umicore
Platinum Engineered
Materials

ARC twister

...beyond simple stirring!

glass industry solutions

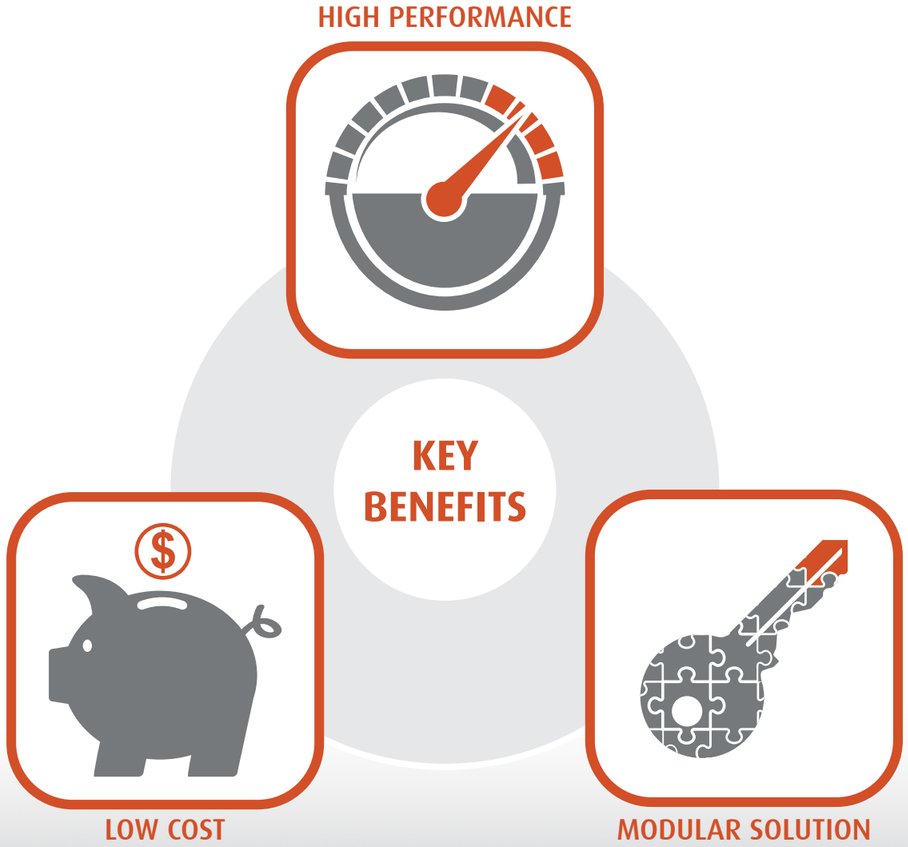
What made us re-invent glass homogenisation devices...

Having been confronted with a wide range of comparable glass homogenisation problems that were common throughout the glass industry we observed that the performance of the conventionally used precious metal based homogenisation devices were not optimal due to their moderate effectiveness.
Consequently we defined the most urgent needs of glass producers and aligned them with the megatrends that drive the industry. Therefore our primary aim was to invent a device that would outperform all existing PGM stirrers used in various segments of the special glass industry.

In the first sketches originating from our development process, the arc blades were soon recognized as the most effective and striking design elements. When we studied the new device's glass agitation profile its extremly effective characteristic was unlike any other stirrer mode of action.
A new component for glass homogenisation was born: the *twister.* After its key design features we name it the ARC*twister.*

