

## **CHAPTER IV**

### **SOFTWARE DEVELOPMENT PROCEDURE**

The procedure of software development for this thesis is described stepwise as follows:

#### **4.1 Preparation of StoryBoard**

The storyboard is an outline flow of overall contents desired to be shown in this EM-CAI. It should be prepared stepwise by the subject expert as follows:

- 1) Objective setting.
- 2) Content specification.
- 3) Content analysis.
- 4) Behavioral objectives. and
- 5) Teaching strategies and model of delivery.

From the prior steps, storyboard will be obtained in document format. The example of storyboard have been shown in Appendix II.

In this work, Dr.Soranart Rhipu is the subject expert on this Engineering Metallurgy course. He is the lecturer who response for this subject at faculty of Engineering at Mahidol university.

## 4.2 Authoring the Program Instruction

The storyboard was transformed to be a flowchart and program instruction, respectively. Flowchart shows functions and processes of this EM-CAI that can be used to track the bug in later. All flowcharts of this EM-CAI have been shown in Appendix I.

Program instructions were designed subsequently by Authorware methodology, flowchart style, as shown in Figure 4.3

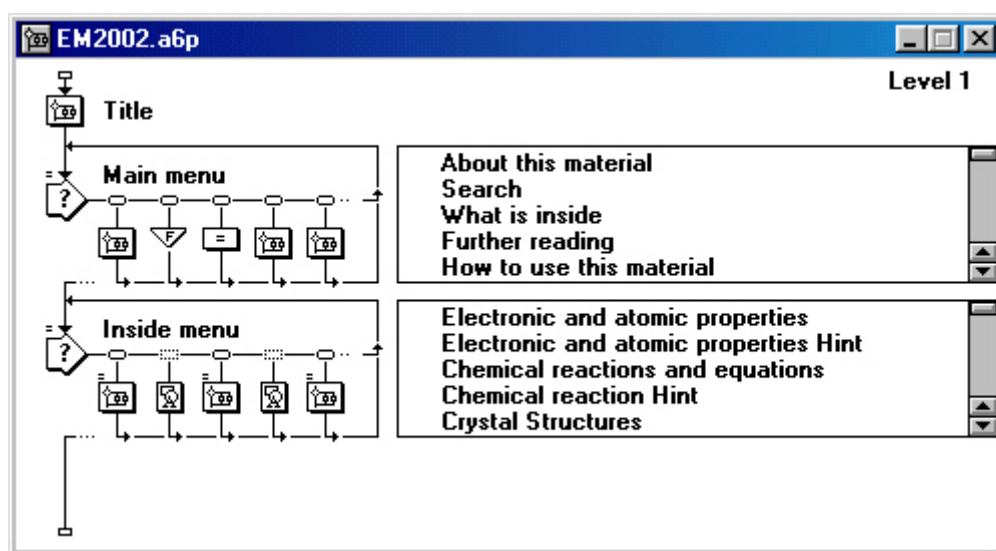


Figure 4.1 flowline with icons of this CAI software

## 4.3 Preparation of all media

The media including text, graphic, sound and animation were prepared using a corresponding material as described in chapter 3. In this section, a detail of preparation method for each media type are summarized as following :

### 4.3.1) Text

Text is main media in this EM-CAI. It should be saved in text file format (\*.txt) which easy to be imported into Authorware.

### 4.3.2) Graphic

Graphic is one of the most important media used to produce this EM-CAI. It includes realistic image, drawing image, scene and interaction graphic. All graphics were prepared and saved in suitable file format using method describe below.

