MBDプロセス研修

番13氏名THAKUR CHETAN

1. 本研修への参加目的とその成果についてご記入ください (Please describe the purpose of participating in this training and the results.)  
     
   Understanding and get hands on with MBD in general. Theoretically the concept of MBD sounds good and easy to understand but have no experience in practical implementation and requirement. Through this course I wish to learn/get practical and hands on with various stages of MDB process as platform/base for future learning and development.
2. モデルベース開発とV字開発プロセスについて説明してください (Describe the model-based development and V-shaped development process)  
     
   Model based development with V-shaped development process signifies very generic development process. It starts with requirement gathering and defining specification, developing simple models which later turn into large and complex models as required. Automatic code generation after satisfactory level are achieved in the model. Testing generated code with real hardware and improving the model. At the end system calibration and deployments of the developed system.  
     
   Based on the learnings from course, web and lecture following is my image of stages in V-shaped development model.   
   1. Project Planning
      1. During this both control and plant model are identified and simulated
      2. Control model is designed, tested and corrected.
      3. It can also be called MILS (Model in loop simulation)
   2. System Design and Specification
      1. During this control model can be tested with physical/actual target for validation or correcting system specification.
      2. It is also called as RCP (rapid control prototyping)
   3. Detailed Design
      1. Controller implementation testing with plant model
      2. Also called as SILS (software in loop testing)
   4. Prototype Implementation
   5. Component Testing
   6. System Performance Testing
      1. It is also called as HILS (hardware in loop simulation)
   7. Final product testing and release

1. V字プロセスの有用性と注意点に関して考察をしてください (Consider the usefulness and caveats of the V-shaped process)  
     
   The V-shaped development process looks very simple and easy to follow and manage. But it does not specify managing change in requirements, type of testing required at various levels in the development process. It is difficult to predict the results of HILS based on the results of SILS or PILS. To me it seems, this process is very tightly coupled with various tools used for development in machine design and development in heavy industries.  
   Without practical experience in this domain and development process it is hard to comment anything further.

But I think the system will run smooth if there are not many changes in specification.   
  
In practical specification changes significantly during the process and redevelopment and validation needs to more time and effort.   
Therefore, careful consideration on system requirement and specification in the planning and specification phase of the system to avoid rework at later stage.

1. 制御におけるワインドアップ現象について説明してください (Explain the windup phenomenon in control)  
     
   In general terms, difference in ideal vs real systems, the ideal output is impossible for real system to achieve. The controller output goes beyond expected threshold and control variable has no effect on the rising system output.   
     
   e.g. in case of motor and rotating disc, the large controller output cannot be converted into large actuating signal due to insufficient actuating power which results in controller rise time.   
     
   The increase in peak and setting time is due to integral windup. Since integral component is responsible of keeping the error to zero approximately. It is also the only component which controls the steady state output.   
     
   In ideal/simulation the integration error is much smaller so the peak/overshoot is also small. But since, in physical system the large integral error result in large overshoot if output signal which is also necessary, which is Integral windup.   
     
   To remove windup effect we must reduce integrating action as long as actuator is within the saturation limit. This method is called anti windup method.   
     
   One of the popular method is back calculation, adds additional feedback which influences integral input as long actuating signal and controller output are different. It can called as tracking constant.   
     
   This cannot fix rise time due to integral windup but it certainly reduces overshoot and settling time of the output signal.
2. 今後の業務への展開について記述してください (Please describe the future development of your business.)  
     
   Implement MBD process in project development, reduce time, identify defect and changes earlier in the process than in implementation process.   
   Other than this I wish to understand the key technical elements in decision making in early stage of development process.
3. 講義への意見・要望等があれば自由にご記入ください (If you have any opinions or requests for the lecture, please feel free to write them down.)  
     
   My Japanese language skills is basic and following videos and contents easily is difficult for me. Having contents or videos with English subtitles would be useful, but for now I can adjust. In future please see if you can accommodate this request.