Figure 10 demonstrates this graphically.

6.0 Application of invention

The approach, together with its algorithm and framework implementation, are applicable not only in the field of engineering design but also in other areas involving the processing of specifications and related decision making such as software design, architecture design, service design, planning, etc. This can be done by changing the Reusable Element Library to one that is related to the application at hand. In product design, the invention is particularly useful when applied to a system that supports designers that design multidisciplinary products which include i) the combination of more than one discipline and ii) life-cycle knowledge in their development. The reason for this is that since such products are complex, very knowledge-intensive and include many specifications for each of the disciplines, then it is difficult for the designer to handle all this without some form of guidance prior to taking commitments.

The implemented DSS is particularly useful for novice designers that have limited knowledge and expertise and who are not used to the traditional way of computer aided modeling. In the case of expert designers, it is helpful in that it encourages designers to experiment and use new alternatives rather than sticking to the usual commitments for a safer result.

7.0 Claims

What is claimed is:

Claim 1: A computational framework and its underlying algorithm comprising of four frames (Frame 1 to Frame 4) which collectively support users by informing them of the feasible solution space from product, sub-assembly and component specifications prior to taking any solution commitments.

Claim 2: Frame 1 according to Claim 1, further allowing the user to input product life-cycle specifications which could be or could not be inherited by the sub-assembly, sub-assembly specific life-cycle specifications which could be or could not be inherited by the component and component specific life-cycle specifications.

Claim 3: Frame 1 according to Claim 1, further allowing the user to determine whether each specification is obligatory or optional.

Claim 4: Frame 2 according to Claim 1, further mapping the specifications (depending on whether they are obligatory or optional) to the properties and values of the alternatives and classifies, by means of a tag, the alternatives in such a way that the user is informed about the 'feasible', 'non- feasible' and 'non-recommended but still acceptable' solution space.

Claim 5: Frame 2 according to Claims 1 and 4, further provided that the mapping occurs between the decision taken and the properties and values of the alternatives, to classify the alternatives for the next decision.

Claim 6: Frame 2 according to Claim 1 which also allows the user to view:
- brief guidance informing the user which specification will be violated if the alternative is chosen or which previous commitment will be in conflict with the alternative if it is chosen

- detailed guidance informing the user about the life-cycle consequences and giving recommendations on how to minimize the consequences
prior to selecting the alternative.

Claim 7: Frame 3 according to Claim 1 which generates three models in real time:
- the specification model which evolves as the designer takes specification commitments in Frame 1;
- the solution model which is made up of:
- a component model that evolves as the designer chooses alternative elements related to the component- a life-phase system model that evolves as the designer chooses alternative elements related to the life-phases of the component

Claim 8: Frame 4 according to Claim 1 which generates a geometric model corresponding to the alternative elements chosen.