A Double Concentric Fuel/Filter Separator Layout System

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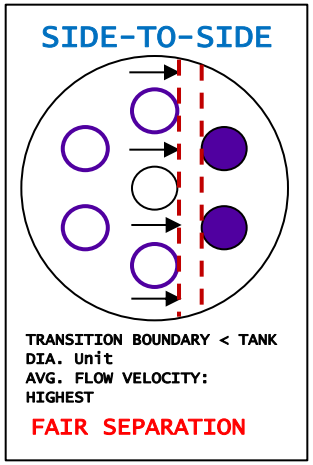
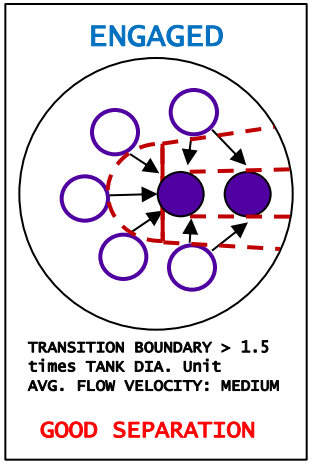
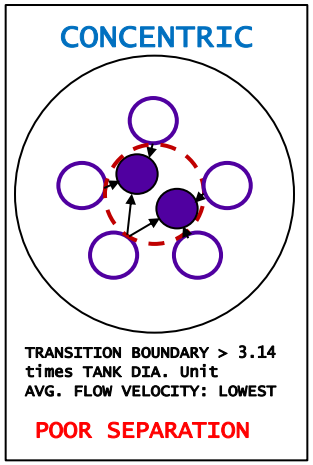
Conventional Technology

Coalescer/Separator Element Layout in Fuel/Water Separators

- **Three types of arrangements** (API/IP 1582)







Commercially Preferred

Coalescer Separator Transition Boundary

Oil & Gas Chemical Processing Filtration & Separation Conference
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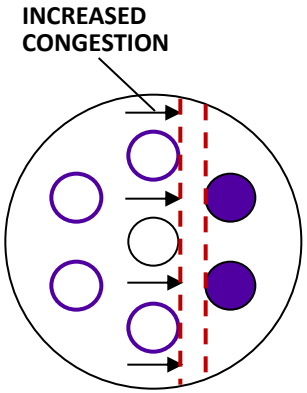
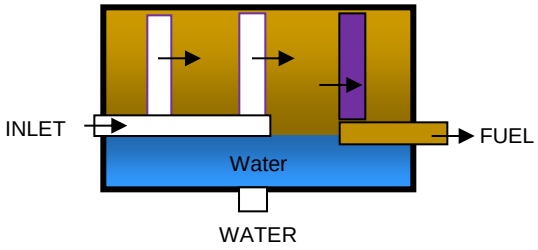
For Large Capacity (>2000 GPM), all result in very large, expensive, low performing Vessel

Side-To-Side Configuration

Coalescer/Separator Element Layout in Fuel/Water Separators

- **Increased congestion leads to re-mixing of water & fuel**
  - Increased volume & weight of resident water
  - Increase in vessel diameter and/or height:
    - increased number or height of elements
    - require larger wall thickness



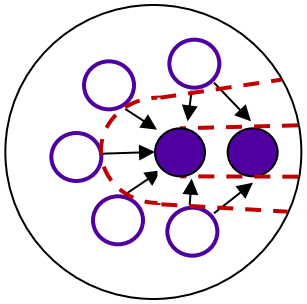


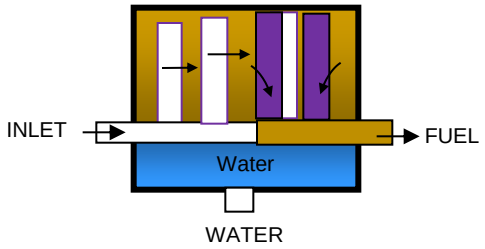
Higher Cost, and Larger Weight & Service Space Required to Achieve Large Capacity

Engaged Configuration

Coalescer/Separator Element Layout in Fuel/Water Separators

- **Separators Load Unbalanced**
  - Increased Separator Efficiency compared to side by side elements layout
  - Reduction in vessel diameter and/or height:
    - increased number or height of elements
    - Reduce flow velocity compared to side by side element distribution system layout





