

Description:	<i>Cost reduction during production by product standardisation and reduction of product variety in China</i>
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### Introduction

China's market demand for solar energy products vary greatly, resulting in a large number of product models of production enterprises; large number types of the raw material, which leads to the high cost of raw material procurement, causes great difficulties to the production organization. An effective way to reduce the production and procurement cost is to reduce the number of products, so as to reduce the number of raw materials. The reduction of support materials and installation costs by prefabricated mounting brackets is another way to reduce the cost of the balcony installation solar system.

### Specific working means

For the unpressurized system which is widely installed in Chinese market many different measures have been used to reduce the costs, the main measures have been the following:

- Reduction of the variety of tank diameters: change the inner stainless steel tank diameter from  $\phi$  315mm,  $\phi$  350mm,  $\phi$  360mm,  $\phi$  370mm,  $\phi$  380mm,  $\phi$  400mm, to  $\phi$  350mm and  $\phi$  360mm, reducing the size of the stainless steel coil which is used to produce the inner tank can be reduced from 6 to 2.
- Reduction of the number of vacuum tubes to 10, 16, 18, 20, 24, 30 or 36 to meet customer's demands of different capacity.
- Reduction of the variety of aluminium profiles: The number of different profile sections of the aluminium brackets were reduced from 5 to 3, and the purchasing volume of each profile increased by 66%, see figure 1.
- Unified supports angle: the supports of the tank shape up in different angles of  $30^\circ$ ,  $42^\circ$ ,  $50^\circ$  were unified to just one having an angle of  $50^\circ$ , then the number of the supports has been reduced from 13 to 3, see figure 2.

