Innovative Mixing & Processing Technology

German technology made in the USA
Applications:

• Dispersing
• Blending
• Droplet Size Reduction
• Particle Size Reduction
• Emulsions (Emulsifying)
• Suspensions (Suspending)
• Homogenizing
• Bleaching
• Neutralization
• Dissolving
• De-agglomeration

Process Operations:

• Batch
  - Open, atmospheric
  - Closed, pressurized, vacuum

• Inline - Continuous
  - Atmospheric
  - Pressurized

• Inline - Discontinuous
  - Recirculation system
IKA Process Equipment Selection

- High Speed - High Shear Mixer
- High Pressure Homogenizer
- Colloid Mill
- Cone Mill
- High Shear Disperser - three (3) sets of rotor/stator
- High Shear Mixer - one rotor/stator design
- High Efficiency Disperser
- Medium Shear Mixer
- Shear Pump
- Static Mixer
- Agitator
- Dissolver

Shear Rates & Horse Power Vs. Flow-Rate

Highest Flow-rate
Lowest Power Consumption

Up to 100,000 s⁻¹
IKA DRS 2000
ULTRA SHEAR - HIGH SHEAR - SHEAR PUMP

Biodiesel Reactors

What is ULTRA & High Shear?
Multiple stage high speed rotor-stator mixing technology with intense shear frequency

What is it used for?
1. Ultra and High Shear is used to process Crude Oil into RBD Oil
   • Degumming Process
   • Neutralization Process
   • Bleaching Process
2. Biodiesel Reaction / Conversion
3. Water Wash Process

What are the Advantages?
• 24/7 continuous process
• Reduced space requirements
• Very low process inventory
• Minimal manpower requirements
• All oils and fats can be processed
• Cold water-wash with ‘Ultra Shear’ - removes sterol glucosides
• High Product quality guaranteed
• Fully Automated Process
• Reactors from 1GPM to 500GPM
• Reactors for New or Existing Plants
• Process success even for very poor-quality crude oil

For more information please visit www.biodieselmixer.com
Superfine - 8SF
Shear Pump - 2P
Coarse - 2G
Medium - 4M
Fine - 6F
Superfine - 8SF

Executed in IKA® quality
A three-stage high-shear dispersing machine for the production of macro-emulsions and very fine suspensions. Due to the three generators (rotor + stator) in direct series a narrow distribution range, smaller droplets and particles and thus a longer stability of the mixture are reached. The generators are easily interchangeable, by which a further adaptation to the respective application becomes possible. Same speed and shear rate for all machine sizes enables an exact scale-up. Drives and process parameters like temperature, pressure and viscosities are the same as for the ULTRA-TURRAX®.

CIP and SIP capability are also given for these machines and they are therefore of great use especially for the production of food and pharmaceutical products.

<table>
<thead>
<tr>
<th>Type Size</th>
<th>Max. flow capacity, ref. H2O</th>
<th>Drive speed</th>
<th>Motor power IP 55 (kW)</th>
<th>Connections inlet/outlet</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPAX-REACTOR®</td>
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<tr>
<td>DR 2000/05</td>
<td>2.500</td>
<td>6.000</td>
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<td>1.500</td>
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<td>DN 150 / DN 125</td>
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<tr>
<td>DR 2000/50</td>
<td>125.000</td>
<td>1.100</td>
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<td>DN 200 / DN 150</td>
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<tr>
<th>Type</th>
<th>Size</th>
<th>Max. flow capacity, ref. H₂O min. gap, at 50 Hz, l/h</th>
<th>Drive speed at 50 Hz, 1/min</th>
<th>Motor power IP 55 kW</th>
<th>Connections inlet/outlet</th>
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<td>DN 150 / DN 125</td>
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<td>1.100</td>
<td>160</td>
<td>DN 200 / DN 150</td>
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The IKA ® HED is a single stage direct driven homogenizer providing high throughput capabilities and superior mixing results. Interchangeable stator options allows for controlled shear input. The IKA® HED 2000 is excellent for deagglomerating, dispersing, emulsifying, blending, disintegrating and homogenizing mixing up to several thousand cPs.

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Goals:
• Droplet Size reduction
• Particle size reduction
• Narrowly dispersed liquid phases
• Homogenized product
• Blended/ Dissolved product
• Neutralized product
• And many more...

