

晨安企業股份有限公司

GOOD MORNING ENTR.CO.,LTD

地址：台北市南港區成功路1段32號5樓之10
電話：02-66160668
聯絡人：林慕志/林盈潔

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Noritake

STATIC MIXER

靜態型混合攪拌管

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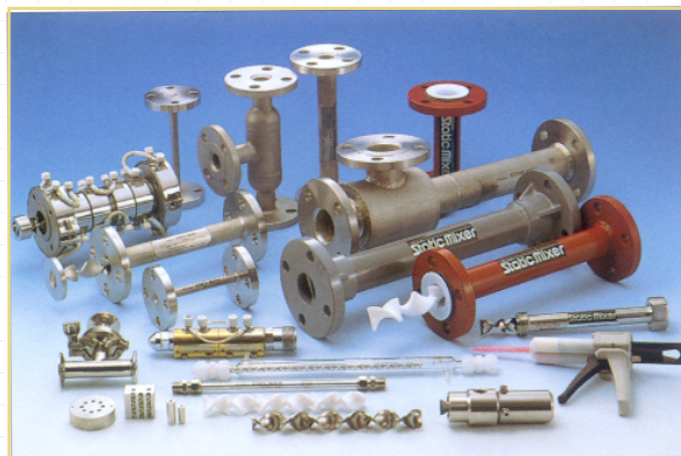
Noritake

STATIC MIXER

FOR NEW ENGINEERING
HIGH TECHNOLOGY NEW PRODUCTS

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Noritake STATIC MIXER



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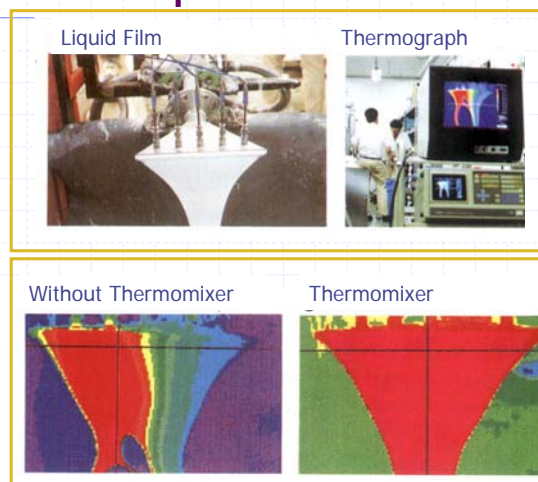
Noritake Static Mixer



- ◆ 攪拌設備步入管內連續性自動控制
- ◆ 取代傳統式攪拌機 / 節約能源 / 節省空間
- ◆ 數秒內完成瞬間混合控制 / 品質均一
- ◆ Mixing Equipment with continuously automatic control
- ◆ substituting conventional mixing machine/ save energy/ save space
- ◆ Finishing instant mixing control / uniform quality

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Noritake Japan STATIC MIXER

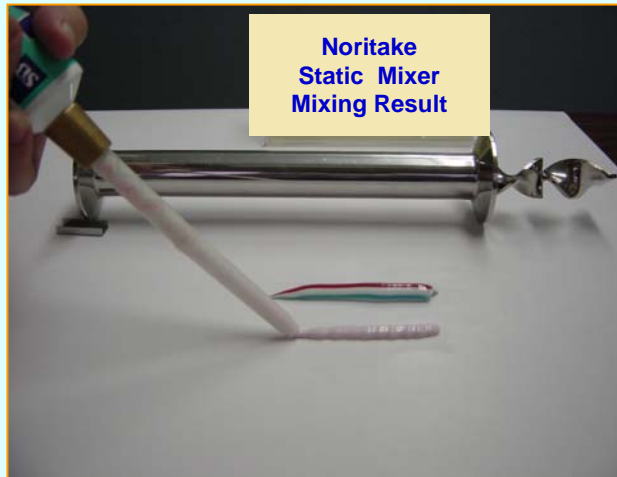


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Static Mixer Mixing Result Demo



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Noritake
Static Mixer
Mixing Result