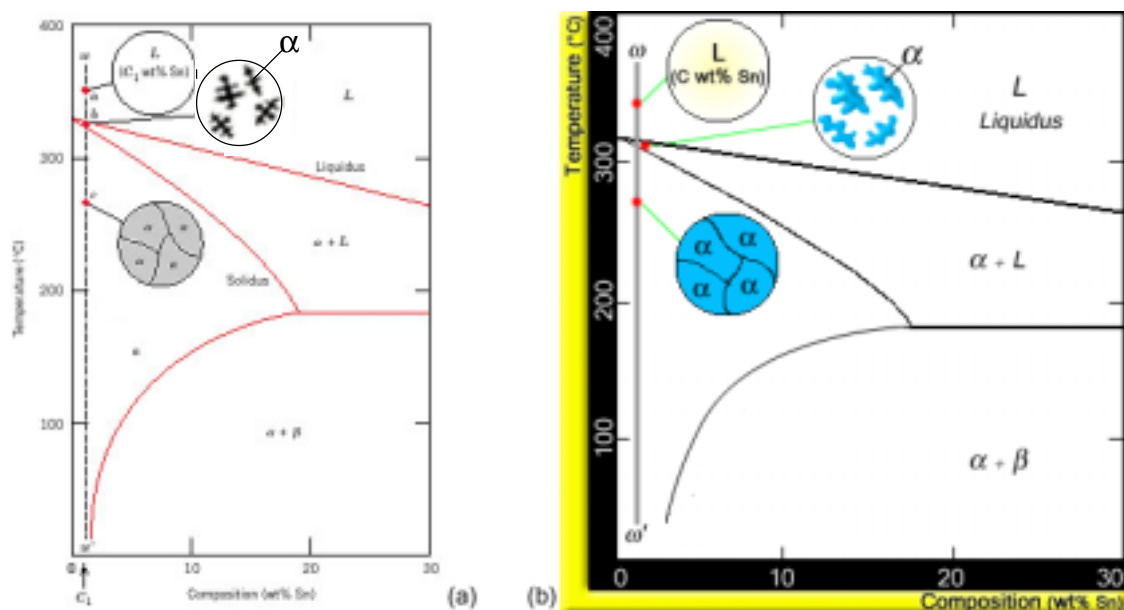
#### 4.3.2.1) Realistic image

Realistic images from original source were scanned and input into computer by the scanner. They were saved in jpg format which will then be retouched with PhotoShop in later. The method are presented as in a following diagram.

After retouch, the image which is now ready to use were also saved in jpg file format. It should be noted that jpg file format is compressed into a small file size which a bit deep color of the image still maintained. A small graphic file is necessary for high speed display.

#### 4.3.2.2) Drawing image

Drawing images were obtained by drawing in PhotoShop program. Figure 4.4 shows the example of drawing image in this EM-CAI.



**Figure 4.2** Comparison between source image and drawing image.

### 4.3.2.3) Scene and Interactive graphics

The scene mean the figure of screen appeared in the EM-CAI. The interactive graphics mean the buttons or icons that response to the actions of users such as click, double click, mouse over,etc. These graphics were designed to conform with course content and the concept of user interface design. In addition, it must appeal to the learner.

The scene were prepared by drawing in computer. Figure 4.5 shows the example of scene in the EM-CAI.



**Figure 4.3** Example of scenes in this CAI software.

The interactive graphics were designed for the ease of use. For example, each button has three status namely Normal, Mouse over and Mouse down which use a different figure to represent. Figure 4.6 shows the same button in three different status.



**Figure 4.4** The example of button in three status that have been represent by different figure.

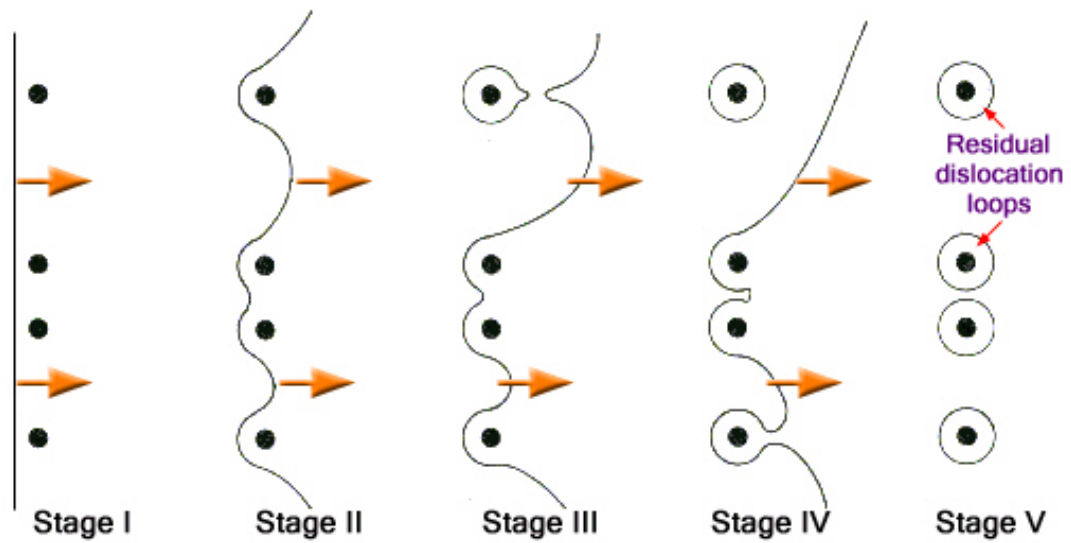
### 4.3.3 Sound

In the thesis, sound means only the music in the title and menus. These sound in WAV format were converted to SWA format in order to compress the file size. Conversion the sound format is one technique in Authorware to optimize the file size as small as possible. No sound exists in content page for keeping the concentration of the learner on the contents.

