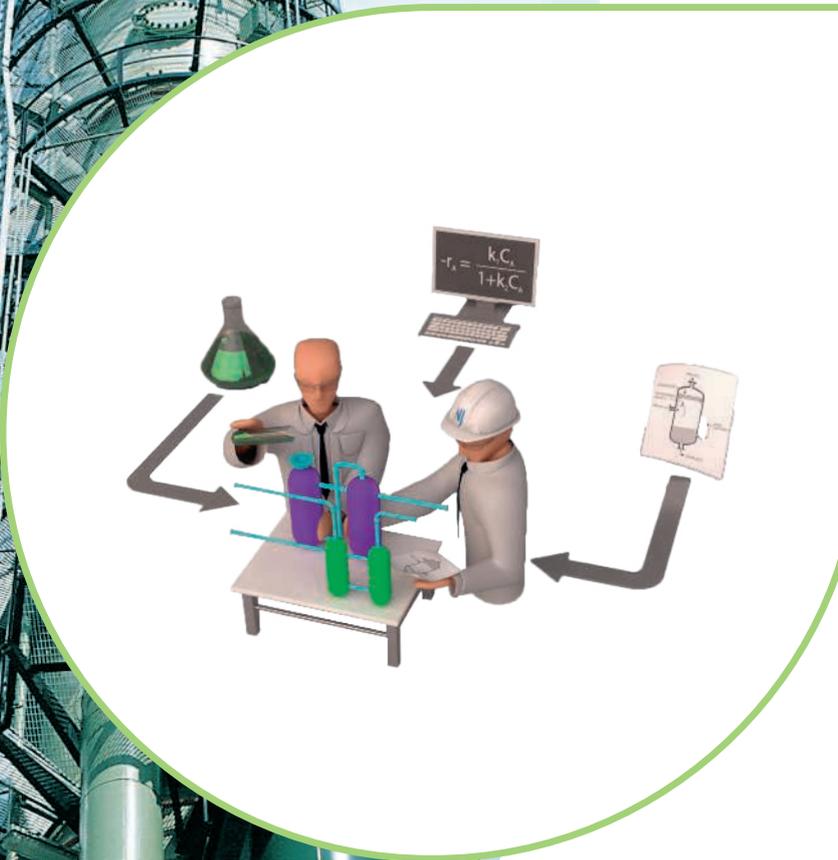


Technology Co-Development

# From Innovative Idea to Commercial Success

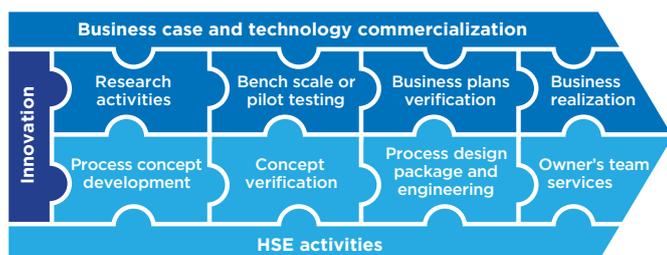


# Technology Co-Development

## The Fast Track to Commercial Success

Success in the process industry increasingly depends on adopting efficient new technologies. In addition to R&D activities, successfully developing a new process requires mastering of physicochemical phenomena modelling, plus related conceptual process design and engineering work. An experienced partner in process development and engineering is essential for executing fast development work – from original idea to a safe and profitable production process.

### Collaboration Is The Key



Neste Engineering Solutions' systematic approach for Technology Co-Development ensures efficient progress towards commercialization of new technologies through process development in seamless co-operation with the customer. As each project has its specific features, the final development plan is tailored to the customer's needs. The required technology definition level as well as intellectual property rights are agreed with the customer to ensure optimum utilization of results.

The Technology Co-Development activities are performed in close collaboration with the customer's R&D and business development team to determine the theoretical basis for modelling and development of the new commercial process. Chemical reaction kinetics, separation processes and any other equipment are modelled to commercial scale, taking into consideration all relevant economic, safety, and ecological boundary conditions.

The key outcome of Technology Co-Development is a process or equipment concept with sufficient basis of engineering data for designing an optimized and safe production plant or equipment. Next steps towards commercialization typically involve a complete process design package for technology transfer, followed by all the needed engineering steps for mechanical completeness and actual start-up. Owner's team and licensor services are provided as needed for consequent new technology related business opportunities and investments.

### Benefits

#### Seamless Collaboration

- Joint research, modelling and engineering effort with objective to commercialize new technology.
- Continuous progress toward commercialization in co-operation with all engineering disciplines in-house.
- Intellectual property right issues are arranged in full co-operation between the parties.

#### Save Time and Money

- Focused research work is guided towards meaningful data by rigorous process modelling and deep expertise.
- Earlier entry to markets – in most cases large scale costly piloting is not needed.
- Possibility to combine with complimentary technologies.

#### Lower Risks

- Modelling provides detailed understanding and mitigation of risks in early stage.
- Reliable models as basis for high-quality process design, advanced control systems and training simulators.
- HSE activities in all stages from research to realization.
- Experienced partner in designing bench-scale and pilot installations as well as commercial units.

#### Experienced, Technology-Focused Partner

- Thorough understanding of phase equilibria, transport phenomena and deriving of reaction kinetic equations.
- Wide network links with universities and research institutes.
- Numerous proven commercial references of world leading technologies.

#### On Purpose Tools Beyond Comparison

- Substantial range of in-house vapor-liquid data banks and programs for fitting kinetics and phase equilibria.
- Commercial and in-house steady state and dynamic simulators with in-house add-on phenomena models
- Scale-up and verification of reactor and complex equipment by computational fluid dynamics (CFD).
- Cost data and extensive engineering competence in-house for rigorous evaluation from the earliest stage.