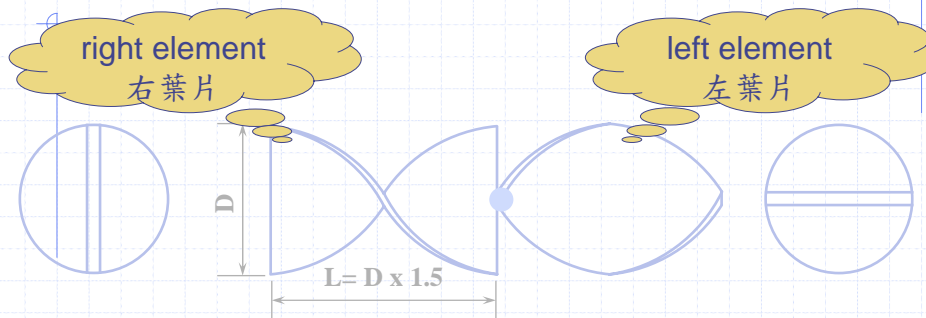
Good Morning

High-viscous and Low-viscous Fluids



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Element Shape 葉片形狀



D = Element diameter
L = Element length

D 為葉片外徑
L 為葉片長度

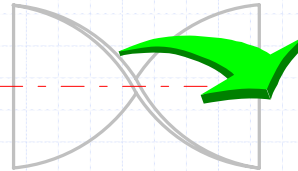
Each element is a plate
twisted 180° to the right
or to the left.

葉片構造將長方形板
扭轉成180度。

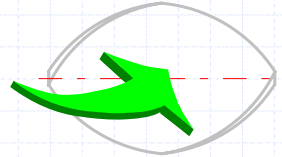
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Element Shape 葉片形狀

right element shape
右葉片形狀



left element shape
左葉片形狀



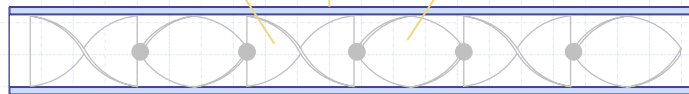
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STATIC MIXER Structure

right elements

pipe

left elements



- ◆ Right and left elements are fixed alternately, adjacent elements being at 90° angles to each other.
- ◆ 6 elements/set
- 左葉片和右葉片在管內排列情形為呈 90° 相互交錯。
- 每套含6個葉片。

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STATIC MIXER Mixing Principles

混合原理

- ◆ STATIC MIXER is a static mixing equipment so that STATIC MIXER itself can't move.
- ◆ The mixing energy only consumes the energy generated from the fluid speed.
- ◆ STATIC MIXER 是靜止型混合器，本身並不會動。
- ◆ 混合的能量只消耗流體本身速度的能量。

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STATIC MIXER Mixing Principles

混合原理

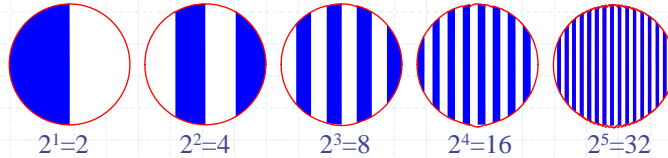
- ◆ STATIC MIXER works with mixing elements.
- ◆ The basic mixing functions of STATIC MIXER are as follows:
- ◆ STATIC MIXER 藉著混合葉片作用。
- ◆ STATIC MIXER 基本混合作用：



STATIC MIXER Mixing Principles (Part I)

Division of Flow 混合原理 (-)

the number of divisions
分割數



◆ What is the number of division (N) = 2^n ?

◆ 什麼是分割數(N) = 2^n ?

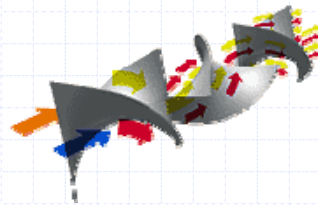
◆ Fluids are bisected as they pass each element.

◆ 流體在通過每一個葉片時，均被分割為二。

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STATIC MIXER Mixing Principles (Part I)

Division of Flow 混合原理 (-)



◆ Flow division is very important when mixing high-viscous fluids, such as resin, adhesive food, ...etc.

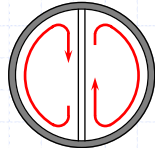
◆ 高黏性流體在STATIC MIXER 內以分割數為主要作用。如：樹脂，接著劑食品...等。

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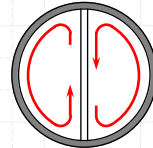
STATIC MIXER Mixing Principles (Part II)

Radial Mixing

混合原理 (二)



right element



left element

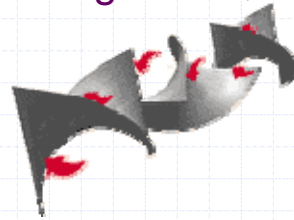
- ◆ What is radial mixing?
- ◆ As fluids follow the curves of the elements, they are rotated radially toward the pipe wall, or rotated back to the center.
- ◆ 什麼是轉換作用？
- ◆ 流體隨著在 STATIC MIXER 內的葉片流動，在各斷面圖內會有圓周方向回轉力。

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STATIC MIXER Mixing Principles (Part II)