### 4.3.4 Animation

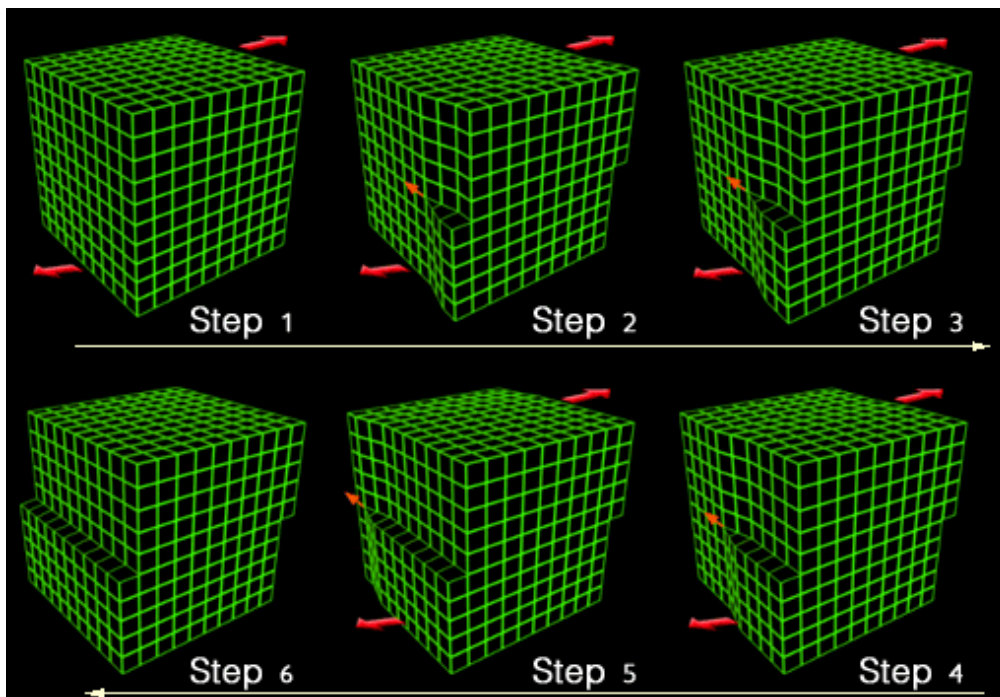
Animation is the most dominant media in every type of presentation, including CAI. This CAI software uses animation to simulate the complicated content that's very hard to understand from one figure. Preparing this media needs different software tool depend on the type of animation as following.

- Two dimension animation : two dimensional animation was created by Macromedia Flash. Figure 4.7 shows frame by frame animation technique. Each figure represents one frame of animation.



**Figure 4.5** Process of frame by frame animation technique.

- Three dimension animation : this animation type requires software tool that able to create model in skeleton form and then transforms (scale, rotate, twist, etc.) to meet the content criteria. 3D studio MAX was used to complete this task. Figure 4.8 shows the example of simulation that each frame was generate by 3D studio MAX.



**Figure 4.6** The example of simulation created by 3D studio MAX.

## **4.4 Integration of all media into program instructions**

The prepared media from 4.3 are integrated into program instructions in 4.2. This integration not only means insertion medias to icons on flowline but includes media synchronization and transition to get the best result that corresponding to the learning objective. In this steps, some improper medias were modified or rejected.

## **4.5 Software Testing**

Software testing was divided into 2 parts, content testing and functional testing. The detail of each was described in the following.

### **4.5.1 Content Testing**

This part was performed by the subject expert. The following aspect, spelling, font format, the correction of simulation were checked reference to the instruction sheet.

### **4.5.2 Functional Testing**

This part was performed by Programmer. The functions that have been tested include HyperLink, Search and Navigation. Error found in this part was track via flowchart and adapted in Authorware flowline.