Future Materials
Biocarbon services

Processing and Characterisation of Biocarbon

Relevant use cases where Elkem Technology's material processing team, via the Future Materials (FM) Catapult Centre, can provide support:

- Customer-driven pre-evaluation of new raw materials for established metallurgical processes
- Access to a broad equipment portfolio for development of new raw materials
- Material characterisation and analysis to support process deviations
- Industrial symbiosis: preparation and alternative use of fines fractions

Our Service Offering

All production processes are different.

A successful test setup requires that the customer selects measurements, defines test setups and success criteria.

Future Materials provides lab- to pilot-scale equipment and operates it professionally.

Customers evaluate results against their own objectives.

Data Handling and IP

The scope of delivery and handling of material and test data are regulated through IP guidelines and agreements.

General guidelines for external project handling		Responsible party	
Tasks		Customer	ET Pilot
Initial work and scope definitions	Present scope and equipment need	X	
	Make available a list of relevant test- and characterization equipment		X
	Sign a Mutual Non Disclosure Agreement	X	X
	Sign a mutual Intellectual Property Agreement	X	X
	Produce a communication matrix or a communication guideline	X	(X)
Test matrix development	Provide a materials list, MSDS and all other data available, necessary for risk assessments and safe test execution	X	
	Define a material compability matrix	X	(X)
	Describe all requested process steps and equipment	X	
	Risk assessment to confirm acceptable handling of risks		X
	Provide equipment data relevant for setting up the test matrix		X
	For production: Describe critical test parameters, parameter operating ranges and test evaluation criterias for the equipment performance	X	
	For intermediate and product characterization: Describe requested measurements, including test parameter settings and test evaluation criteria	X	
	HSE evaluations prior to startup	(X)	X
Project execution	Facilitate a HSE course and provide necessary protective wear		X
	Complete the Elkem HSE course and comply with our photography and area restrictions while visiting	X	
	Test execution based on parameter settings defined by the customer		X
	Performance and quality evaluations during trials are based on, and limited to, the evaluation criteria defined by the customer		X
	Any changes to the test program due to quality or performance issues are to be suggested by the customer	X	
Results evaluation and reporting	Collect and return all papers, materials and consumables belonging to the project once the campaign is ended	X	
	The test results will be presented in a short report note. All evaluations in the note will be related to, and limited to the test criteria defined by the customer only		X
	Evaluation of results towards success criteria is not part of the assignment, and is to be performed by the customer only	X	
Stop criteria	*ET Pilot reserves its right to deny execution of any activity evaluated as not safe for personnel, equipment or environment*		X

Our Laboratories

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Coarse Lab

0,2- 10 litres scale

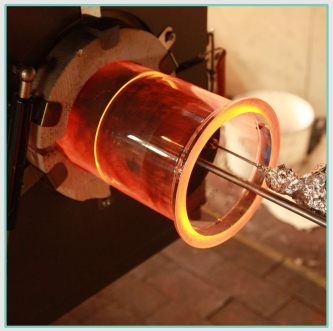
Splitting, fractionation, milling, mixing, agglomeration, drying, characterisation

Clean lab

Accupyc II, Geopyc, Sikter, TGA-DTA, Malvern Aero-Hydro, Tap density analyzer, rotavapor, +++

Pilot scale equipment

Crushers, Eirich- mixer 75l, Titan- mixer 75l, briquetting, pelletizing, extruder, drying cabinets, induction- pipe- and electrode-furnaces



Why biocarbon qualification?