Radial Mixing

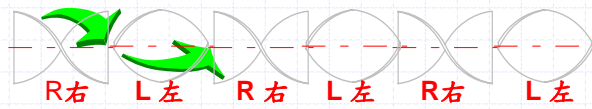
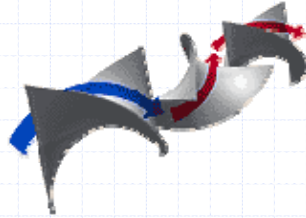
混合原理 (二)



- ◆ Radial mixing is very important when mixing low and high viscous fluids together.
- ◆ For example, REACTOR, HEAT EXCHANGER, THERMO-MIXER, ... ETC.
- ◆ 低黏性流體和高黏性流體混合時，第一考量為轉換作用。
- ◆ 例如：反應器、熱交換器、THERMO-MIXER。

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STATIC MIXER Mixing Principles (Part III) Flow Reversal 混合原理 (三)



◆ What is flow reversal?

◆ 什麼是反轉作用？

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The Selection of the Element Numbers of STATIC MIXER 選定 STATIC MIXER 葉片數的方法

Consideration of the Loss of Pressure 考慮壓力損失

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Based on Re No.

以 Re 數為指標選定

What is Re No.?

什麼是 Re No.?

Inertial Force

慣性力

$$\text{Re} = \frac{\text{easily mixing fluids}}{\text{high viscous fluids}}$$

$$\text{Re} = \frac{\text{容易混合的流體}}{\text{不易流動的流體}}$$

Viscosity

黏力

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Based on Re No.

以 Re 數為指標選定

What is Re No.?

什麼是 Re No.?

R

Re No. is one of the important factors to decide the element numbers.

雷諾數是決定葉片數的重要因子之一。

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The Selection of Element Numbers

- | | |
|--|---|
| ◆ $Re > 2300$
=> 葉片數 = 6
(氣體混合時，葉片數 = 4) | ◆ $Re > 2300$
=> 6 elements
(when mixing gas, 4 elements) |
| ◆ $2300 \geq Re \geq 10$
=> 葉片數 = 12 or 18 | ◆ $2300 \geq Re \geq 10$
=> 12 or 18 elements |
| ◆ $Re < 10$
=> 葉片數 ≥ 24 | ◆ $Re < 10$
=> equal or greater than 24 elements |

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The Application of 6 Elements

6 葉片的應用

- | | |
|--|---|
| ◆ Mixing low-viscous fluids <ul style="list-style-type: none">■ PH adjusting■ NaOH diluting■ The mixing of gas | ◆ 低粘性流體混合 <ul style="list-style-type: none">■ PH 調整■ NaOH 稀釋■ 氣體混合 |
| ◆ Mixing high-viscous fluids <ul style="list-style-type: none">■ Polymer's temperature improving■ Polymer's viscosity improving | ◆ 高粘度流體的均質化 <ul style="list-style-type: none">■ Polymer 的溫度改善■ Polymer 的粘度改善 |

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The Application of 12~18 Elements 12~18 葉片的應用

- ◆ Mixing medium-viscous fluids
 - Oil Mixing
 - Yogurt
- ◆ Extraction
 - Washing with Acid or Alkali
- ◆ Emulsification
 - The manufacturing of emulsified fuel
- ◆ 中粘性流體的混合
 - 油類混合
 - 養樂多
- ◆ 抽出
 - 用酸或鹼洗淨
- ◆ 乳化
 - 乳液燃料油的製造

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The Application of 24 Elements 24 葉片的應用

- ◆ Mixing high-viscous fluids
 - Adhesive
 - Polymer
 - Miso, milk, egg paste
- ◆ 高黏度流體的混合
 - 二液型樹脂(接著劑)
 - 聚合物
 - 味噌、牛乳、蛋糊

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Consideration of the loss of pressure

壓力損失的考量

◆ Three facts of calculating the loss of pressure

- Fluid speed
- Viscosity
- Element numbers

◆ 計算壓損的三要素

- 流速
- 黏度
- 葉片數

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Fluid Speed

流速

◆ The fluid speed is faster while the pipe diameter is smaller.

◆ 流速隨著管徑愈小，流速愈快。

◆ The loss of pressure is larger while the fluid speed is faster.

◆ 流速愈快，壓力損失就愈大。

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Viscosity

黏度

- ◆ The viscosity of each fluid is different because of its characteristics.
- ◆ 黏度隨著流體性質而有不同。
- ◆ The higher viscosity, the larger loss of pressure.
- ◆ 黏度愈高，壓損也就愈大。

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Element Numbers

葉片數

- ◆ More elements comes higher mixing index but larger loss of pressure.
- ◆ 葉片數愈多，混合度愈高，但壓損也會相對提高。
- ◆ The number of mixing elements should be decided by the purpose of mixing.
- ◆ 混合葉片須以混合目的來決定更適當的數量。

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The Conclusion of selecting STATIC MIXER

選定結論

- A. The characteristics of the fluid (high viscosity or low viscosity?)
A. 流體特性 (高粘度或低粘度?)
- B. The ease of installation (easy or difficult?)
B. 安裝的容易程度 (容易或困難?)
- C. The cost of the mixer
C. 混合器的成本
- D. pipe speed (suitable or not?)
D. 管線速度 (是否適用?)
- E. The loss of pump pressure (enough?)
E. 泵的壓力損失 (是否足夠?)

