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The Centre for Process Innovation

PI Technologies – CPI Experience
Steve Donegan

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About CPI

- Based at Wilton Centre
- Funded primarily by ONE Northeast
- Philosophy of creating an asset
- Open access for industrial users
- Chemistry and biotechnology

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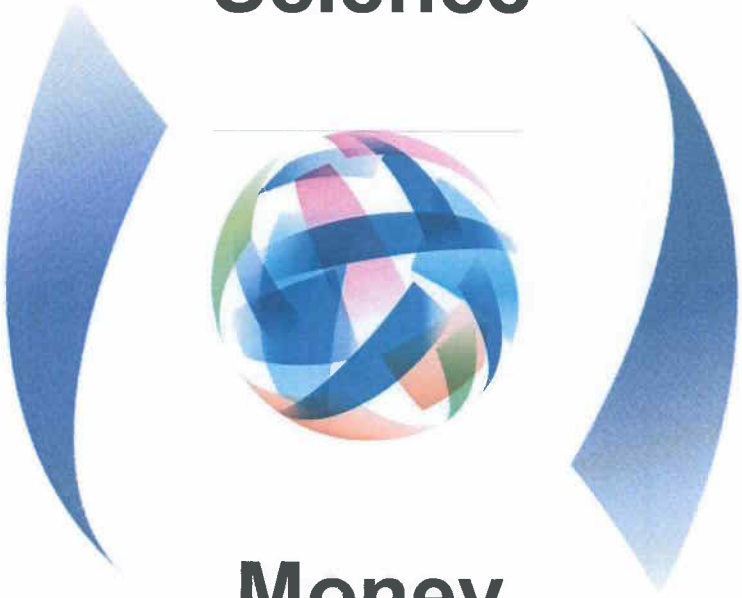
Converting Science into Wealth

Science



Money

Market led Technology
Robust Product and Process Development

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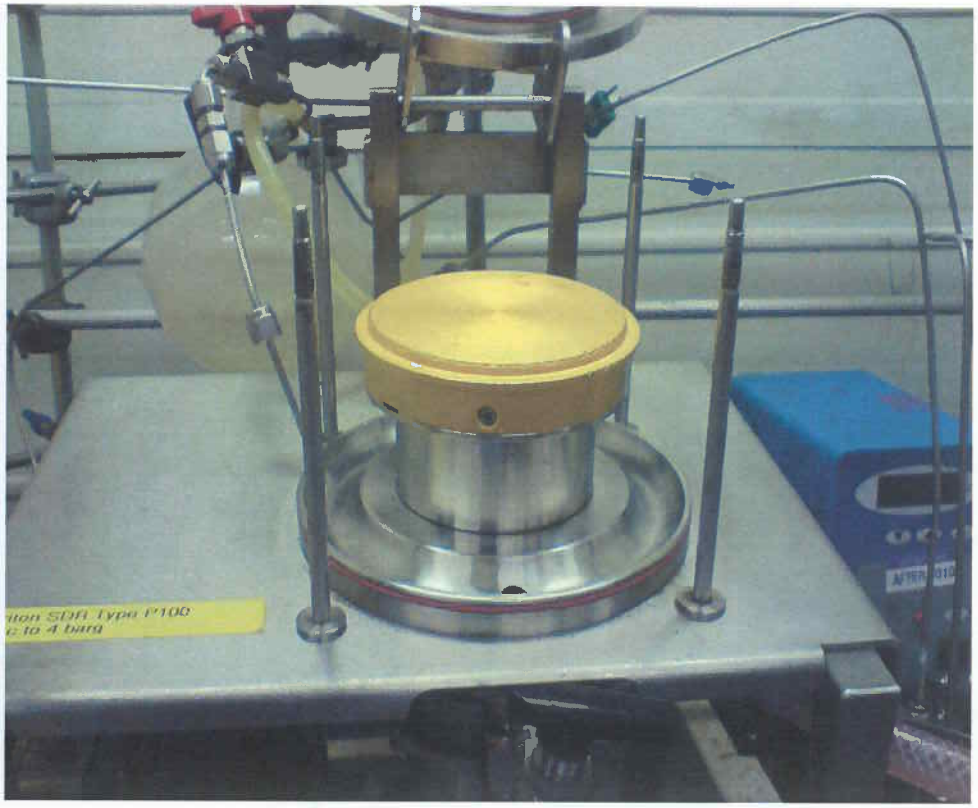
PI Technologies

