

Prototype of a concentrated solar heat energy unit

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Abstract – 70 plane glass mirrors are focusing the sunlight to an absorber surface. The collected energy is transported through pipeline to a barrel filled with water. The capacity of the prototype unit is 5 kW. The system follows the sun by a processor controlled moving mechanism. The applied silver coated glass mirrors provided the best energy output comparing to aluminum and steel metal mirrors. The poster shows the mirror development process and the prototype unit. Final goal of the concentrated solar energy unit is a kiln dry heating.

Keywords: solar energy / metal mirror / concentration / prototype

1. INTRODUCTION

Solar energy concentration is not a new idea. More than 100 years ago the first concentrated solar energy unit started to work. Recently solar energy plants are generating electricity by mirror concentration and achieve high temperature. One of the key component of the system is the mirror. We have developed a 5kW concentrater colar energy unit for research purpose. Different mirrors are tested and the best one is selected for the prototype system.

2. THE PROTOTYPE UNIT

The prototype unit is designed for testing different mirrors. Att together 70 mirrors as Fresnel mirror are focusing to an absorber surface. The whole sytem is follows the sun. The concept is shown on figure 1.

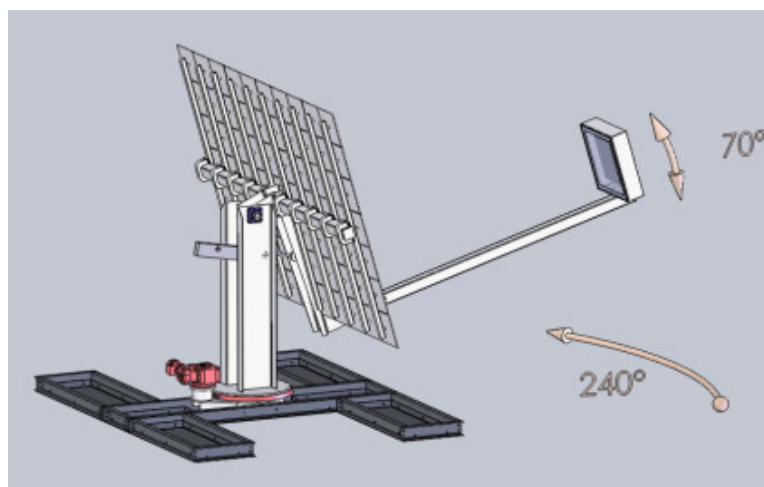


Figure 1. The concept of the solar energy unit.

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Design concepts were: relative low cost, porability, stability in wind, resistance for rain and ice, prcise position control. The prototype system suffered some weekness, especially stability in wind was the problem. The fixing of the mirrors was weak. After reinforcing the system now is ready for the firs test run. The prototype system is shown on figure 2. The prototype unit is manufactured by company 3B in Zalaegerszeg, Hungary



Figure 2. The prototype system after the wind attack.

2. SELECTION OF THE MIRROR

The selection criteria of the mirror is the high reflectance in the whole visible light spectra and the near infrared regin. Conventional glass mirror with silver coating, aluminium, stainless steel material were tested. The reflectance measured in the 400 – 700 nm wavelength range. Result is shown on figure 3.

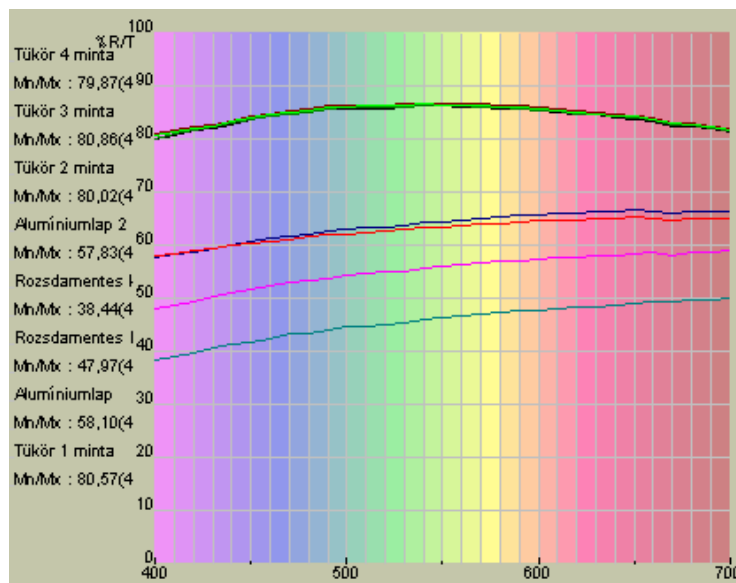


Figure 3. The reflectance of different mirror materials.

Among of different mirror materials, the silver coated glass mirror provided the highest reflectance, followed by the aluminium and stainless steel.

3. CONCLUSIONS

The concentrated solar energy unit is started to work equipped with glass mirror. More effort is necessary to improve the aluminium mirror reflectance, because it would provide a low weight and low cost mirror. The first test run will start soon in Zalaegerszeg.

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