



JE Dense Loader



JE Dense Loader Specification

CONTENTS



Introduction ...	3
Quality ...	4
Specification ...	5
Effects ...	7



Introduction - Catalyst Dense Loading

Dense Loading is a technology that maximises catalyst performance in the reactor and the general performance of the reactor itself. Commonly used in the petroleum refining and petrochemical industries. It offers the following advantages:

- Increases reactor processing capacity
- Improves liquid / gas distribution
- Controls local differential pressure build-up and prevents the generation of hot spots

The flat loading of catalysts at a uniform density, without damaging the catalyst, is vital to reactor operations.

However, conventional Dense Loading methods have, at times, caused flow maldistribution, differential pressure build-up, and other such problems stemming from catalyst damage resulting from uneven loading density or loading surface and poor loading machine performance.

In order to solve these problems, a high-performance loading machine called the JE Loader has been developed.

Advantage

Our loading technology is widely adopted for use in Residue / VGO hydro-desulfurization units, hydrocracking units, diesel oil and kerosene desulfurization units, and lubrication units in the petroleum refining industry. It offers the following advantages over conventional loading technologies:

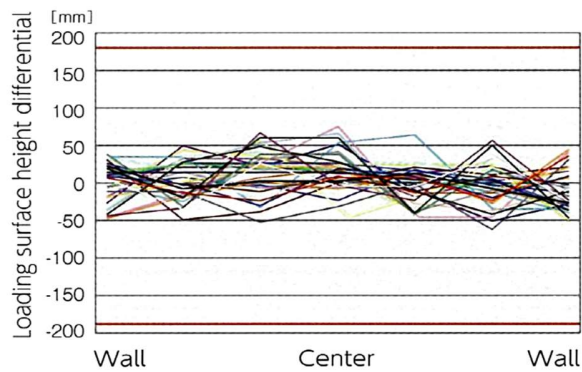
- Excellent loading surface control: loading surface can be easily levelled.
- Reduced instances of catalyst damage / dusting
- High loading density
- Uniform loading density: the unevenness of horizontal and vertical loading surfaces is minimised.
- High cost performance

Our loading technology is applicable for use in any type of reactor and process. Including single / multi-bed reactors, tubular reactors, and centre-pipe reactors, as long as the loading machine can be attached to the centre of the reactor.

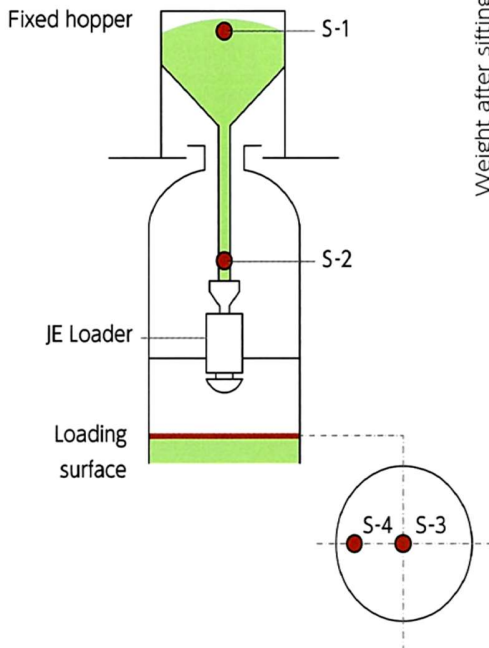
Quality

■ Loading Surface Control

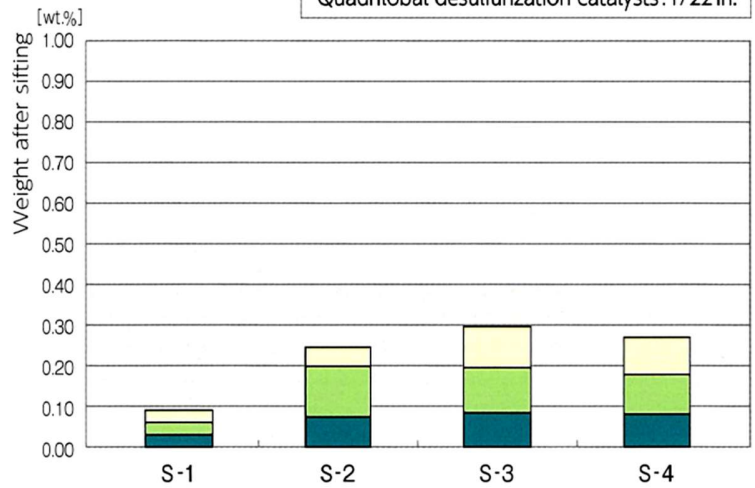
Type : VGO desulfurization reactor
 Reactor diameter : 4,115 mm
 Loading weight : 158 tons
 Control height differential : < 360 mm (= tan 5°)
 Measuring points : 8points×34times=272points
 [Height differential during actual loading]
 Max. : 126 mm
 Min. : 13 mm



■ Catalyst Dusting Ratio



Quadrilobal desulfurization catalysts: 1/22 in.



