SHELL Model is the foundation to understanding Human Factors in Aircraft Maintenance

Posted by FlightSafe on 09.24.10 at 09:00 PM

Using models to explain complex systems are useful in giving a visual sense of how elements of these systems interact and affect one another. The cornerstone of Human Factors (HF) theory is the SHELL Model. The human, or in the case of aircraft maintenance, the aircraft mechanic, is the center of this model.

Plenty has been written on the SHELL Model. As with any theory, concept or model they are limited in their usefulness unless they are put into practice. How the center, human component of this model interface with the various elements and how this interaction with these elements potentially create errors, is the key to understanding it.

SHELL Model
Photo: Edwards modified by Hawkins

How can the mechanic transform this model into a practical tool that can be used everyday?

The first step is creating awareness.

As an example of “S” (software), a poorly written procedure that is sitting on a shelf in a technical library is not doing anything to affect the airworthiness of an aircraft until the mechanic picks it up and begins to use it. This interaction now becomes dynamic and alive, with the potential to induce an error into the system unless recognized, captured and contained before it can result in a negative outcome.

The “H” (hardware) element could be the aircraft type the mechanic is working on or a piece of test equipment used to troubleshoot a system. Is the mechanic familiar with and properly trained on the equipment? Creating this awareness and taking action is the responsibility of the mechanic. A good tool here would be just to ask for help or if no help is available, do not attempt the job.

Mechanics do not have much influence over the “E” (environmental) elements they must work in, but they can be made aware of the types of risks that they may face when working in such environments. This could be something as simple as lighting the work area, adding ventilation or wearing a safety harness when working at heights.

One of the “L” (Liveware) elements is other people. Usually mechanics do not work alone. They interact with other people. Are there communication issues with coworkers, maybe a language or cultural barrier preventing the flow of important information such as a shift turnover or interpreting tech data? Recognizing and then acting on communication issues with others will help prevent errors. Again, awareness is the key.

The mechanic as the other “L” (Liveware) and center component of this model should be aware that whatever stresses or baggage they carry simply walking into the hangar to begin work has as much impact on the system as the other elements have potential to affect them. These are the natural limitations of every human; it’s what makes us unique individuals. For instance, the mechanic may have a family issue they are dealing with, maybe a sick child, or other family member. A distraction such as this could result in an error being made. Does the mechanic have adequate knowledge, training and experience to perform the task? Is the mechanic fatigued? These types of factors, unless recognized, have the potential to have a negative outcome on the airworthiness of an aircraft.

Educating the mechanic and creating an awareness of how these factors influence ones decision making process is the first step. Putting this tool into the hands of the mechanic to practically apply this concept will reduce errors and help prevent accidents and incidents.

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lee dennis (not verified) on Fri, 04/08/2011 - 05:45

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reply

Anonymous (not verified) on Sun, 01/29/2012 - 21:56

I was just up-dating the EASA mod 9 textbook which I use in the UAE and noticed no mention of the SHELL model.

Just want you to know that your synopsis was so well written that I am utilizing it in my course notes.

Thanks for the short and sweet definition.

reply

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- Yes
- It depends on the student
- Not very much
- I am not sure
- No

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