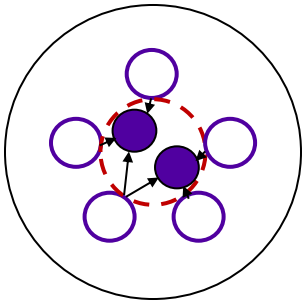
Coalescer Separator Transition Boundary

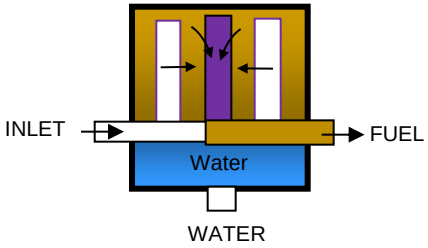
Higher Cost, and Larger Weight & Service Space Required to Achieve Large Capacity

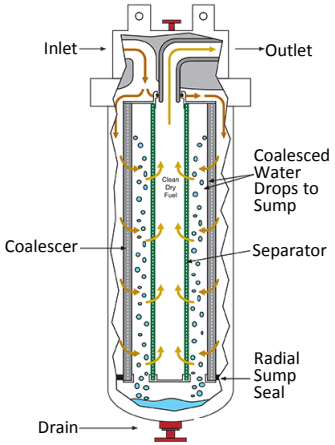
Concentric Configuration

Coalescer/Separator Element Layout in Fuel/Water Separators

- **Balanced Separator Load Compared to Engaged Configuration**
- **Shortest Transition Boundary; Lower Flow Velocity compared to Side-by-Side or Engaged Configuration**
  - Increased Separation Capacity per foot print







Simple Example

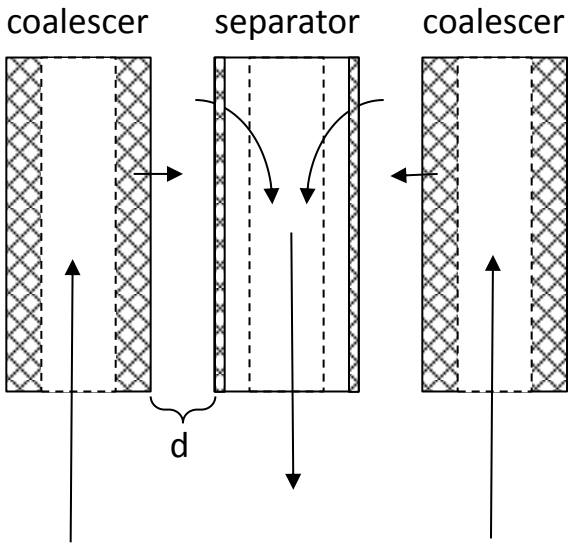
Source: Velcon Brochure

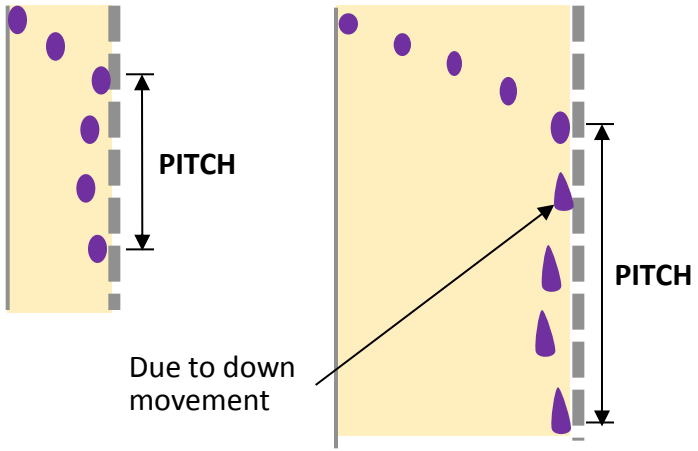
Coalescer Separator Transition Boundary

Higher Cost : Separation Ratio

Effect of increasing Resident Time

- **Filtrate Resident Time is Increased by increasing the distance between coalescer / separator elements or reducing fluid flow velocity across elements**