	S-1	S-2	S-3	S-4
Dust particles [~180µm]	0.03	0.05	0.10	0.09
Fragment [450µm~180µm]	0.03	0.12	0.11	0.10
Fragment [890µm~450µm]	0.03	0.07	0.08	0.08

Specification

■ Loading Machine Performance

- (1) Loading density
10-18% greater than sock-loading procedure
- (2) Surface levelness
Reactor diameter $\times \tan 2.5^\circ - 5.5^\circ$ or less
- (3) Dusting rate (within loading machine)
0.5 wt% or less

Loading speed

60~200 kg/min.
Max.300 kg/min.

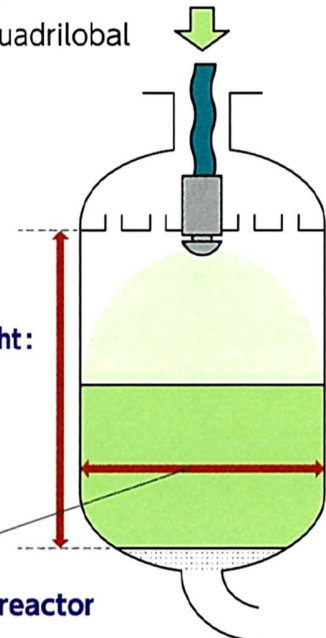
Catalyst types

- Cylindrical
- Trilobal, Quadrilobal
- Spherical



Allowable loading height:
20~0.2m
below tray

Applicable reactor diameter
0.5~6.5 m



■ Equipment Configuration / Installation

〈 Size of loading machine 〉

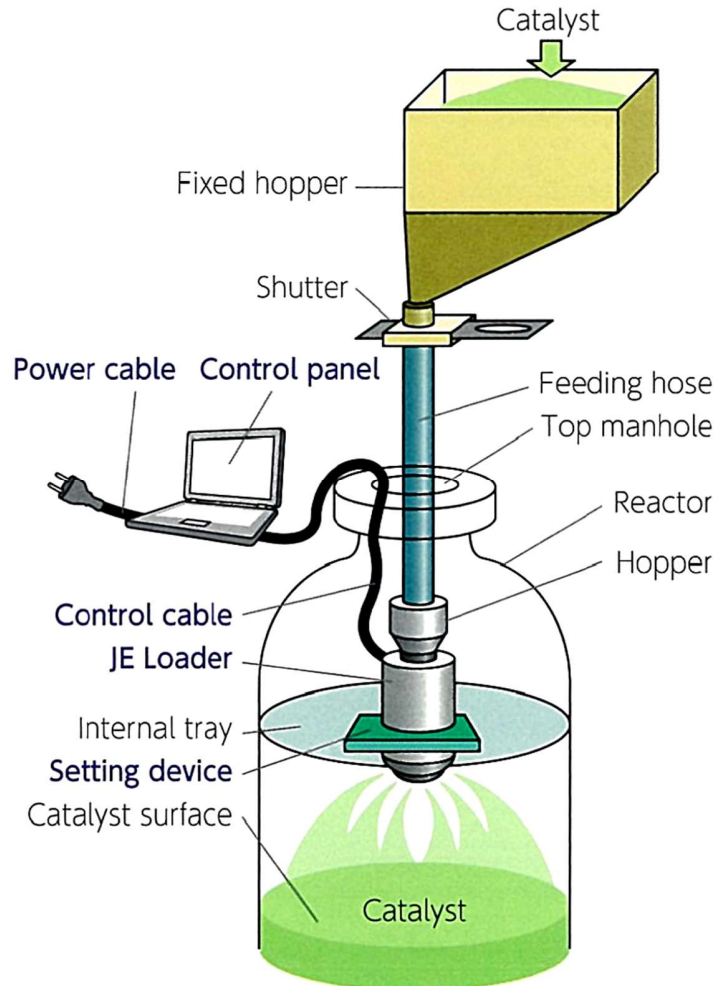
Dimension : $\phi 360 \times 410$ mm

Weight : 20 kg

〈 Set up procedure 〉

JE Loader can be easily install inside and outside the reactor, as follows.

