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# SOLTRAIN

## Training Course for Experts & Professionals

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### Agenda - Training Course 2

**Lay-out, dimensioning and simulation of pumped solar thermal systems**

10 – 12 August 2010

**Venue:**

Centre for Renewable and Sustainable Energy Studies (CRSES), Department of Mechanical Engineering, Room M203, Stellenbosch University, South Africa



**Background Information:**

In order to be accepted to take part in this second training course participation either in training course 1, which took place on 21 and 22 January 2010 in Stellenbosch or the participation at one of the dissemination workshops is a prerequisite.

**The main content of the 2<sup>nd</sup> technical training course will be:**

Analyses of the performance of South African thermosyphon and pumped systems based on monitoring results.

Design, calculation and lay-out of medium sized pumped solar thermal systems by means of tables, nomograms, calculation tools as well as simulation program T-Sol. **Main focus:** system concepts (high and low flow), collector hydraulics, lay out of pumps and expansion vessels, stagnation behaviour, frost protection, performance criteria and solar yields

**Responsibility:** "AEE - Institute for Sustainable Technologies" from Austria in cooperation with Centre for Renewable and Sustainable Energy Studies (CRSES), Stellenbosch University.

**Aim:** to increase the knowledge on solar thermal systems and applications of professionals already working in the field.

<b>Tuesday, 10 August</b>		<b>08:30-16:00</b>	
08:30h	Welcome	Prof. Wikus van Niekerk and Duncan Palmer, CRSES	
08:40 h	Repetition of the content of the 1 <sup>st</sup> training course	Werner Weiss, AEE INTEC	
10:00 h	Break		
10:20 h	Analyses of the performance of South African thermosyphon systems and of pumped systems	R. Moschik	
12:30 h	<b>Lunch</b>		
13:30 h	<b>Lay out of pumped solar thermal systems</b>	<ul style="list-style-type: none"> <li>• General hydraulic schemes</li> <li>• Mode of operation (High and low flow systems)</li> <li>• Presentation and discussion of the general principles</li> </ul> Werner Weiss	
15:00 h	<b>Break</b>		
15:15 h	<b>Medium sized pumped systems (30 – 100 m<sup>2</sup> collector area)</b>	<ul style="list-style-type: none"> <li>• Design principles (hot water systems and combi systems)</li> <li>• Backup heating</li> <li>• Distribution: 2 and 4 pipe networks</li> </ul> Werner Weiss	
16:00 h	<b>End</b>		

<b>Wednesday, 11 August</b>		<b>8:30 – 17:00 h</b>	
<b>8:30 – 12:00 h</b>	<b>Whole group</b>	– general introduction: Simulation program T-Sol	
<b>12:00 h</b>	Lunch		
<b>13:00 – 17:00 h</b>	<b>Split of the group:</b>	Group A: T- Sol Simulations Group B: Design of solar thermal systems using nomgrams, tables and calculation methods	

<b>Thursday, 12 August</b>	<b>8:30 – 16:00 h</b>
<b>8:30 – 12:30 h</b>	Group A: T- Sol Simulations Group B: Design of solar thermal systems using nomgrams, tables and calculation methods
<b>12:30 h</b>	Lunch
<b>13:30 – 16:00 h</b>	Demonstration systems and conclusions

### **Wednesday, 11 August and Thursday 12 August**

#### **Design of medium sized pumped systems (30 – 100 m<sup>2</sup>)**

The aim of this part of the training is to provide professional guidelines for the design of medium sized pumped systems.

The following topics are going to be in the main focus: system concepts, collector hydraulics, calculation of the pumps and expansion vessel, stagnation behaviour, performance criteria and solar yields.

