Introduction to Aircraft Design
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Lecture – 10
House of Quality Chart

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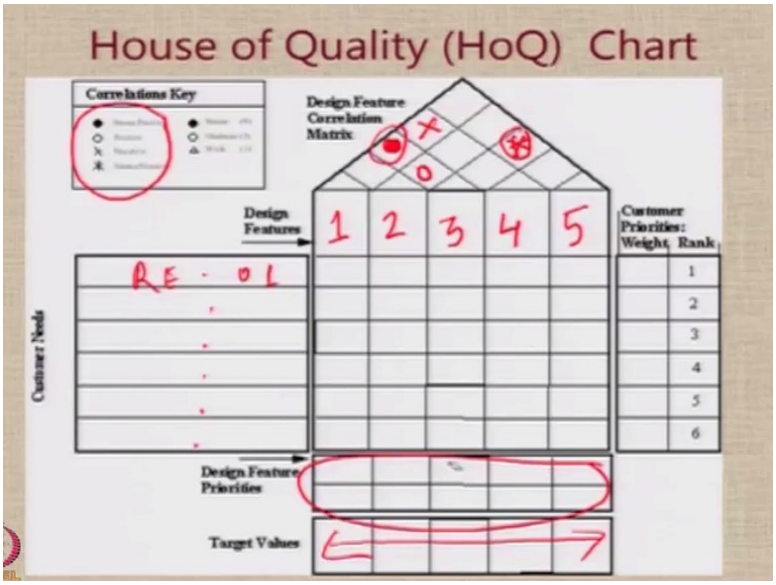

So now how the house of quality chart or the quality function deployment procedure is used to try and understand the requirements which the customer has specified and how we can provide features in the product that we are designing to meet the requirements. So, what I have done here is this particular slide shows the blank house of quality chart. Now house of quality chart can go into many, many levels and it can go into very, very great detail.

For illustration purposes, we are going to work only on a small house of quality chart. So what are the features of this chart? The features of this chart are as follows. The first and the foremost is the area on the left where we enter what are called as the customer needs okay. As you can see I have given here 1, 2, 3, 4, 5, 6. You know there are 6 places where you can enter the customer needs and what we normally do is we ask the customer what is the priority of each of these requirements.

And sometimes the customer is able to give the priorities and sometimes the priorities have to be determined. So in this case what we do is we write down the customer needs in the order of the customer priorities okay. So you can see on the right hand side of the chart I have these

2 columns, the one which says rank 1 to 6 okay. This is the rank and on the left of it we have a column for called customer priority weights and this is currently blank because this is a template. So the customer requirements or the needs will be mentioned here.

So we can say for example this is requirement number 1 and the corresponding weightage for this let us say 30%, 0.3 will be written and we have to enter the data in such a manner that the requirement number 2, requirement number 3, etc. are in the decreasing order of customer priority and therefore the ranks are also accordingly given. On the top of the house we have an area for design features. This is the area where we are going to put features. Now to illustrate I have only used you know 1, 2, 3, 4, 5 features.

I have only given a provision for only 5 features, but in real life you know there could be many, many more. So this is just an example which will be illustrative purposes. So in this particular example, what we are going to do is we are going to identify 5 design features to be provided in the product to address the 6 requirements which the customer has stated. The top of the chart is the design feature correlation matrix.

And this particular chart is used by the designer to note down which are the features that have a positive correlation to each other or a negative correlation to each other or they do not have any correlation at all. Some features may conflict or contradict the other features and vice versa. So what we do is we use some kind of a symbology. So if there is a feature that strongly support another feature, for example if the design feature number 1 and design feature number 3.

If they have a direct positive correlation, then what we will do is in this area which is common for both of them we are going to put a strong a dark circle, a filled in circle, but suppose design feature number 5 and number 3 they are having a negative correlation, that means if you provide 3, then 5 is affected adversely or if you provide 5, then 3 is affected adversely, then in this particular area we are going to put a star mark.

For example if the feature number 2 and feature number 3, they have a positive correlation but not such a strong positive correlation, then we will put an open circle in this one between 2 and 3. Similarly if design feature number 3 and 5 or let us say feature number 1 and 4 they have negative correlation but not very negative correlation, then we will go and put a cross

mark here. So the top of the box or the design feature correlation matrix gives a visual impression.

If this area is full of many asterisk marks like this that means the features we have chosen are actually trying to cancel each other. On the other hand, if we see many of the boxes like this or many of the marks like this in our rooftop that is a very good sign. That means the features we have chosen to investigate are supporting each other or acting in positive correlation with each other. Now this area is used by us for the calculations.

On the bottom we have target values for certain parameters. So we have chosen some design parameters, but we are going to give some target values if known and here we will be calculating the design feature priorities. So this is the output area of the house of quality chart.

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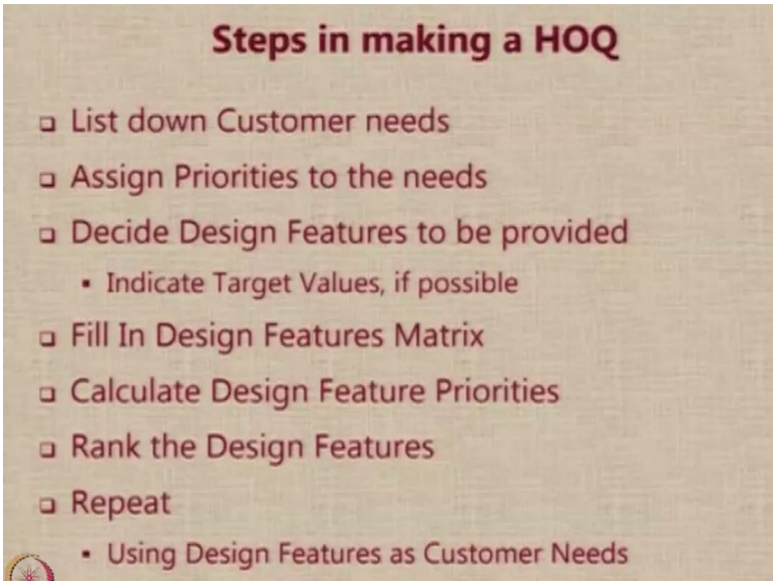

So let us see the steps. So what we do is first we list down the various needs of the customer. Then we assign the priorities to these needs, these priorities normally are specified by the customer. Then we decide what design features are to be provided to meet these requirements. These decisions come from either an understanding of the problem, consultation with experts or past experience.

And if possible, we have to indicate some target values for these features that you are providing because there is no point in exceeding those values, they do not give too much benefit, but this is only if possible. Many a times these values can come from the competition

and then the next step will be to fill in the design features matrix as I will explain very shortly. You calculate the design feature priorities and then you rank the design features and then what you do is when you rank the design features you get the list of features.

If you find some feature has got a very poor score, you may decide to drop it altogether because it means that it does not really affect too much the improvement of the design or you might use most of the design features and add some more features. Now you use them as the requirements and repeat the whole process and it goes on cyclically. Thanks for your attention. We will now move to the next section.