

MAJOR ACHIEVEMENTS IN BREWING SCIENCE AND TECHNOLOGY IN 250 YEARS

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As brewers, we like to think that we are part of a high-tech industry, always quickly adopting new machinery and processes, and always using the best from biology and chemistry. In fact, we are usually proud to talk about our industry's achievements.

Let us pose two questions:

A. Has brewing throughout history always developed?

B. Are we still loyal to our heritage of developing breakthrough ideas?

Going through brewing textbooks from Germany and UK – after all, two countries with a long brewing history – you find no shortage of reports of new ideas in machinery, processes and general improvements. The trick is to look for *real improvements*, i.e. 'breakthrough' type developments, different from 'continuous improvement' type developments, which over time also contribute substantial improvements.

So which achievements deserve to be classified *real improvements*?

This may result in a subjective answer – some are value machinery developments, others biological breeding programmes, etc.

Here follows 20 major brewing achievements in the last 250 years, listed in chronological order, not according to importance:

If you, as a reader, have comments, additions or disagreements, please let me know!



1. A saccharometer for metering of wort gravity – since 1784 by John Richardson.
2. A 1 hp steam engine is first used in a brewery – 1846 by Gabriel Sedlmayer, Spaten Brewery, Munich.
3. Wort and beer pasteurisation since 1870 following Louis Pasteur's publication 'Des causes des maladie de la biere'.
4. A cooling machine for beer cooling, first used in 1876 by Carl von Linde. First used in Denmark by Carlsberg in 1887.
5. Yeast purification and a yeast propagation plant – 1883, Emil Chr. Hansen.
6. Crown Cork bottle closure patented in 1898 – first used in Denmark in 1907, as Denmark in 1907 agreed on a standard beer returnable bottle.
7. Wort cooler replaces brewhouse coolship in the years after 1930.
8. Filtration of beer using Kieselguhr – since 1940s.
9. Control of diacetyl removal during primary fermentation – since 1950s.
10. Chemical stabilisation of beer with PVPP and Silicagel – since 1960s.

11. Stainless steel replaces copper as brewhouse construction material – since 1960s.
12. Cylindroconical fermenters and fixed piping replacing horizontal fermenters and hose connections – since late 1960s.
13. Efficient empty bottle inspectors in beer bottling – since 1970s.
14. HGB using deaerated, carbonated water – since 1970s.
15. Barley breeding: Yield increased from four to seven t/ha from 1970s to 2000.
16. Continuous fermentation using immobilised yeast cells – Finland since 1980s.
17. Yeast strain breeding – in particular since 1980s.
18. Mash filter with high-pressure lautering and > 12 brews – Meura, since 1990s.
19. Beer in PET bottles with low oxygen penetration – after year 2000.
20. Membrane filtration – avoiding filter aids like kieselguhr – since year 2005.

Now back to our two questions:

A. Has brewing throughout history always developed?

It appears that a real breakthrough period was 1870-1890, as the cooling machine, the pasteurisation concept and the propagation of a pure yeast culture all happened in those 20 years.

The years 1900-1950 show only little improvement work – perhaps surprising, if we consider that the modern automobile was developed in that period.

The 1970s perhaps again showed real news with high gravity brewing, cylindroconical fermenters and the EBI for bottling developed in this period.

B. Are we still loyal to our heritage of developing breakthrough ideas?

Are we, again, caught in times of little real improvement since the 1990s? No doubt, all leading brewers are busy working with improvements in productivity, losses, packaging efficiency programmes and continuous improvements in general, but are we witnesses to the much wanted breakthrough improvements, and – if not – do we secure our industry's ability for research, tests, the inevitable risks and stakes for this game? ↓