ARC *twister*

High added value in glass production



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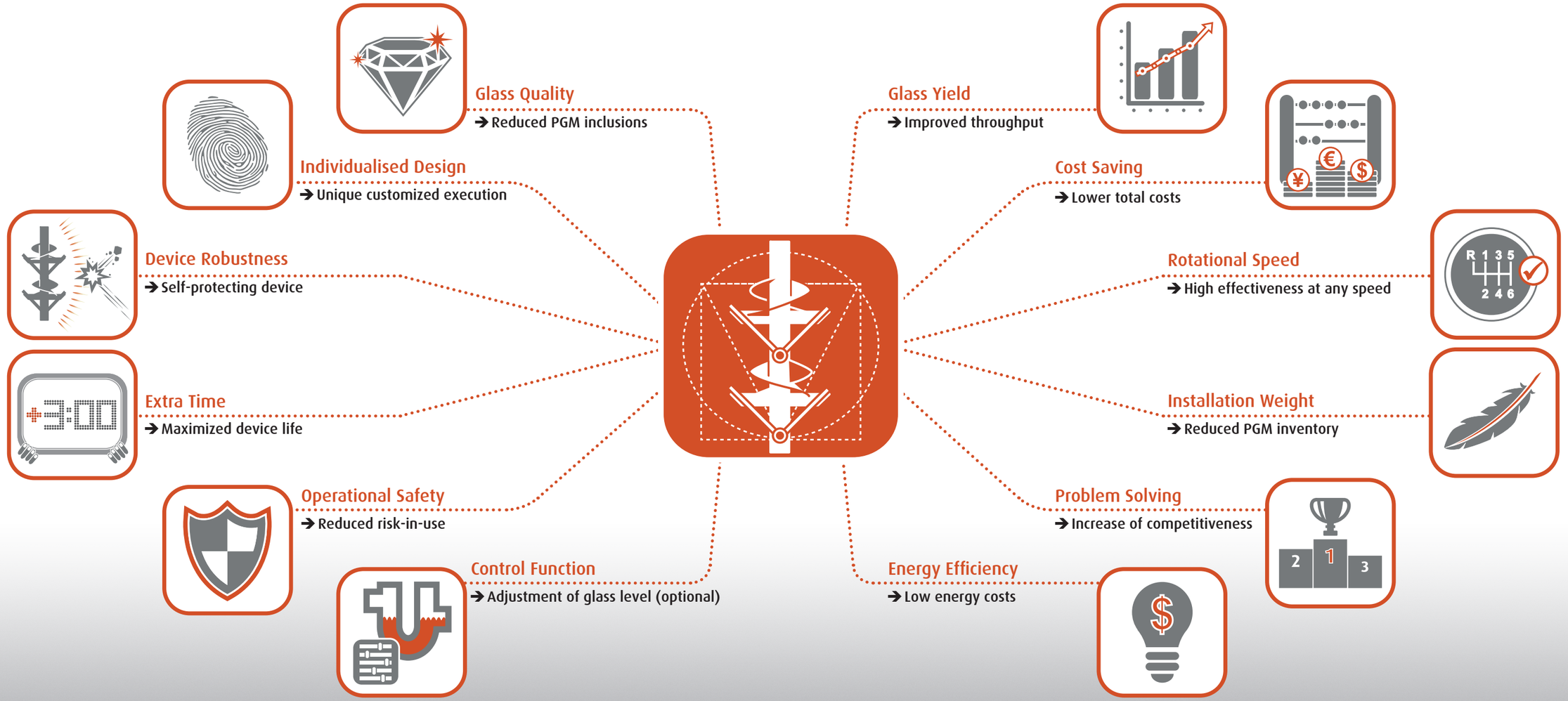
Superior functionality enables higher profit