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Mechanical strength properties

Chemical properties

Process conditions

Small-scale, low-cost testing to reduce industrial risk

BioProMet Project Overview

2023–2025 | SIVA support: NOK 2 million

Partners

Future Materials, Elkem Silicon Products, Elkem BioCarbon

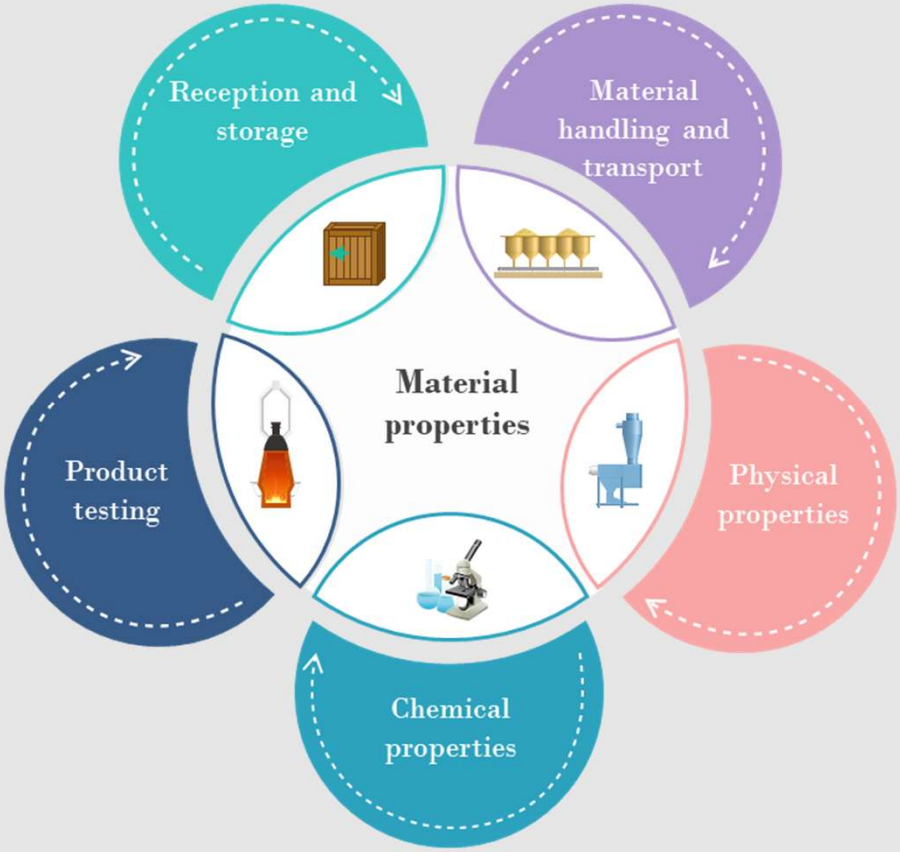
Scope

Develop a comprehensive test line designed to support testing of biocarbon materials for a range of metallurgical processes

Outcomes

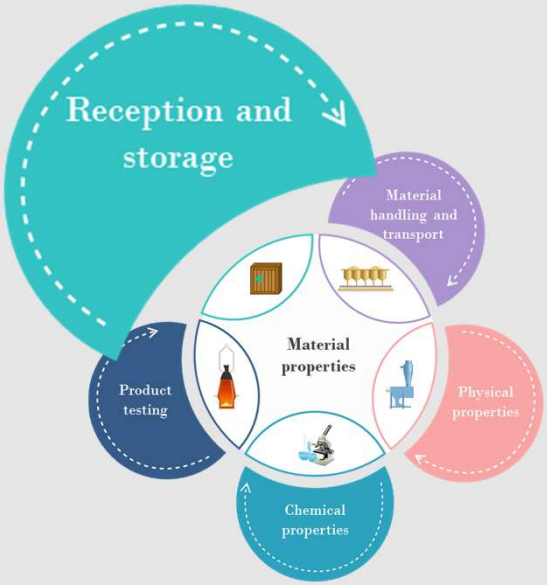
Biocarbon heat treatment furnace
Improved characterisation methodologies
Training and competence building

Following the completion of the project, external customers will have access to equipment operated under both standardised and customer-specific procedures



Storage conditions may potentially strongly influence material properties

- Storage size and fill height
- Temperature and fluctuations
- Moisture and ageing effects
- …



