |

# Compactor Plants

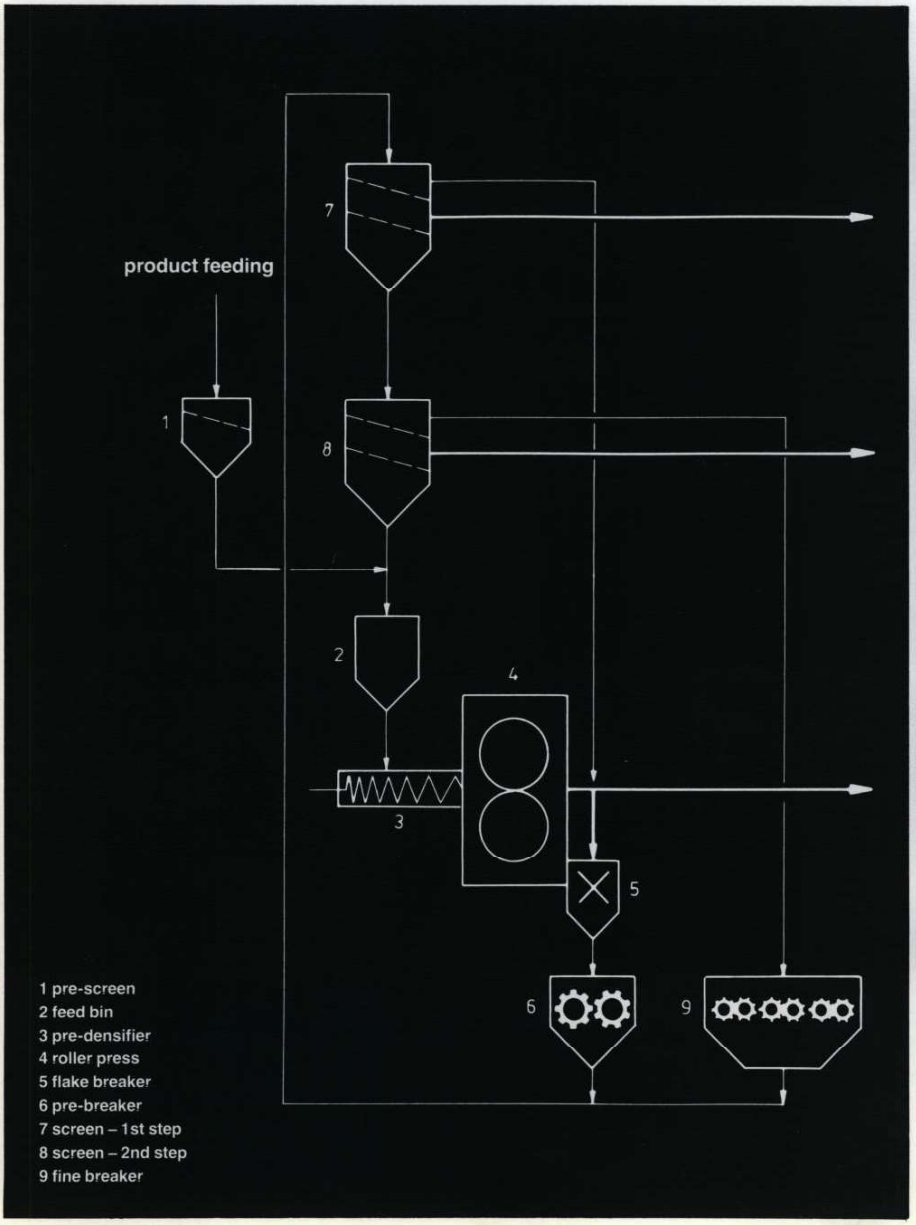
for the mechanical upgrading of chemical and pharmaceutical powders

The process of mechanical upgrading of fine particles is becoming increasingly important. Protection of our environment is another challenge set to us.