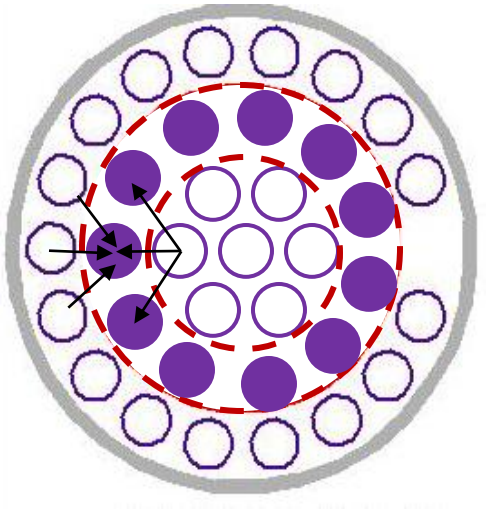
Longer travel time or distance makes the droplets longer
Bounce frequency over surface reduces
Pitch length increases

Large Flow Capacity Vessels

Coalescer/Separator Element Layout in Fuel/Water Separators

- **Double Concentric Layout***
  - Double transition boundary in a small space
  - Increased fluid resident time between elements
  - Water sinks faster due to low inter-element velocity
  - reduced congestion prevents re-mixing
  - Accommodates large number of elements at equal distances for high throughput in a small space

Optimized For Large Capacity Applications (over 2000 GPM)

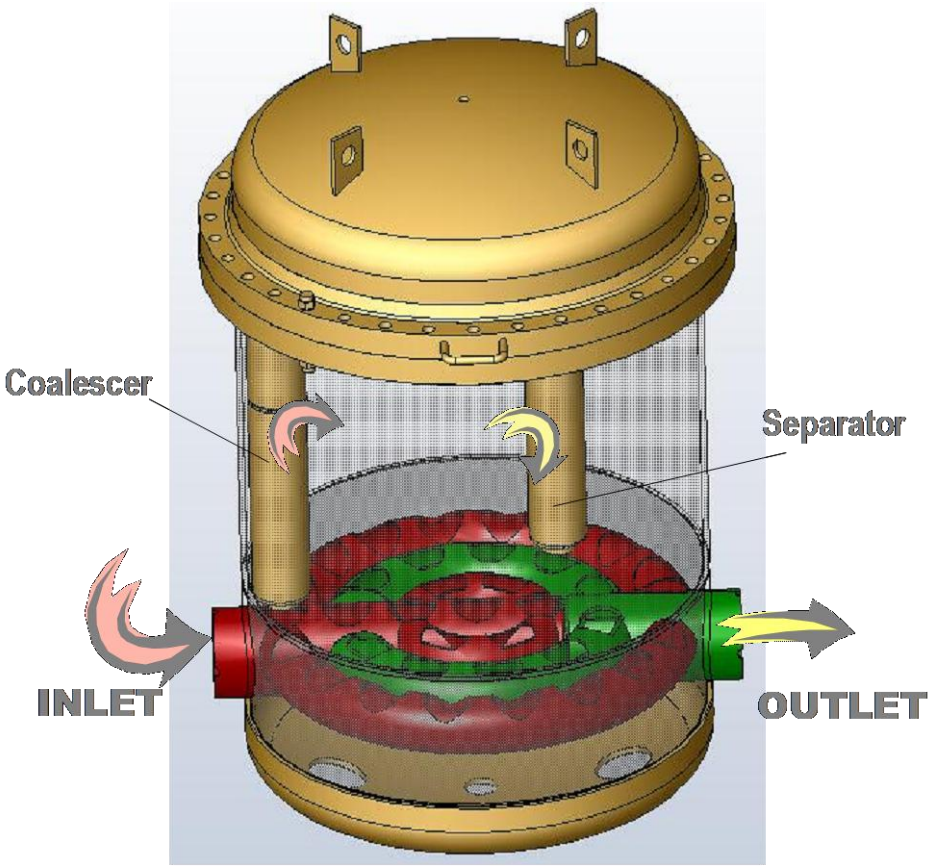


TRANSITION BOUNDARY: 360°
AVG. FLOW VELOCITY: 50% of Side-by-Side

EXCELLENT SEPARATION

Coalescer Separator Transition Boundary

2500 GPM Vessel using Double Concentric Element Layout*



**DOUBLE CONCENTRIC CONFIGURATION IS OMTEC PROPRIETERY (PATENT PENDING)*