Relevant tests

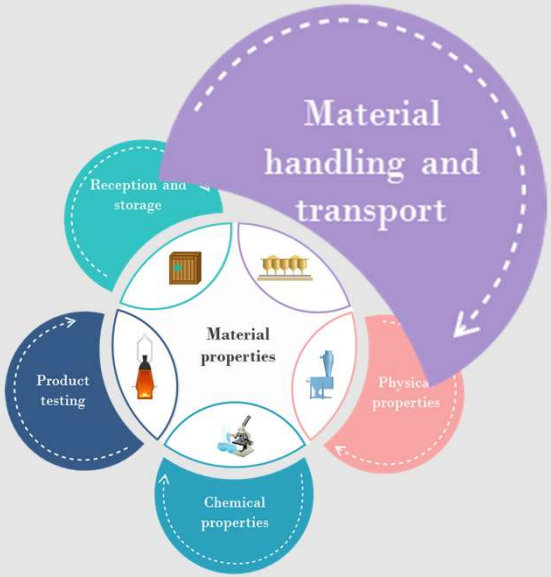
- Self-heating (IMO)
- Compressive strength
- Water resistance
- Frost resistance
- Porority
- Combinations of the above

During bulk handling and transport materials are exposed to impact, abrasion and crushing

- Drop height (impact)
- Particle-particle friction (abrasion)
- Selective crushing

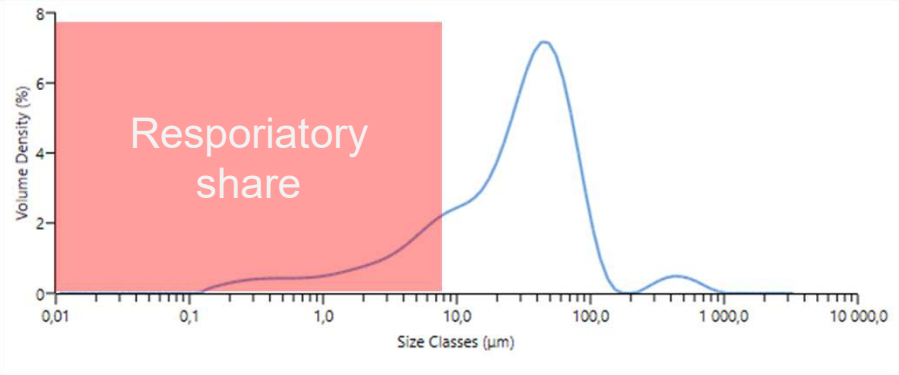
Poor match between transport setup and material quality

- Quality degradation
- Dust hazards (health, explosions)
- Altered flow behaviour



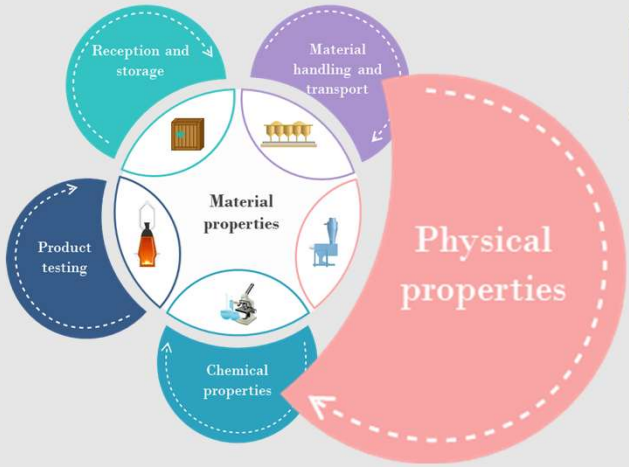
Relevant tests

- Drop strength
- Abrasion
- Dust generation and dust properties
- Combinations of the above



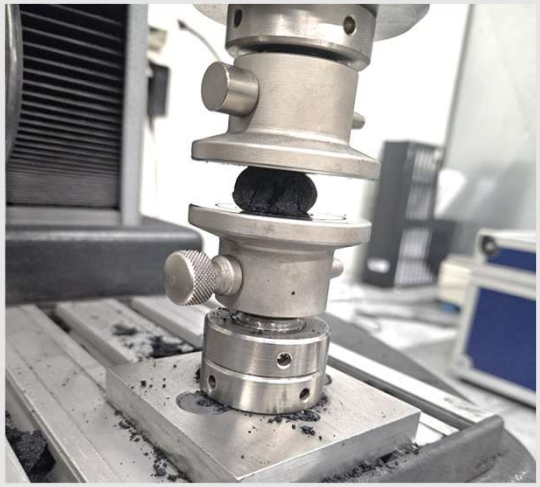
The material geometry, size distribution, porosity and density affect storage conditions, transport solutions and furnace processes.