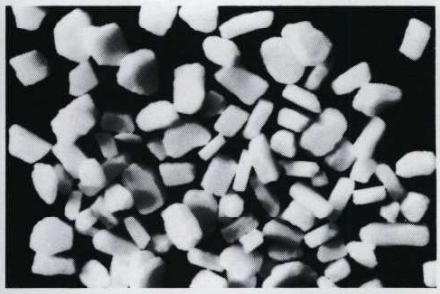
Dust and fine powdery materials are mechanically compacted and followed by a controlled size reduction process to produce the particle size required.

The plants can be automatically controlled to the particular extent required by the customer.

Roller compactors in horizontal or vertical construction are the main part of the plant. The pre-densification unit before the compactor is to be attributed with increased importance especially when using materials with a low bulk density. The compactor roller pressure is infinitely variable via a hydraulic system, so as to achieve a required strength and dissolving power in the granulate.




1 pre-screen
2 feed bin
3 pre-densifier
4 roller press
5 flake breaker
6 pre-breaker
7 screen – 1st step
8 screen – 2nd step
9 fine breaker



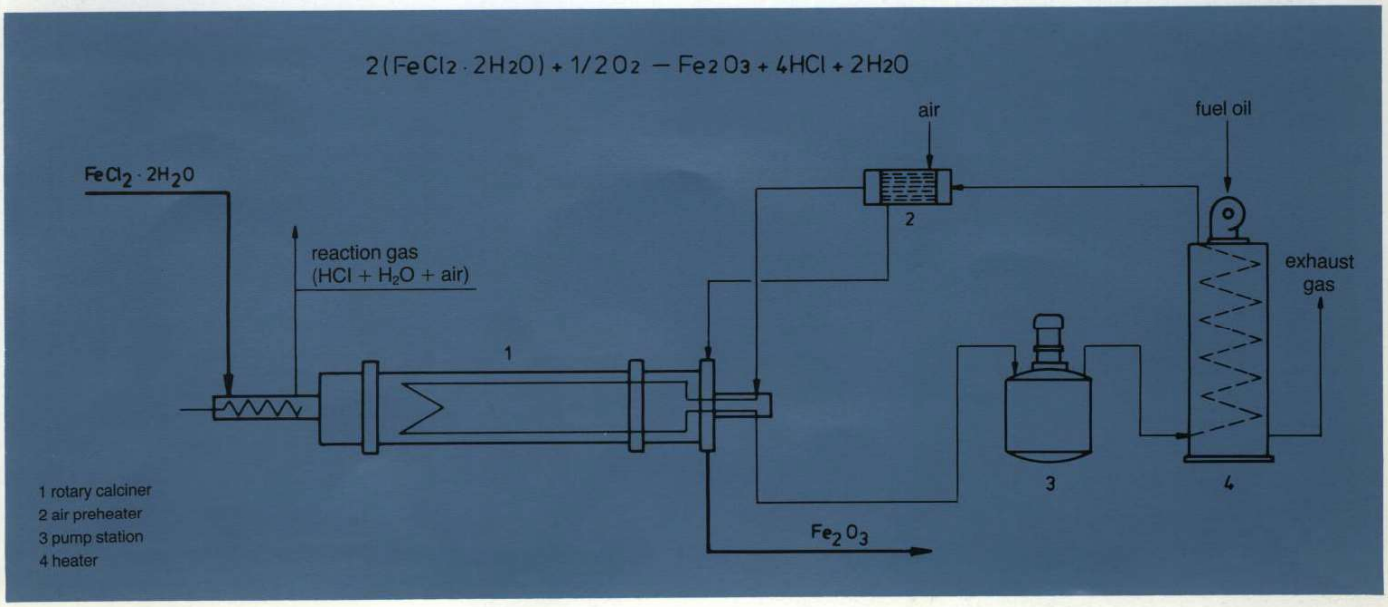
# Thermal Decomposition

of organic or inorganic materials by indirect heat transfer
(DBP 1.558.031)

The principle of indirect heat transfer is effected through the combination of two known processes:
The rotary dryer and heater for the heat carrier.
A controlled temperature of reaction ensures a careful and consistent treatment of the product.
Organic or inorganic heat carriers with high boiling points, permit small heat exchange surfaces for low temperature differences and a practically pressure-free heat exchanger system to be used.

