SWERIM

Resources, recycling and agglomeration (REAG)

Agglomeration lab equipment

REAG Vision

Swerim possesses the role as a leading partner, with a holistic view, in the research area of improving resource, recycling and environmental efficiency.

Research areas and methodologies

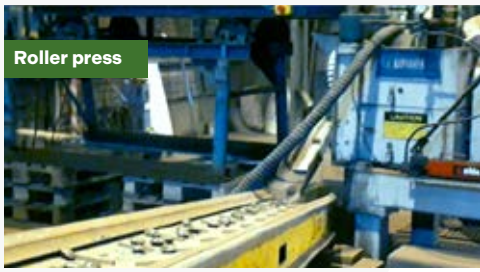
- Agglomeration
- Value chain study
- Waste heat recovery
- LCA/carbon footprint
- System/benefit analysis
- Resource/energy efficiency
- Circular economy and industrial symbiosis
- Digitalization/AI application for solving environmental issues
- Valorisation of residual materials through recycling, remanufacturing and reusing

Flexible agglomeration lab

- Lab and pilot scale
- Dry and wet materials
- Different particle sizes
- Different types of materials (biomaterial, dust, sludge, WEEE, etc.)
- Different agglomeration processes (pellets, granulates and briquettes)

Target clients, for instance

- Recycling industry
- Ferro-alloy industry
- Steelmaking industry
- Mining and metals industry
- Energy companies (coal and biocoal)


Roller press

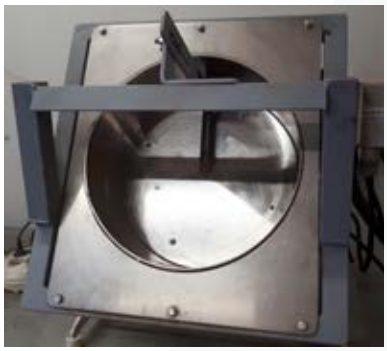
Vibro press


Extruder

Material preparation and pelletizing and granulation

Eirich mixer

- Model: RV02E
- Max capacity 12 kg
- Pan diameter 31.5 cm
- Pressurized water spray



Pelletizing disc

- Model: DP14
- Disc diameter 35.5 cm
- Disc depth 7 – 22 cm
- Disc speed 0 – 50 rpm
- Incline angle 0 – 60°

Sieving equipment for PSD

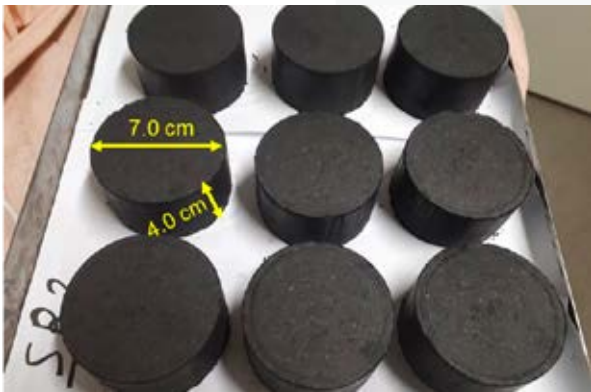
- Sieves 0.04 – 19 mm

Lab scale briquetting

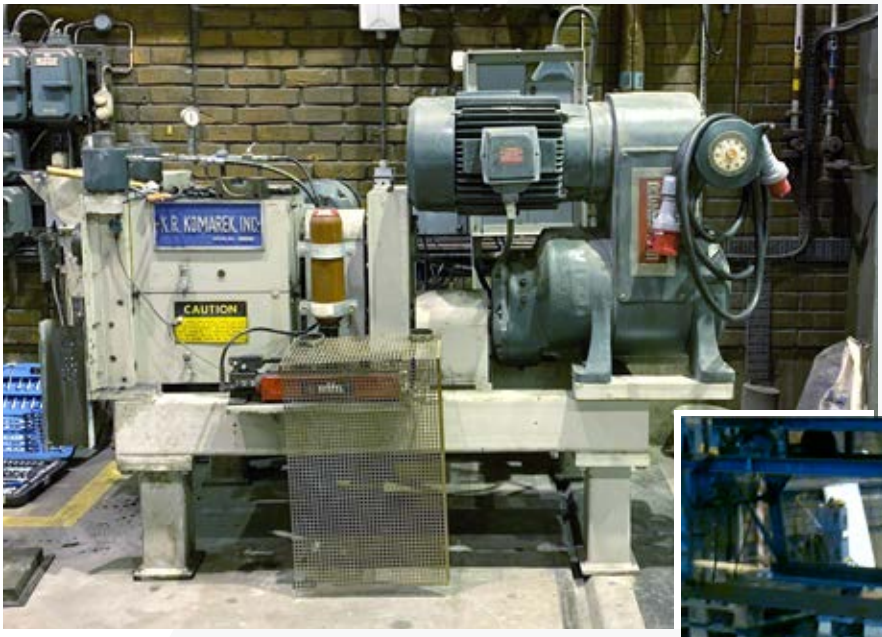
Ø 20 mm

Ø 40 mm

Ø 70 mm



Roller press



Facts

- Maximal briquetting pressure: 220 bar
- Two different briquetting wheels setups:
  - Briquette volume: 13.5 cm^3
  - Briquette volume: 2 cm^3
- Possible to produce large amount of briquettes. Typical production rate 300–500 kg/h