Each process has its own set of more or less clearly defined optimal ranges for these material properties. Developers and prospective end users are offered the opportunity to assess and qualify their materials based on their specific goals and performance targets.



Relevante målinger

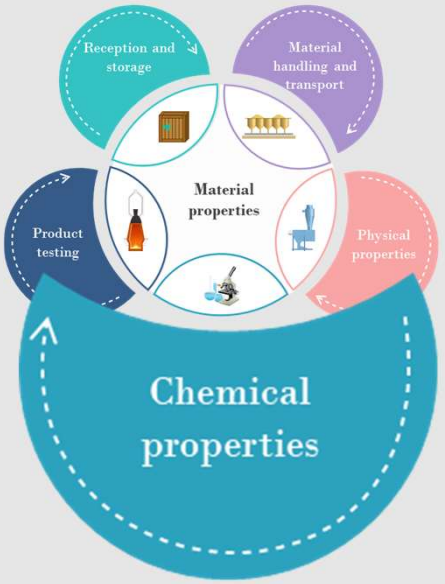
- Agglomerate particle size distribution, fines content
- Bulk density, true density
- Porosity, pore volume
- Compressive strength
- Abrasion tests
- Flow properties
- Combinations of the above



A thorough understanding of a material's chemical properties is often critical to ensuring the quality of the final product.

For most processes, a range of key elements must be controlled, including both desirable and undesirable components.

Chemical analysis can be used to support quality assurance throughout the value chain, covering both intermediate products (agglomerates) and the final product.

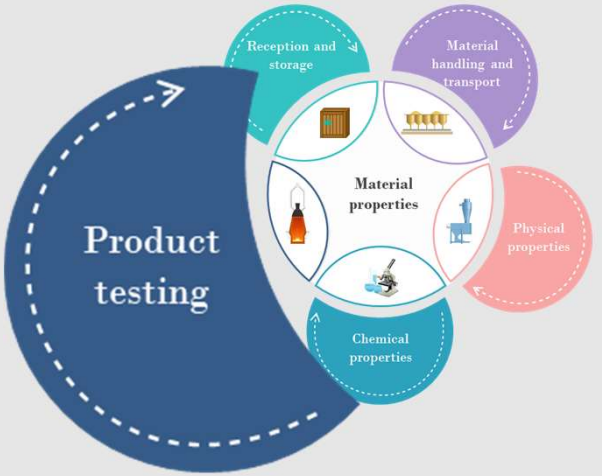


Relevant measurements

- Sample preparation
- Moisture determination
- Ash content
- Volatile content
- Elemental analysis (Varian AAS)
- Carbon analysis (LECO RC612)
- Total carbon and sulfur (LECO SC832)

For thermal and metallurgical processes, characterization of the raw material “as received” does not necessarily provide all the answers.

Elkem Technology Pilot facility offers customized heat treatment based on the customer’s specific setup, enabling evaluation of thermal effects on the product properties that the customer considers most relevant



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Relevant measurements

- Physical process simulation
- Thermal stability
- Product ignition temperature
- Weight loss during heat treatment
- Combinations of treatment and characterization

Other Areas of Interest

Measurement methodologies developed within the Biopromet project are applicable across a wide range of areas, including:

- Characterization of charcoal and coke samples for the metallurgical industry
- Agglomerates based on raw material sources other than biocarbon
- Development of new products for air and water treatment applications (adsorption of environmental pollutants)
- Development of biochar-based fertilizers for soil improvement (increased pH and water retention)
- Biochar as a feed additive in animal nutrition (improved nutrient uptake and enhanced immune response*)
- Biocarbon for moisture regulation and insulation in building applications

*Early-stage research

Contact us for more information:

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