The advantages of the process are a high thermic efficiency (> 85%) optimum concentration of the reaction gas, high heat output ($20 \times 10^6$ kcal/h $= 83{,}74 \times 10^6$ kgj/h) and a controlled temperature of reaction.

The roasting of iron chloride is an example of use illustrating the particular advantages of the indirect heat transfer in the rotary tube using liquid heat carriers (see diagram). The decomposition of the iron chloride occurs at a running temperature in the heat exchanger of 480°C. And a recycling temperature of 473°C. The remaining chlorine gas can easily be re-processed in an absorption plant to form concentrated hydrochloric acid (HCl) without further enrichment and the iron oxide can be directly roasted. This process is characterized by a higher thermic efficiency.



# compaction

**Alexanderwerk Roller Compactors** with roll faces graded to suit particular materials, for mechanical upgrading of powders are used for bulk goods as well as valuable chemical and pharmaceutical materials.
A prominent feature of the Alexanderwerk Roller Compactor is the vertical arrangement of the rollers and the horizontal product feed system, including the possibility of our unique vacuum deaeration system.
The advantages of this construction are manifold. The roller compactor forms a single complete unit together with the subsequent breaker and size reduction accessories.

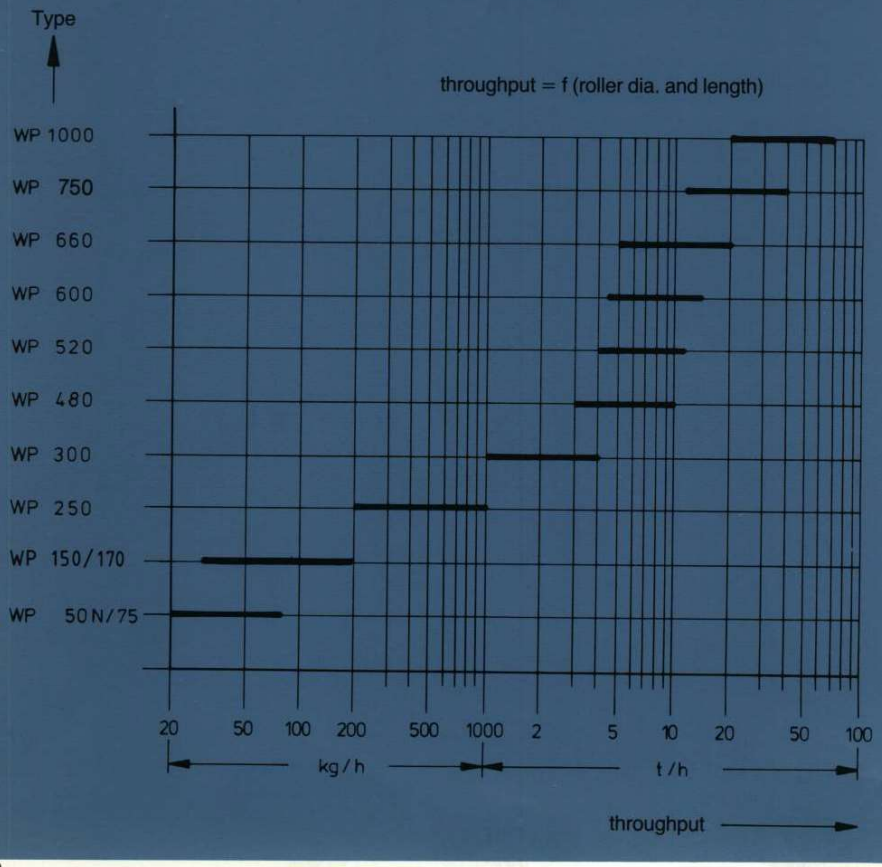
**Mode of Operation:**

- continuous process
- low to high grade compaction of the feed material without the need to use a binder or liquid