#### **3 options of design tools are presented**

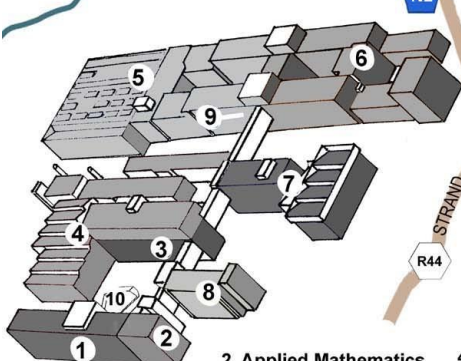
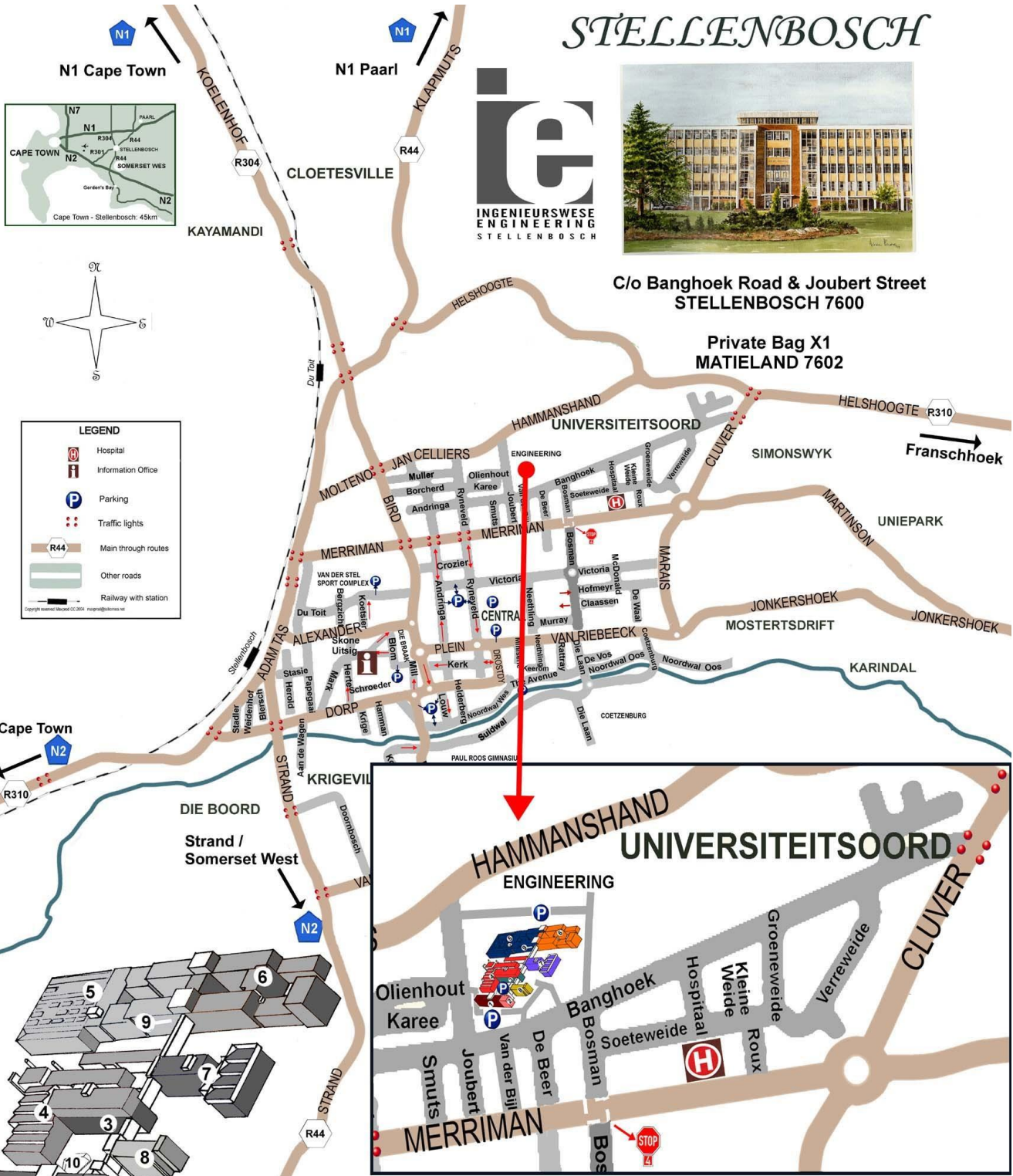
1. Design based on tables and nomograms – quick estimation for feasibility studies
2. Calculation tools (detailed calculations – the participants are going to do all design steps needed for dimensioning of a medium sized system)
3. Simulation with the program T-Sol and short presentation of the freeware RETScreen. Based on an introductory lecture on the T-Sol program the simulation program is used to do the simulation of the same system, which was calculated the day before.
4. Finally a comparison will be made of the three design options.

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**Please park in Banghoek Street between the Engineering Faculty and Spar as parking is a problem**