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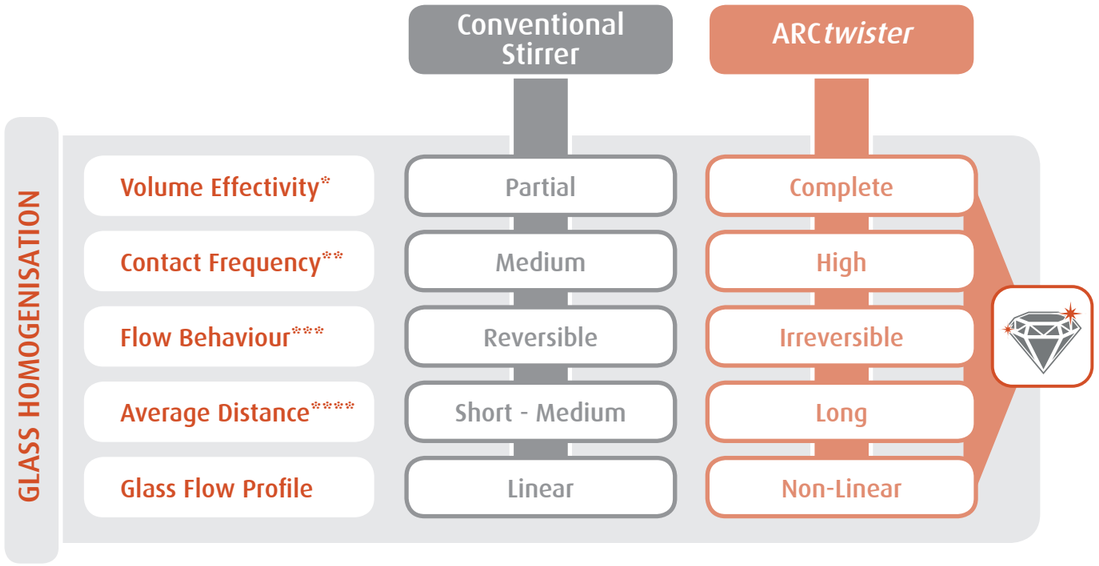
Effectiveness: Stirrer vs. Twister



Remarks:

* Mass exchange throughout the entire relevant homogenisation space without any voids

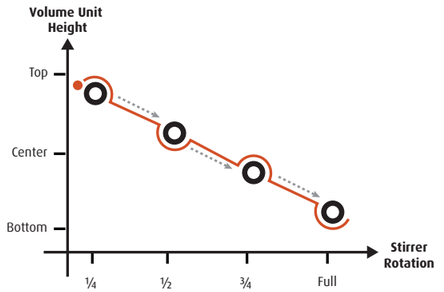
** Glass particles in contact with the agitator elements within the volume per time unit

*** In case of discrete homogenisation

**** Trajectory of a glass particle / mass unit in a reference volume element due to the flow characteristics

Agitation Profile: Stirrer vs. Twister

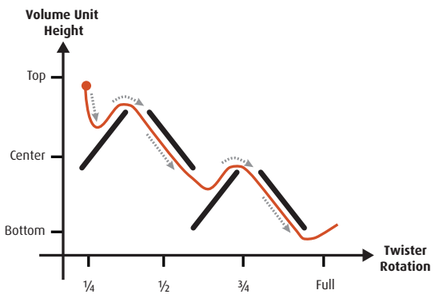
Conventional Stirrer



Conventional Flow Characteristics

- Blades are only local agitators in the outer area (proximity to the wall)
- The fluid is only affected in local areas of the volume unit
- Discrete guidance of fluid particles streamlined at volume unit's circumference

ARCtwister



Advanced Flow Characteristics

- Blades are bulk agitators in the outer area (proximity to the wall)
- The fluid is affected all over the height of the volume unit
- Continuous guidance of fluid particles streamlined at volume unit's circumference

Conventional stirrer blade — Flow direction

ARCtwister blade — Glass particle flow

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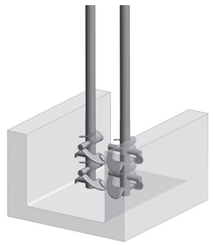
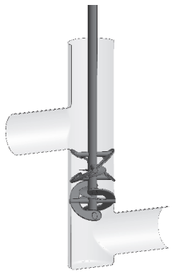
Features: Stirrer vs. Twister

		Conventional Stirrers	ARC*twister*
MATERIAL	Main Material Type	Cast Alloy or ODS	FKS®
	FKS® Grades	1*	2*
	FKS® Sub-Grades	0	2
ENGINEERING	Software Tools	Basic	Advanced
DESIGNS	Base Types	1	3
	Variations	< 25	> 100
	TOTAL Variants	< 25	>> 1.000

*e.g. FKS® Rigilit®

*dedicated Twister grades

ARC*twister* application examples

X-Type	A-Type	V-Type
		
Feeder	Channel	Feeder
		
Cell	Crucible	Cell

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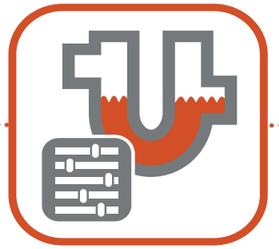
A unique new Mode of Action