**Construction Details:**

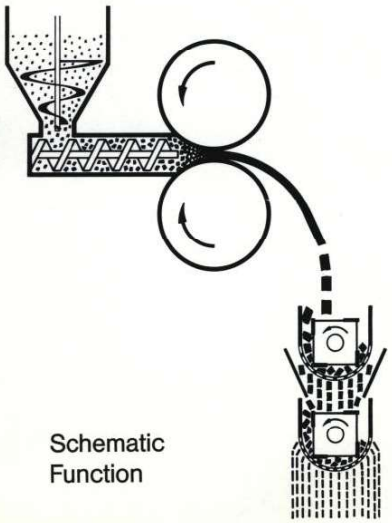
- rollers supported on roller bearings
- rollers coolable
- roller gap variable in sliding roller guide
- infinitely variable product feed (horizontal) to achieve effective influence on the degree of compaction and output quantity
- unique vacuum deaeration system to permit efficient handling of light bulk density materials
- roller pressure generated by hydraulic oil system, maintenance free, infinitely variable
- roller body manufactured in hardened high duty steel
- all parts in contact with the material can if requested be manufactured in corrosion resistant chrome nickel-steel
- suitable for long periods of operation and for use under extraordinary circumstances.
- granulate of a fixed size is produced by the size reduction of the compacted material and subsequent screening. Varying granulate sizes can also be produced at the same time

**Summary of Range with output range**



# 2

Roller Compactor
WP 1000



Schematic
Function

Roller Compactor WP 50N/75
for both laboratory and production use

# granulation forming



# 3

Alexanderwerk granulating machines form distinct cylindrical pellets from moist materials. Granulate is produced in this way as the material is extruded through a perforated die. Two rotating cylinders are the tools of the machine, one being perforated the other being solid and acting as the pressure cylinder. Depending upon the size of the perforations in the granulating cylinder (die perforation) a pressure builds up inside the perforation thereby compacting the material to be processed. Inside the perforated cylinder, the extruded, densified product is broken off by a knife blade. The process is designed to operate continuously.

Granulating cylinders (perforated dies) are interchangeable, the pressure cylinder is coolable.

All products are suitable for granulation which possess sufficient free flowing properties in a moist condition. If the consistency of the material to be processed is suitable, then the yield is 90 percent of the input. The granulation process often includes a drier to stabilize the moist granulate mechanically.

Throughput quantities:

| | |
|---|---|
| GA 65 | 30 – 50 kg/h |
| G 1/100/160 S | 100 – 500 kg/h |
| G 1/168 | 300 – 1000 kg/h |
| G 1/244 | 500 – 3000 kg/h |

Granulate diameter: 1 – 10 mm.

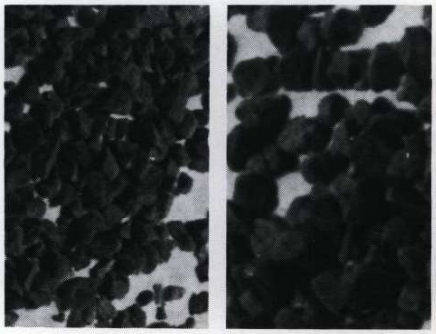
Granulator G1/148

Pasty materials, the consistency of which is too moist for the granulating machines, can be granulated using the **Alexanderwerk paste granulator.** Two separate rollers run in a double open trough with oscillating sliders. The sliders and the trough form a central gap on the narrowest point of which is fixed a perforated die. The die forms extrusions which run continuously from the machine and can be transported away on trays or conveyor belts. These extrusions form a loose pile. The increased surface of the material being processed aids the drying process. The orifice plates (perforated dies) are interchangeable. Only very low power is required for the formation of extrusions and thereby the degree of compaction is low. Extrusions from 1 – 10 mm diameter can be formed. Working widths dependent upon machine series up to 900 mm wide.

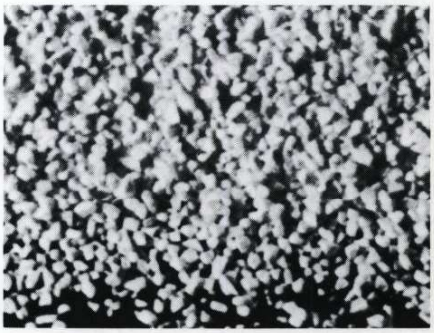
Paste granulator PG 180

# size reduction


**Toothed Disc Crushers**
for size reduction of dry, lumpy materials with cam breakers and scrapers.
The pitch of the disc shafts is adjustable to permit control of the resulting granulate size.