1. Attachment to a manhole flange
2. Attachment to a tray manway
3. Attachment to a grid manway



Equipment configuration

- JE Loader
- Control panel
- Cables
- Setting device

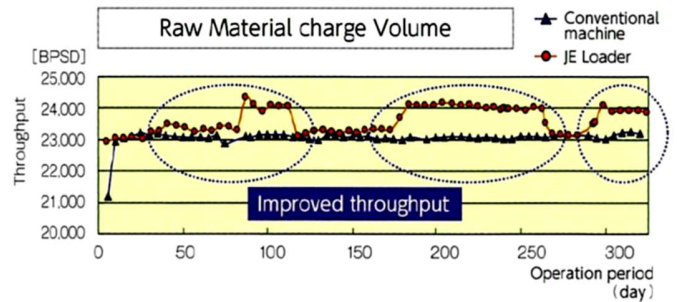
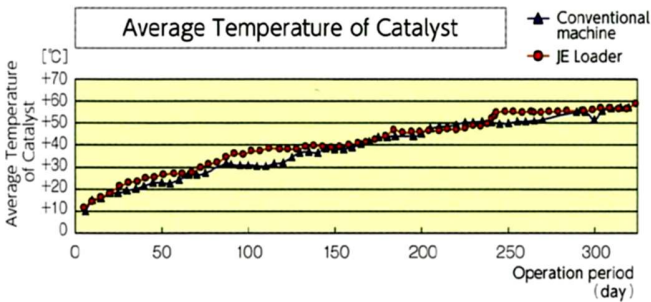
Utility: 100V-115V single phase 15A/50Hz&60Hz



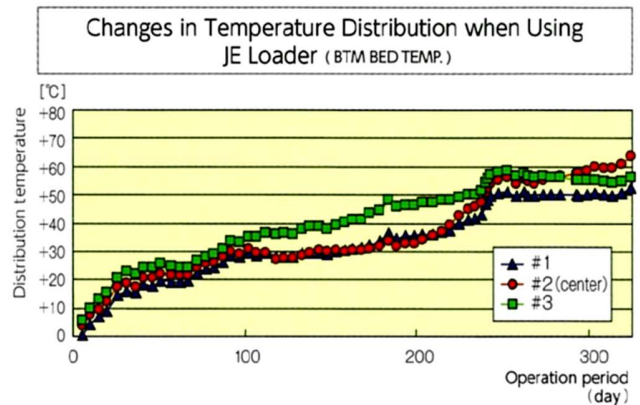
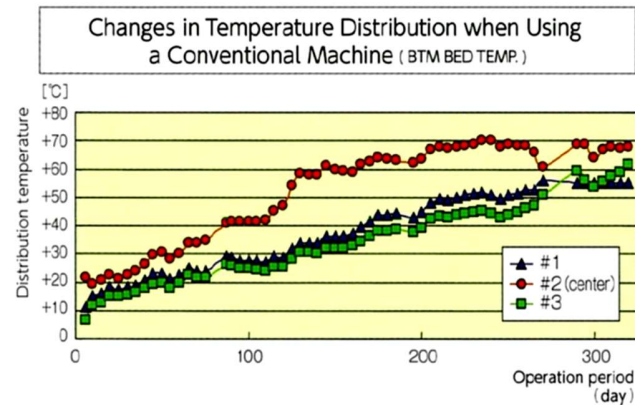
Effects

The following shows a comparison of the operating performance of a Residue hydro-desulfurization unit when using JE Loader and when using a conventional loading machine, where stock oil properties and operating conditions are basically the same.

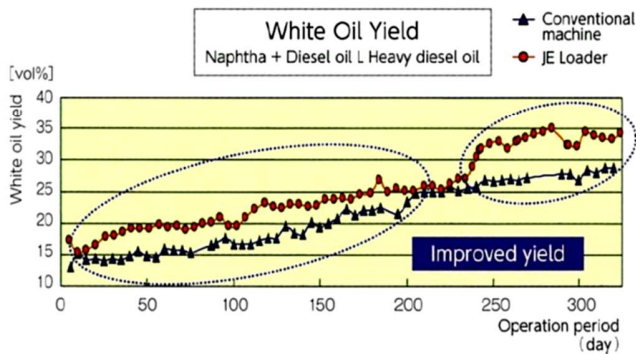
Improvement of Charge Volume



Improvement of Temperature Distribution



Yield Improvement



Yield Improvement and Increased Throughput Effects

Run	Conventional machine	JE Loader
Operation period (days)	320	324
Raw material throughput	BPSD 23,000	24,000
Naphtha yield	vol% 2.1	2.7
Diesel oil yield	vol% 17.7	20.3
Heavy diesel oil yield	vol% 1.0	3.4
Total white oil yield	vol% 20.8	26.4
Residue yield	vol% 79.2	73.6
Total throughput yield	KL 1,173,000	1,221,000



As shown, improved temperature distribution in the catalyst layer inside the reactor could bring significant advantageous effects to the operating conditions of conventional production units.

- Increased liquid throughput
- Improved yield
- Full use of catalysts; longer intervals between catalyst replacement
- Stable operation

Our Dense Loading technology will increase the added value of conventional production units and contribute to further yield improvement.





References

The JE Dense Loader has loaded over:

82 million* Kgs of Catalyst

*As at April 2018

The JE Dense Loader has been used all over the world.



Catalyst Manufacturers include:

Albermarle	Haldor Topsoe
Advanced Refining Technologies	JGC C&C
Axens	Nikki Chemical Co Ltd
BASF	Nippon Ketijen
Chevron	Orient Catalyst Co Ltd
Criterion	UNK
Exxon Mobil	UOP
EuroCat	Unicat

Additional contact information is available upon request