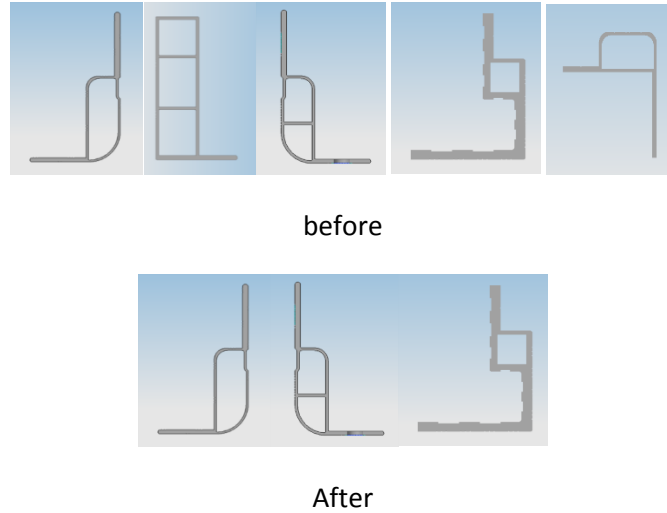


Figure 1: Aluminium profile used before and after reduction of profile variety

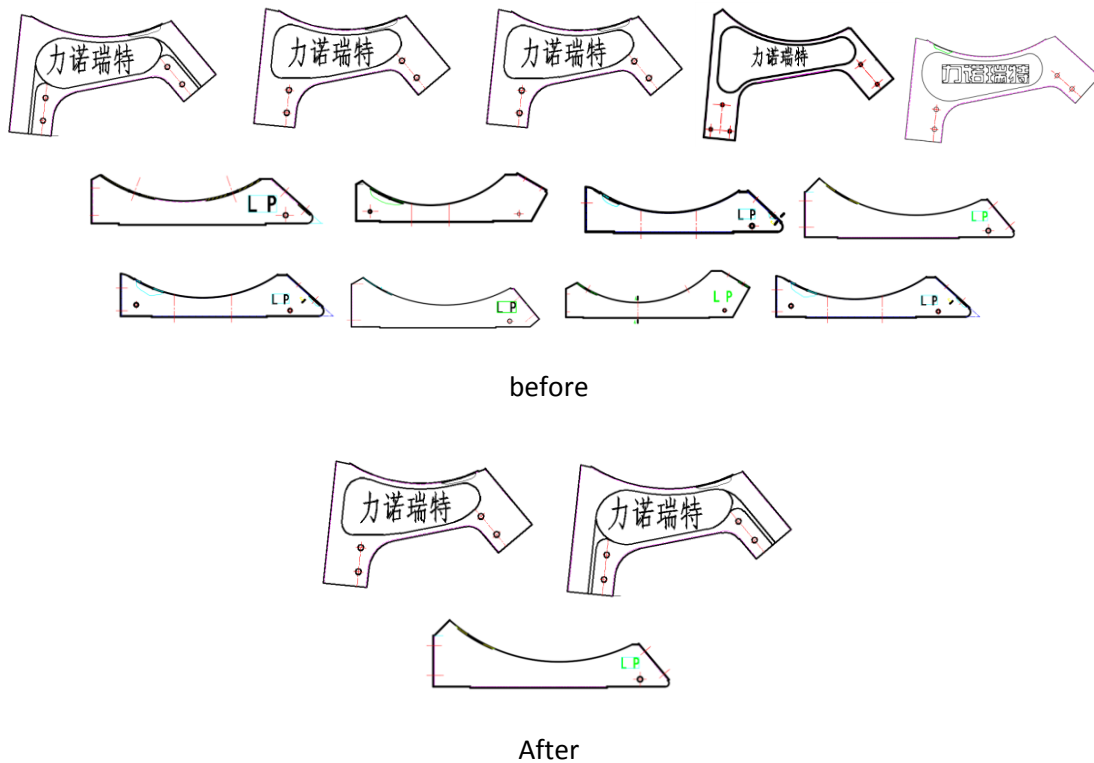


Figure 2: Support angles used before and after reduction of support angle variety

- Reduction of the number of form and colour of the end cover: The tank covers shape were reduced from 6 to 3, the color of the covers were reduced from blue, red, yellow and gray to blue and gray only.
- Vacuum tube types: change from  $\phi$  58-2100 mm, 1900 mm, 1800 mm, 1600 mm to  $\phi$  58-1800 mm, 1600 mm.

- Reduction of the vacuum tube spacing: The spacing between the vacuum tubes was 83 mm, 80 mm, 76 mm before and is unified to 76mm only. The punching moulds do not need to be replaced frequently during the production process, thus the working efficiency could be improved.

For another type of solar thermal system which is installed on the balcony wall, one of the useful ways to reduce the cost is to reduce the support materials and installation costs by prefabricated mounting brackets. For China's high-rise building, solar collector is usually installed at the balcony, the original approach is to install the solar collector bracket after the building is completed, the cost of the stent is relatively high. Our improved approach is to combine with the architectural design unit, design the pre-buried and prefabricated support, which can greatly reduce the material. According to the accounting, the cost can be reduced by 2/3, by the use of pre-buried and prefabricated support.

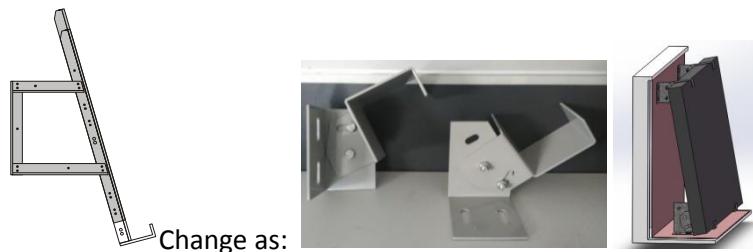


Figure 3: Support material used so far (left side) and building integrated support material (middle and right)

### Implementation effect

- Due to the reduction of the inner diameter of the water tank liner, the volume of a single fixed length volume brought by the reduction of the volume of the stainless steel coil is increased, and the cost is reduced about 9%.
- Due to the reduction of the cross section of aluminium profile bracket and the number of the barrel support, the cost is reduced about 11%.
- The reduction of forms and colours of the end cover reduction reduced the batch processing cost about 11%.
- Vacuum tube type reduction decreased the cost about 4%.
- Because of the reduction of spacing between the vacuum tubes, the number of mould changes in the process is changed from 8 to about 4 times a day, saving about 1h per shift of 8 hours resulting in labour cost savings of approx. 20%.

Summing up all single effects yields a cost reduction during production of about 9%.