- Spinning Disc Reactor
  - Fast Sulphonation and Nitration reactions
- Oscillatory Baffle Reactor
  - Oxidation hydrogenation
  - Fermentation
- Continuous Flow Reactors (Micro/ Mini Reactors)
  - Corning
  - Three Phase Gas/liquid /Solid

Spinning Disc

- Project with Thomas Swann
  - Speed
  - Materials addition feeding points
    - Mixing Trials
  - Corrosion

Spinning Disc



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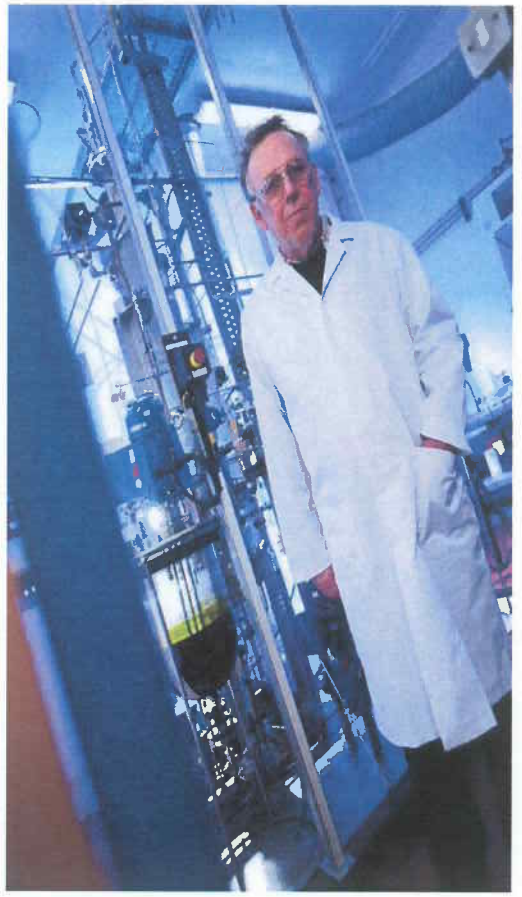
OBR

- Three phase reactions
  - Excellent for handling solid phase catalysts
- Versatile technology



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Continuous Flow Reactors (Micro/ Mini Reactors)

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Continuous Flow Reactors (Micro/ Mini Reactors)

- Flexible facility
- Performed three phase reactions
- Glass
- -60 C to +200 C
- 18 Bar
- See what is going on

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Observations

- All the technologies successful in the correct application
- Important to know
  - Kinetics
  - Mechanisms
  - Thermodynamics
- Processes quickly to shift to differing Pressure and Temperature zone
  - Residence times shorter

Observations 2

- **Proof of Concept experiments quickly successful**
  - **Perform difficult processes**
- **Products and Quality improved**
- **Optimisation takes a little longer**
  - **Yield**
  - **Impurities (profile changes)**
  - **Other products (Dimers over reaction)**

Observations 3

- Systems can become extremely complex
  - Multivariate analysis
- Masses of data easily collected
- System dynamics can be changed and stabilised very quickly

Plug Flow

- Most of these technologies push towards plug flow
- All molecules have the same experience, need to be sure what that experience is
  - Feed Tanks (mixing)
  - Feed Rates
  - Temperature Control
- Expend much time refining the feeds

Conclusions

- **Application of PI technologies is recommended**
- **Ready to commit time**
- **Projects and process must be thought through**
- **CSTR's can be in some ways more forgiving**

Thanks TO

- **PIN for inviting me**
- **ONE Northeast**
- **CPI**
- **Denis Wray, Ruksanna Ahmad, Gustavo Valente, Ana Paracho**

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Any Questions?

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