

The Continuous Way from Batch to Extruder

Guido Arzt

Stuttgart, Germany, Nov 13th 2018



| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| Did you know...

- ... that Henkel is the **world's number one** adhesives producer?
- ... that Henkel sells detergents for around **25 billion wash loads per year?**
- ... that **every second, more than 20 hair colorants** from Henkel are sold worldwide?



| Who we are

Henkel at a glance 2017

More than **53,000** employees
worldwide

More than **€20 bn** sales,
+3.1% organic sales growth

€3.5 bn adjusted¹ operating
profit (EBIT)

40% of our sales generated in
emerging markets

More than **2,100** social
projects supported

More than **141 years**
of success

¹ Adjusted for one-time charges/gains and restructuring charges.

| Who we are

Global footprint

- Henkel products and technologies available **worldwide**
- Employees from **120 nations**
- Strong presence in emerging markets:
40% of sales, 54% of employees
- **188 manufacturing** and **22 major R&D sites** around the world



Who we are

Leading positions in consumer and industrial businesses

Adhesive Technologies



LOCTITE
TECHNOMELT
TEROSON

Beauty Care



Schwarzkopf
Dial
syoss

Laundry & Home Care



Persil
Purex



| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| Why should I be interested in a continuous process?

1. Modern process
2. Fully Automated
3. Short process throughput time
4. Self-control of the system
5. Constant quality
6. Better logistics around the process
7. Cost efficient process
8. Lower material losses
9. Flexible „batch“ size
10. Easy change over



| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| Wrong myths about the continuous process

1. Only suitable for simple recipes.
2. Make only sense for a small number of identical recipes.
3. For the system is best never turn off.
4. When starting, high losses until the system is stable.
5. High risk if anything that does not work stable.
6. Hard to clean.
7. It's hard to define a batch size.
8. High production volume required for a good economy.

| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| How can I start?

1. Internal clarify for which product (family) such a process would bring benefits (cost, quality, capacity increase, etc.)
2. Accurate analysis of the batch process (what exactly is going on, are there reactions, minimum batch times, etc.).
3. Creation of a raw material matrix with all formulations, raw materials and properties of the raw materials (powder, liquid, viscosity, density, melting point, bulk density use).
4. Then create with experts a first design of the process.
5. Plan and execute trials. Then optimize the design and determine the process data.
6. Create the layout for a production equipment and costing.

| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| What should I know

1. ZSK is primarily for medium to high viscosity materials.
2. The process is not as flexible as the batch process.
3. It requires a minimum throughput to operate the equipment economically.
4. The effort for the design of the process is bigger.
5. The batch process really needs to be clearly understood, especially when reactions are taking place.
6. Introduction of the new process, the approval process for the customer must be considered.
7. Product development has to be involved in the process right from the beginning.
8. The handling of raw materials plays a major role in the process.

| Agenda

1. Who is Henkel AG&Co KGaA
2. Why should I be interested in a continuous process?
3. Wrong myths about the continuous process
4. How can I start?
5. What should I know
6. When is the right time to start implementing it?

| When is the right time to start implementing it?

Good opportunities for investment*:

- Always when you plan to expand your existing production.
- When you plan to build up a new production.
- A replacement of a old equipment.



*From the first considerations and trials on an extruder to the start of production on an extruder, you easily need 2-4 years.

Thank you!