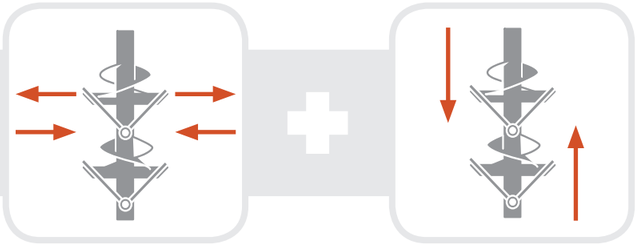
Active alternating multi-dimensional counter-flow principle

- A new unique “S-curved” helical glass flow characteristic is achieved.
- Vertical direction: A constant glass volume exchange in axial direction is maintained providing for repeated contact with the blades.
- Horizontal direction: Glass volumes are transported from the outside to the bowl center and vice-versa.
- The combination of both agitation directions enables a unique and complete mass exchange within the entire volume of the homogenisation space.

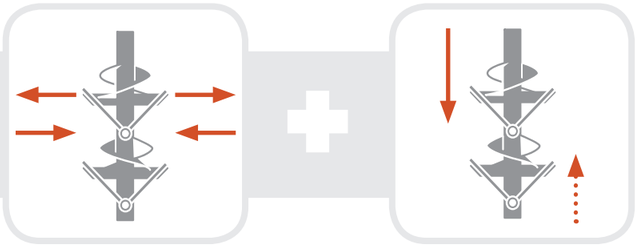


Specific modes depending on application

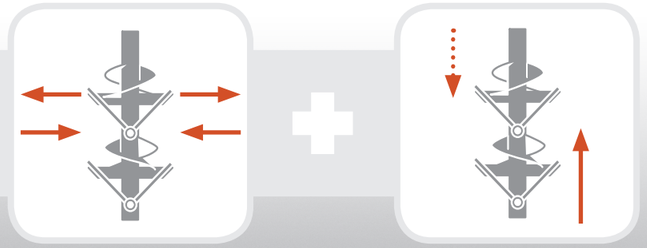
Mode 1: NEUTRAL
No impact on glass level



Mode 2: PUMPING
Decrease of glass level



Mode 3: SUCTION
Increase of glass level



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New & improved features for better functionality

MATERIAL

- New tailored FKS® materials (AT grades)
- 2 superior AT grades with 2 sub-grades each
- Material properties aligned with design
- Material adapted to structural elements

A much bigger TOOLBOX than ever before

DESIGN

- Outer inclined agitators (ARCs)
- Inner helix
- Bi-functional tubular blades
- 3 base designs (A, V, X type)
- Multitude of design executions per type
- Self-protecting & self-cleaning device
- Optional conveying functionality (2 modes)

+

ENGINEERING

- Data Processing (R&D, Application)
- Physical Modeling
- Mathematical Simulation