Range of Particle Sizes

- DISPAX-REACTION® DRS
- DISPAX-REACTION® DR
- ULTRA-TURRAX® UTL, UTC, UTS, UTE
- HED-REACTION® HED
- ROTOTRON® TURBOTRON®
Application Side:

- Material (liquid/solid/gas)
- Desired Result
- Process (batch, inline)
- Viscosity, bulk density
- Quantity (flow rate)
- Dispersion time
- Temperature
- Peculiarities (abrasive, corrosive, hazardous, explosive, flammable)
- Mechanical Requirements (wetted materials, seal faces, electrical etc.)

Equipment Side:

- Design of the dispersing chamber/tools
- Dead spots in the chamber
- Easy access for maintenance
- Seal design (cartridge, pressure, faces)
- Drive System (belt drive, gear box, direct)
- Scalability: tip speed and generator design
- Variety of interchangeable dispersing tools
- Modular design of dispersing chambers
- Noise level
- Options (vertical/horizontal mounting, custom design, high pressure)
- Choice of materials of construction
Automated machinery guarantees the precision manufacturing required by IKA’s standards.

The distances between the rotor and the stator are from 0.25 to 0.8 mm. IKA machines allow this small of a gap because of precision machining and high quality standards for all IKA machines. All IKA generators are machined on computerized numerical control machines.
Rotor/Stator Design

Multiple Stage Extreme High-Speed & Shear Mixer - IKA DRS 2000/...

Multiple and Single Stage High Shear Mixer DR 2000/... and UTL 2000/...

Single Stage Moderate Shear Pump Mixer HED 2000/...

2G - Coarse

2P - Shear Pumping

4M - Medium

6F - Fine

8SF - Superfine
All IKA products go through a series of demanding quality control checks. Every product that goes through our doors has exceeded our quality standards and carries the IKA Guarantee.
Crude Oil Refining - Step 1
De-gumming Process / Removing Impurities and Gums

De-Gumming Skid
Modified Water Degumming With Enzymes
Removing Impurities and Gums
Highest Oil-Yield Improvement

Enzymatic Degumming

Crude Vegetable Oil
Heat Exchanger
Enzymatic Solution
Flowmeter
Pump
Flowmeter
IKA Dispax Reactor
Multiple-Stage Ultra-Shear Reactor
2 hour Retention Tank
Centrifuge
De-gummed Oil
To Neutralization Process
Water
Crude Oil Refining - Step 2
Neutralization Process / Removing of FFA

Neutralization Skid
Continuous Transesterification Process

Ultra-Shear Mixers and Mixing skids available:
0.5 MGY, 1 MGY, 5 MGY, 20 MGY, 40 MGY, 80 MGY, 150 MGY, 250 MGY

Primary Transesterification Skid

Secondary Transesterification Skid

F.A.M.E = 98.59 before Wash Process
F.A.M.E = 99.85 after Water Wash Process
Semi-Continuous - Batch Transesterification Process

- Refined Feedstock
- Methanol
- Catalyst
- Primary Transesterification
- Separator
- Centrifuge
- Decant Tank
- Secondary Transesterification
- Methyl Ester
- Crude Biodiesel
- Glycerin

- IKA Biodiesel Reactor
  - Up to 1,200 GPM and 300 PSI
  - 10,000 Gallon Batch and converted to M.E. in 30 min max
  - Complete reaction to Methyl Ester and Glycerin
  - Multiple rotor/stator options
State of the art R & D Systems
Inline dispersion system for Oils & Fats
Bioreactor and Lab Reactors

Inline Dispersion System

- Continuous capacity of 1GMP or optional 2 GPM
- Capacity is suitable for pilot plants or production (max. 1MYG)
- Ultra High Shear Mixer technology - used in reactions for over 50 years
- Accurately meters feedstock, acid, caustic, methanol, or catalyst with precision gear pumps and high accuracy mass flow meters

Bio-Diesel from algae

IKA Algae cultivation reactor
The IKA® Philosophy:

IKA is one of the leading manufacturers of mixing and dispersing machines.

An IKA Product means a combination of the latest innovative technology and highest quality. The use of an IKA machine or system must be economically justified, but at the same time must guarantee a constant product quality over a long period of time with guaranteed results.

We carefully establish a clear plan to determine which machines or systems are most suitable for each and every application. Our philosophy is ‘the product to be processed and the production time have to be matched in order to achieve the optimum result.'