History of High Resolution Mass Spectrometry in Bremen

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Thermo Fisher Scientific (Bremen)
ATLAS Werke AG Bremen

- A former shipyard company

- Dr. Ludolf Jenckel (Physicist, Atlas Werke AG) together with one colleague developed in 1 year the first MS prototype in the cellar of a hospital

- After completion he persuades his company to set up a small division for MS:

1948 Atlas MAT was founded!
MAT = Mess und Analysen-Technik

Magnet from his teacher Walcher, mounted on wooden frame
Companies in England and the US already sold commercial mass specs
The prototype could not compete with these instruments
CH1 (1948) – first prototype / birth of MAT

Definition of MS, from a user in USA:

„A machine that almost doesn‘t quite work“
CH3 (1950) – (here: prototype)

Maximum Resolution 300

In 1952 exhibited at the Achema show in Frankfurt
MS division was always close to dissolution
Sales volume 100,000$ per year in 1954
Not enough for a division with 20 people
CH4 (1958) – first success

- More than 400 installed by 1967

- MAT expanded

Applications: e.g.
Analysis of coffee aroma (headspace);
Perfume mixtures;
Cigarette smoke
CH4 (1958) – first success

GC-CH4 shown on Achema in early sixties seen as curiosity
GC/MS started in US
MAT now independent subsidiary of Atlas
1965 - 400 people working for MAT
1967 Varian acquires MAT

First trial to make a double focusing MS on the basis of the CH4 – does not work
SM1 (1966) - Mattauch-Herzog Geometry

- High end MS
- The first double focussing MS

- Later:
  MAT 731: photoplate
  MAT 711: scanning

But:
High production cost
thus high priced MS
MAT 711 / 731 Mattauch-Herzog Geometry

MAT 711: scanning

MAT 731: photoplate
For routine analysis

Single focussing MS

- Maximum Resolution ?

10,000
CH5: magnet, (CH5 was built until 1975)

- CH5-DF: (1971) double focusing MS (developed for routine analysis)
MAT 311 (1972, double focusing MS)

Maximum Resolution? 20,000

More than 1000 instruments sold by 1976 - MAT became one of the leading producers of MS in the
MAT 8200 (1982 – 1986)

First Dioxin measurements done
Flexible GC transfer line with poor performance
HSQ 30 (1985) – First Hybrid System

LTQ Orbitrap XL
Recent Hybrid MS
MAT 90 Series (1987)

- The MAT90: first completely computer controlled MS on the market
MAT 90 Series: Direct Predecessor of the DFS

- 1987 - MAT 90
- 1992 - MAT 95
- 1995 - MAT 95 S
- 1998 - MAT 95 XL
- 2001 - MAT 95 XP

2003
MAT95 XP Ion optics and electronics design dated back more than 15 years
DFS - Design Sketch
DFS High Resolution MS (2005)

Introduced at the 2005 Dioxin Conference in Toronto

70 % used as Dual GC-MS instrument
Resolution up to 80,000
20 fg TCDD with S/N > 200:1
Designed for low power consumption and small footprint
What’s next?

Thank you for your attention!