ECRA’s research project
Future Grinding Technologies

Summary of Phase I
Challenges for cement grinding

Sustainability

Efficient production
What technologies are available for cement grinding?

Today’s grinding technologies

- Is the available technology still able to meet all requirements?
- Can the efficiency of industrial grinding equipment be further increased?
- Do we need a whole new concept for cement grinding?
ECRA’s “Future Grinding Technologies” Project

Stimulate research projects driven by the industry’s demand

Break with conventions of cement grinding by cross-sectoral approaches

Understand requirements for today’s and tomorrow’s cement production

Provide technical solutions to meet these requirements
Phase 0: Literature study

- Started in 2013
- Database with 130 grinding systems
- Divided into 8 classes:
  - Chemical / thermal grinding
  - Crusher / coarse grinding
  - Cutting
  - Jet mills
  - Media mills
  - Particle bed comminution
  - Wet grinding
  - (Ultra-) Fine Grinding

Source: Reichardt
Phase I: Roundtable event 4-5 November 2014
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- 50 participants
- Delegates form 8 universities
- Equipment suppliers (also non-cement equipment)
- Other industries (e.g. lime, gypsum, mining)

- 1st half day: Lectures and discussions
- 2nd half day: 3 Working groups
Workshops

Group 1 – Machine level
“What does the ideal comminution device look like?”

Group 2 – Plant level
“What is the optimal layout of a cement grinding plant?”

Group 3 – Industry level
“What synergies exist between industrial sectors?”
Benchmarking existing technical solutions

- There are great technical solutions available
- New future requirements can make existing solutions more attractive
- Evaluation by benchmarking process for industrial equipment
- Boundary conditions set by product requirements
  → Demand for comminution modelling

Source: Raschdorf
Future challenges for the cement industry

- What has to be optimised?
- Where are the main challenges today / tomorrow?
- Strong focus on energy but also quality and flexibility
- Control of particle size distribution is a key element
- Practical tools for a-priori determination of process impact on product required
Scientific approach

Phase 2

Basic model description

“Influence of stress type, intensity and frequency on PSD and energy transfer factor”

Phase 3

Benchmark equipment
Control process

Direct practical benefit!

Phase 4

Identify technical optimum
Develop optimum plant design

“Best available solution”

Phase 5

Develop optimal machine
Construction of demonstrator

“Best possible solution”
FUTURE grinding technologies

• We have to understand tomorrow’s industry to provide the right technical solutions!

• Develop products and downstream process together with grinding technology

• What will happen to energy and resource availability?

→ Unlimited amount of energy but limited temporal availability?

→ Higher fineness for better resource efficiency?
Report on Phase I: Evaluation of Roundtable Event

- Summary of data from all discussions, workshops and pre-studies available for download at www.ecra-online.org

- Proposal for future research activities
Thank you for your attention!