

# IPM Technology

## Integral Pump Mixing



By taking a radical "ground-up" approach to high performance fluid mixing and combining elements of the most successful techniques, IPM represents a major breakthrough in mixing technology.

The unique geometry and operation of IPM were patented in 1997 and cover a wide range of machine types and application areas.

### Process Benefits

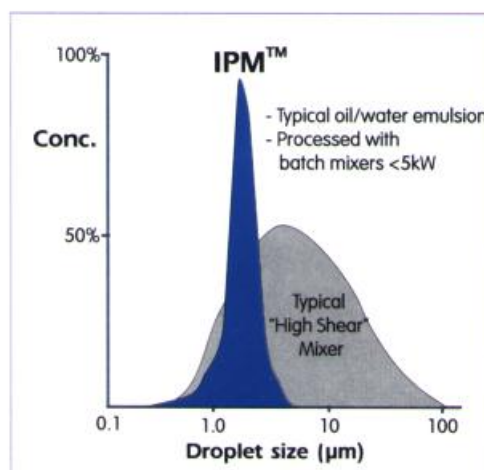
- Very high energy transfer - up to 10x traditional "high-shear" mixers to give:
  - Better quality product - finer dispersions with higher uniformity
  - Shorter mixing times
- Wide viscosity range -  $10^{-1}$  to  $10^9$  cP
- System pumping up to 10 bar (gauge) for inline machines
- Multi-stage inline mixing with near-ambient pressure inter-stage dosing
- Consistent process history - fluid passing through the head sees uniform stress
- Can be retro-fitted to existing plant and processes
- Cost-effective - more efficient processes mean lower operating costs

"IPM represents a major  
breakthrough in fluid mixing technology"

### Applications

- Homogenisation
- Emulsification
- Dispersion
- De-agglomeration
- Reaction

For use in industries ranging from food and pharmaceuticals to fine chemicals, coatings and petrochemicals.



Maelstrom APT **Integrimix** machines based on IPM technology are available in both batch and inline forms from laboratory scale through to large-scale production. Maelstrom APT can also supply complete mixing systems to suit most applications including vessels, pumps, dosing systems, bulk conveyors, piping and controls.

technology

IPM™

Integral  
Pump  
Mixing

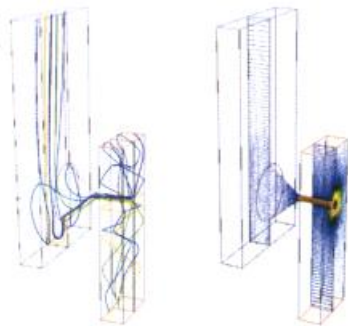


## Operating Principle

IPM technology combines the actions of

- high pressure nozzle homogenisers
- jet impinging mixers, and
- turbulent shear rotor/stator mixers

to achieve very high levels of energy transfer into fluids. Within the mixing head of an IPM machine, positive displacement pumping is used to generate an internal fluid pressure drop across a set of nozzles. Fluid passes through these nozzles at high velocities and experiences both extensional and shear stresses.



The jets of fluid which exit the nozzles then impinge on the inner wall of the mixing stage, releasing their kinetic energy as impact stress. Finally, prior to exiting the mixing stage the fluid is allowed some relaxation time within a turbulent shear stressing zone, which research has shown to be significant in preventing re-agglomeration.

“higher effective mixing energy means  
smaller droplets and particles”



### Integrimix BP

A range of general purpose batch mixers available in 3 basic size ranges from laboratory to full production scale. Integrimix BP offers low-cost flexibility combined with higher performance in many applications where “high-shear” rotor/stator mixers are currently being used.



### Integrimix BF

For materials which are very difficult to mix, the Integrimix BF range of fixed batch mixers provides a unique combination of high stress IPM action and total batch mixing. By cyclically driving an IPM mixing head through the integrated vessel, complete mixing is assured.



### Integrimix C

A range of high performance inline machines with integrated positive displacement pumping and exceptional mixing performance. Throughputs range from 125 litres/hour to more than 100 tonnes/hour to meet all requirements from development to production.



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