

# Case Study 103

## 项目实例



### Customer:

A major Chinese refinery

### Location:

Fujian, China

### Tower Name:

C<sub>3</sub> distillation column

### Tower Diameter:

3000mm



## ADV High Efficiency Trays Increase Tower Capacity by More Than 50%

**Objective:** The rise in price of propylene on the market spurred the customer to increase the propylene production from LPG. They wanted to increase the capacity by 50% and reach 270,000 tons/year (LPG base).

**Problem:** The gas fractionation installation was originally designed for capacity up to 180,000 tons/year (LPG base) and its upper limit was 200,000 tons/year which is the constraint to increase the capacity.

**Solution:** Zehua's proprietary ADV high efficiency valve tray was used to replace the existing conventional valve trays in both De- C<sub>3</sub> column and C<sub>3</sub> distillation column. ADV valve with more vapor channels provides better vapor dispersion in liquid, therefore, it has higher mass transfer efficiency than conventional trays. Innovated tray deck joint design increases the percentage of open area and vapor bubble uniformity. For C<sub>3</sub> distillation column 200 trays were designed as 15% open percent and 20% downcomer percent. Bubble promoters were added to enhance tray performance. New feed pipes, reflux pipes and reboiler vapor return pipes were also modified and added.

**Results:** The capacity of the installation has reached 300,000 tons/year (LPG base), 10% more than the designed target and contract guarantee. The customer will not increase its capacity anymore because of restrictions from the duty of heat exchangers. C<sub>3</sub> distillation column efficiency has significantly increased with better propane purity at smaller reflux ratio. The propylene recovery has increased from 90% to 95%.

### C<sub>3</sub> distillation Column Conditions: Before And After Reconstruction

	Before	After
Tray type	V-1	ADV
ID (mm)	3000	3000
No. of trays	200	200
Tray space (mm)	450	450
No. of passes	2	2
Capacity	100%	150%
Propylene purity vol %	99.6	99.7
Propane purity vol %	96	99.8
Reflux Ratio	16	<15.7