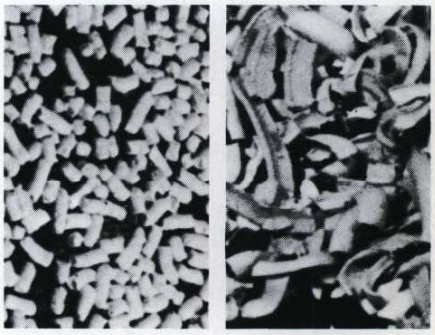



**Fine Granulator**
for dry and moist materials, with rotating work tool, easily exchangeable screen.
Screen mesh size as to choice from 0,63 – 5 mm.



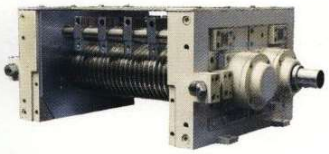

**Shredder/Grater**
for shredding and grating, aeration and granulation of solid dry or moist materials.

Degree of fineness is determined by the type of working cylinder used.



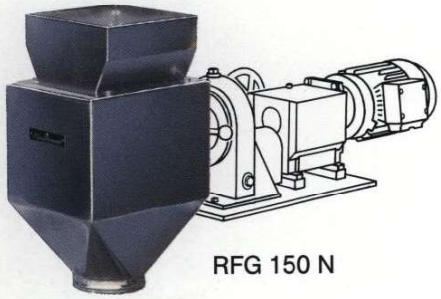

**Worm Screw Machines**
widely used size reduction machine with cutting set in several parts and several perforated plates.

# 4



ZB 200 V

| Type | Throughput (kg/h) | Particle Size (mm) |
|---|---|---|
| ZB 100 V | 500 – 5000 | 1 – 5 |
| ZB 200 V | 5000 – 30000 | 3 – 10 |



RFG 150 N

| | | |
|---|---|---|
| RFG 150 N | 50 – 300 | 0,63 – 4 |
| RFG 150 V | 50 – 300 | 0,63 – 4 |
| RFG 250 V | 100 – 500 | 0,63 – 4 |
| RFG 350 V | 200 – 750 | 0,63 – 8 |
| RFG 350 VD | 400 – 1500 | 0,63 – 8 |
| RFG 350 VDL | 600 – 2250 | 0,63 – 8 |

R 340 A

| | | |
|---|---|---|
| RSA<br>RAN 70<br>RAN/S | 100 – 500 | 1,5 – 12 |
| E 409<br>R 300 | 300 – 2000 | 1,5 – 12 |
| R 340 A | 1000 – 4000 | 2 – 12 |