Select the appropriate
選定合適的 Static Mixer

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Noritake Static Mixer



- ◆ 攪拌設備步入管內連續性自動控制
- ◆ 取代傳統式攪拌機 / 節約能源 / 節省空間
- ◆ 數秒內完成瞬間混合控制 / 品質均一
- ◆ Mixing Equipment with continuously automatic control
- ◆ substituting conventional mixing machine/ save energy/ save space
- ◆ Finishing instant mixing control / uniform quality

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◀ N10

Static Mixer

N60 ▶



▶ N16



◀ Noritake Cooker

N50 ▶



Steam Mixer ▶

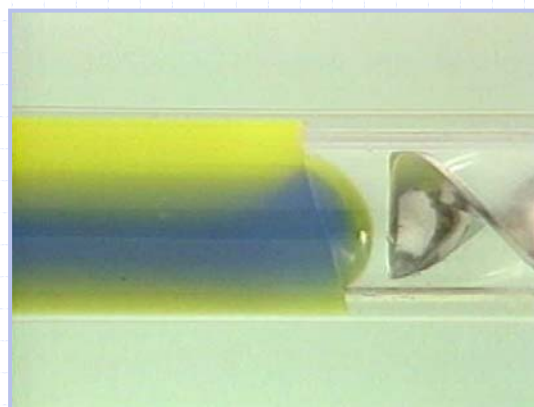


High-viscous and Low-viscous Fluids



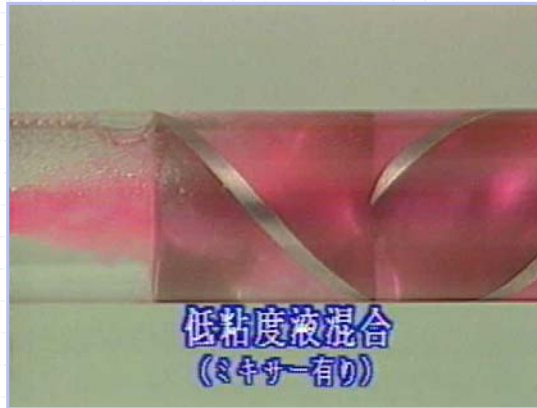
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High-viscous Fluids



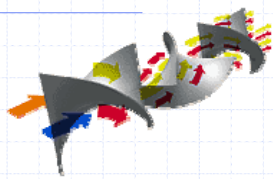
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Low-viscous Fluids

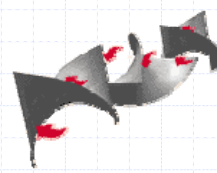


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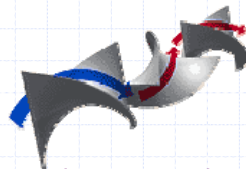
STATIC MIXER



Division of Flow
分割作用



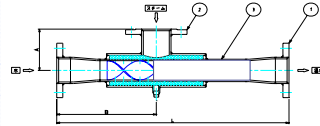
Radial Mixing
轉換作用



Flow Reversal
反轉作用

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STEAM MIXER TYPE: SME-V



Type	Dia	Steam	Housing	Length	Amm	Bmm	Hot Water (m3/h)	Weight
SEM-V25-3	1"	1"	3/4	254	80	105	0.84-4.18	6
SEM-V40-3	1.1/2"	1.1/2"	1.1/4"	379	110	133	2.28-11.4	9
SEM-V50-3	2"	2"	1.1/2"	439	120	147	3.08-15.4	12
SEM-V65-3	2.1/2"	2.1/2"	2"	529	120	171	4.85-24.3	17
SEM-V80-3	3"	3"	2.1/2"	632	140	194	8.14-40.7	20
SEM-V100-3	4"	4"	3.1/2"	804	160	233	14.9-74.3	33
SEM-V125-3	5"	※	4"	939	180	277	19.2-95.8	45
SEM-V150-3	6"	※	5"	1104	220	314	28.6-143	71

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Thanks Thanks Thanks



晨安企業股份有限公司
地址：台北市南港區成功路1段32號5樓之10
電話：02-66160668
聯絡人：林慕志/林盈潔

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