Material properties suitable for roller press

- Particle sizes under 3 mm
- Can handle dryer material than the extruder and vibro press

Briquetting wheel

Ca 40 x 30 x 20 mm

Vibro press

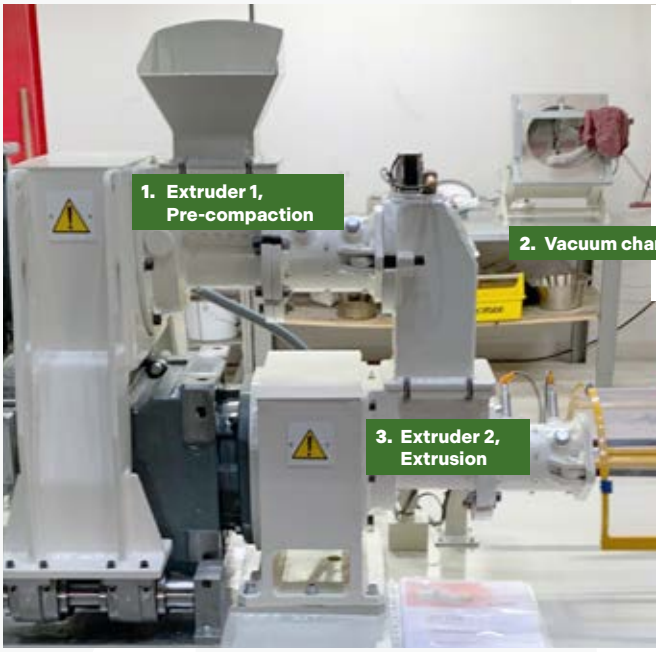
Facts

- Maximum compaction pressure: 120 bar
- Compression time and vibrating time is flexible
- 16 hexagonal briquettes per press
- Briquette dimensions:
  - Width: 6 cm
  - Height: flexible, max 9 cm
- Compared to the extruder and roller press the vibro press
  - is flexible when it comes to particle size
  - produces briquettes more proper for gaseous reduction due to the lower compaction pressure

Material properties suitable for vibro press

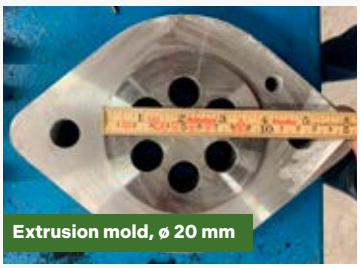
- Can handle particle sizes over 4 mm
- Possibility to work with both wet and dry materials and their mixtures

Extruder



Mold	Holes	Length, cm	Diameter, mm
Pre-compaction	4		25, 23, 20
Pre-compaction	8		18, 16, 14
Extrusion	1	7, 9, 11, 13, 15	40
Extrusion	6	3, 5, 6, 8, 9, 11, 14	20
Extrusion	9	3, 5, 6, 8, 9, 11, 14	14
Extrusion	25	3, 5, 6, 8, 9, 11, 14	8

Extruder position	Pre-compaction	Extrusion
Auger diameter, mm	80	80
Maximum extrusion pressure, N	50k	50k
Volumetric production, dm^3/h	180	180


Extrusion mold, ø 20 mm


Extrusion mold, ø 40mm, L: 15 cm

Material properties suitable for extrusion

- Particle sizes under 4 mm
- The material needs to be wet

Evaluation

Compressive strength
Max ca 1 bar

Compressive strength
Max 160 bar

Tumbler index equipment

Moisture test

Sieve analysis

Tumbler index equipment

- Used to measure the mechanical tumbler strength according to ISO 3271:2015
- ID Ø1000 x IW 500 mm drum, made of 5 mm thick St 27-37 Steel sheet
- Driven by an electrical motor and gearbox 1.5 kW, 380 V, 3 p, 50 Hz, 1400 rpm, by manual controlled (ON/OFF)
- The drum rotates at 25± 1 rpm

Welcome to the future!

Swerim conducts needs-based industrial research and development concerning metals and their route from raw materials to finished products. We adopt a holistic perspective that is well-aligned with the mining, steel and metals industries' development of circular solutions and innovative materials and applications for increased sustainability.

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