SP/L 200

| | | |
|---|---|---|
| WA 82 | 50 – 100 | 1 – 8 |
| SP/L 200 | 500 – 1000 | 2 – 10 |
| ZW 300 | 1000 – 10000 | 4 – 15 |

# cooling
# drying
# calcining
# roasting

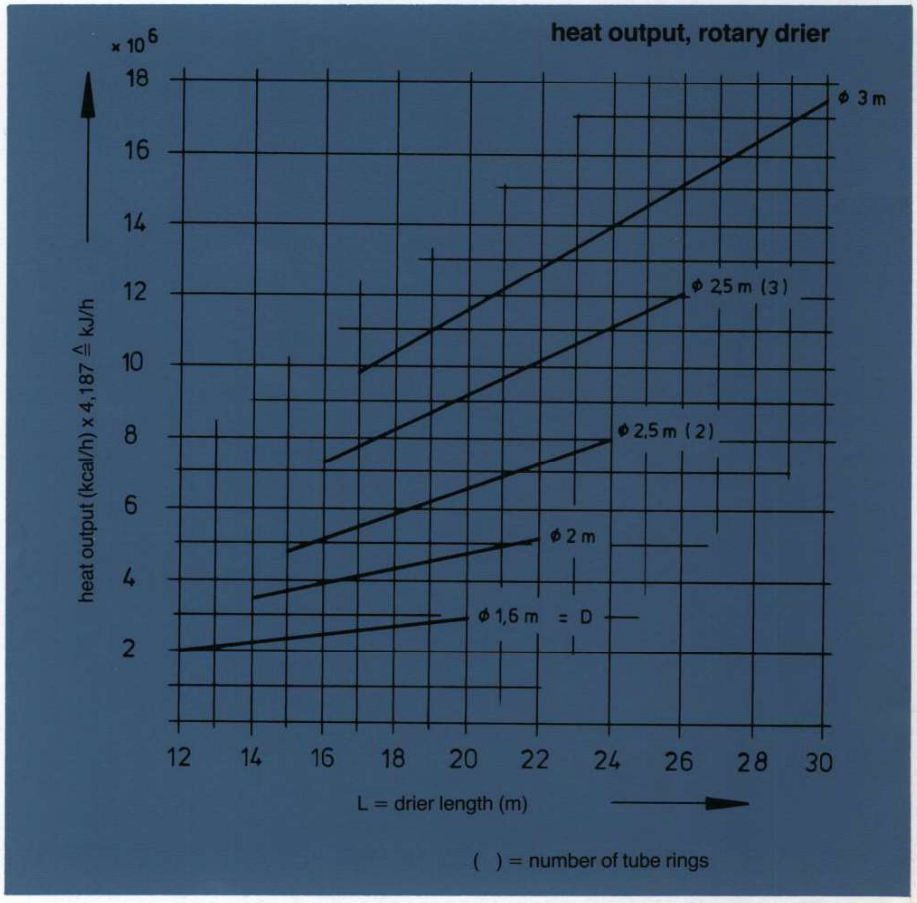
**The Rotary Drier, Alexanderwerk – Struthers Wells System** transfers heat indirectly. It consists of a rotary tube with concentrically arranged special tubes.

The heat carrier flows in the pipes, the construction of which is suited to a particular duty. The material to be treated flows round the outside.

For cooling, drying, calcining and roasting of organic and inorganic materials, water, steam, thermo oil or molten salt is used as the heat carrier.

Definite reaction temperatures up to 500°C are possible utilising the physical and technical values of this heat carrier.

Steel, alloy steels and non-ferrous alloyed metals are used as the materials. This wide range of materials available permits a choice to most suit the particular duty.




**Characteristics:**

| | |
|---|---|
| Heat output: | up to $20 \cdot 10^6$ kcal/h = $83{,}74 \cdot 10^6$ kgJ/h |
| Reaction temperatures: | up to 300°C |
| Heat carriers: | water |
| | steam up to 40 bars 300°C |
| | thermo oil up to 320°C |
| | molten salt up to 500°C |

# 5

**Examples of Use:**

**Cooling of**
calcined and dense soda ash
melamine
zinc oxide

**Drying of**
silicic acid
activated carbon
barium carbonate
polyvinylchloride
terephtal acid
calcium carbonate
hydrate of aluminate

**Calcining of**
sodium carbonate
monohydrate
sodium bicarbonate + sodium hydroxide

**Roasting of**
iron chloride
iron fluoride


Calciners 2,5 m ∅ x 23 m long for Alpat Argentine

# References Applications

## 1 Plant Construction (sample extract from full list)

**Calciner Plants/Light soda ash**

| | |
|---|---|
| Alcalis de la Patagonia, Argentine | 2 x 340 t/24 h |
| BASF, Ludwigshafen, Germany | 90 t/24 h |
| Chemica del Mediterraneo, Italy | 2 x 400 t/24 h |
| Fabrika Sode Lukavac, Yugoslawia | 2 x 400/24 h |
| Misr Chemicals El Mex, Egypt | 2 x 150 t/24 h |
| ICI Khewra, Pakistan | 150 t/24 h |
| Sodawerke „Karl Marx", Bulgaria | 4 x 300 t/24 h |
| Sodawerk Staßfurt, Germany | 2 x 400 t/24 h |