A much better UNDERSTANDING of how to apply these tools

FUNCTIONALITY

Tailored EFFE CTIVENESS for defined objectives

HIGH PERFORMANCE

KEY BENEFITS

LOW COST

MODULAR SOLUTION

Improved PROFITABILITY

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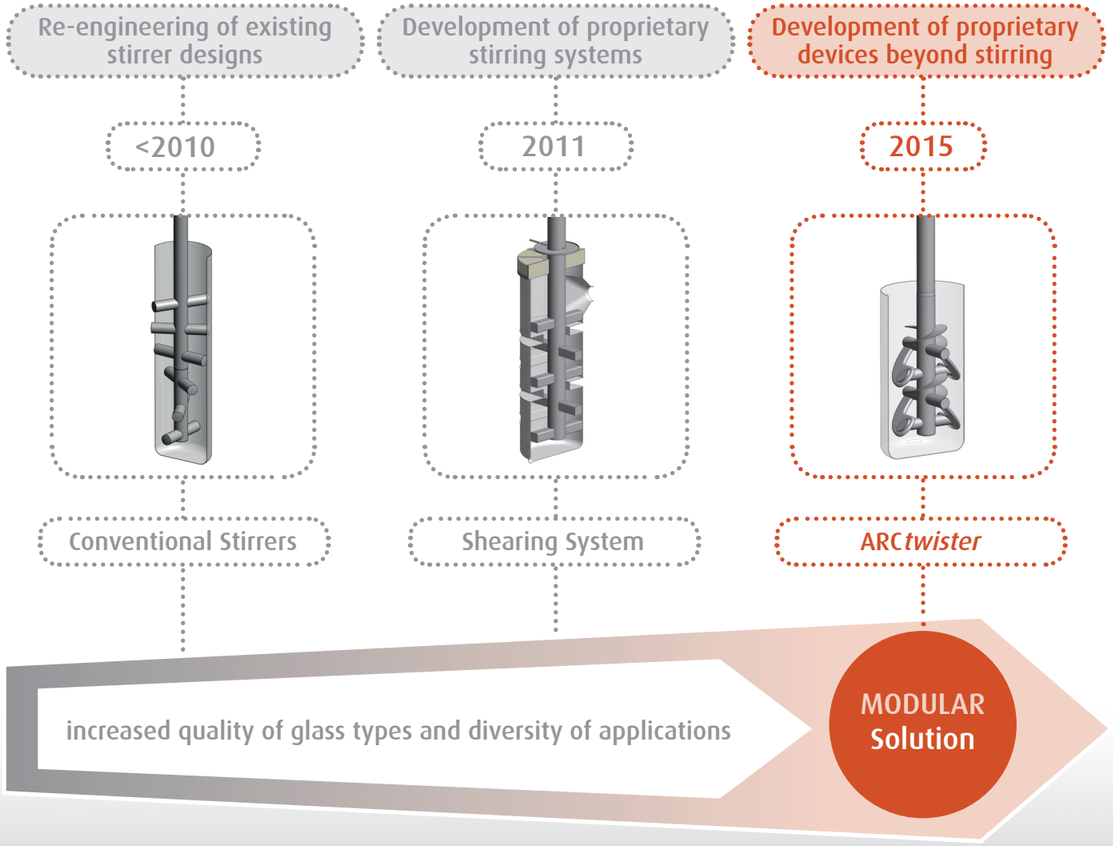
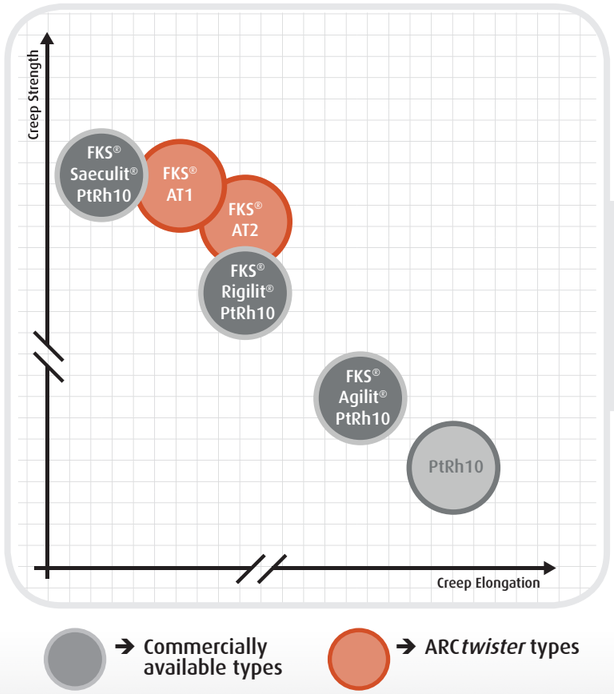
Innovation is the key driver for Umicore's stirrer evolution



Dedicated new materials for superior performance



A new FKS® family for the twister

- New FKS® grades have been developed for exclusive use with the ARC*twister*
- FKS® AT grades are not commercially available like our other FKS® materials
- FKS® AT1: the material of choice for the twister shaft and close to the strength of FKS® Saeculit®
- FKS® AT2: the material of choice for the structural elements (ARCs, helix, tubes) and even stronger than FKS® Rigilit®

Contact us!

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