**Dense Soda Ash Plants**

| | |
|---|---|
| Alcalis de la Patagonia, Argentine | 550 t/24 h |
| BASF, Antwerpen, Belgium | 85 t/24 h |
| Matthes & Weber, Germany | 240 t/24 h |
| NPC Shiraz, Iran | 155 t/24 h |
| Saurashtra Chemicals, India | 50 t/24 h |
| Sodawerk Inowroclaw, Poland | 3 x 550 t/24 h |
| Botswana Ash PTY Ltd., Botswana | 2 x 600 t/24 h |

**Compactor Plants**

| | | |
|---|---|---|
| AKZO-Chemie | Germany | silicid acid |
| Duracell | Belgium & U.K. & USA | battery materials |
| Glaxo | U.K. & Italy | pharmaceuticals |
| Lonza | Switzerland | fertilizers |
| Kores | India | barium carbonate |
| Bofors Nobel | Sweden | acethylsalicylic acid |
| BASF | Germany | fertilizers |
| Maito-Mix | Finland | cattle foods |
| Ever-Ready | U.K. | battery materials |
| Bristol Myers Squibb | France, USA | pharmaceuticals |
| Chemie-Linz | Austria | ammonium nitrate |
| Sandoz | Canada | pharmaceuticals |
| Baltea (Olivetti) | Italy | copy toner |
| Varta | Germany | battery materials |
| Ferrimport | Cuba | pharmaceuticals |
| Morgan Matroc | U.K. | ceramic materials |
| Ciba Geigy | Spain, Taiwan & USA | organic materials |
| Cheil Sugar | Korea | monosodium glutamate |
| Cogema | France | uranium oxide |
| Polimex Cekop | Poland | ampicillin-trihydrate |
| Süd Salz | Germany | sodium chloride |

## 2 Compaction

acetylsalicylic acid
activated carbon
barium carbonate
battery materials
manganese ore
fertiliser
iron oxide
sponge iron
colour pigments
flotation materials
fluorspar
glass mixtures
urea
calcium chloride
calcium carbonate
silicic acid
magnesium oxide
magnesium stearate
sodium bicarbonate
sodium chloride
sodium carbonate
sodium sulphate
pharmaceuticals
strontium carbonate
zinc oxide
citric acid

## 3 Granulation Forming

red lead
iron oxide
pigments
fatty alcohols
filler material
animal feed
yeast
instant food products
ceramics
diatomite
bone meal
lecithin
milk powder
foodstuffs
paraffin
pharmaceuticals
colours
salts
vulcanising materials
detergent (washing powders)
sugars
pasty and doughy materials

## 4 Size Reduction

battery masses
binder materials
dietics
fertilisers
colour materials (dyestuffs)
filter cakes
fruit
vegetables
ceramics
foodstuffs
pharmaceuticals
salts
sweet confectionery
reject tablets
paste products
paraffin wax
centrifuge materials

## 5 Cooling Drying Calcining Roasting

**Cooling:**
light and dense soda ash
melamine
zinc oxide

**Drying:**
silic acid
activated carbon
barium carbonate
polyvinylchloride
terepthal acid
calcium carbonate
hydrate of aluminate

**Calcining:**
sodium bicarbonate
monohydrate
sodium carbonate and sodium hydroxide

**Roasting:**
iron chloride
iron fluoride

Alexanderwerk

## Questionnaire

Prior to trials in Alexanderwerk laboratory, please answer the following questions granting the optimum test results:

Name / address of client : _____

_____

_____

Person in charge : _____

Tel./Fax number : _____

Do you want to effect

- ❑ compacting trials
- ❑ moist granulating trials
- ❑ size reduction trials
- ❑ others

specification of the raw material parameters

abrasiveness _____

corrosiveness _____

hygroscopicity _____

particle size _____

temperature _____

moisture _____

drying temperature _____

bulk density _____

others _____

specification of the final product requirements

granule size distribution _____

grain hardness _____

solubility / dispersion _____

bulk density _____

max. permissible contents of
oversize / undersize particles _____

max. permissible moisture _____

required plant capacity _____

practical use _____

others _____

---

Address where to return the material after trials:

.....
.....
.....
.....

---

Information about handling the material:

health hazards _____

environmental behaviour _____

dust explosion hazards _____

transport requirements _____

others _____

---

Thank you very much for your co-operation !

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