T1 Optimizer Future Work
4/22/05

The following are some possible future development activities for the Index Test Box in FY 2006 or beyond.

1. Design & implement a GDACS function appropriate for the Winter-Kennedy tap signal sensing and to control the flushing mechanism. This is a reproducible version not a one time test version. Albright will be making a demonstration version that will likely need to be modified for reproduction purposes, that is lower cost and maintainability. [Probably Doug Albright would perform part of the work and GMT, or their contractor, the other part.] It would be nice to be able to buy a single assembled part. Costs/time _ME-0, EE-80

2. Create a health check type output when ongoing results indicate a step change that should not exist. This can be due to such things as a bad transducer or blocked water passage. Costs/time ME-0, EE-120

3. Add a calculation to determine head from the Winter-Kennedy tap pressure transducers. Compare results with head telemetry to determine problems. Possible problems that can be uncovered are 1) trash build up; 2) calibration errors; 3) W-K clogging; 4) and many other much less likely problems that impact efficiency. (This assumes we won't have acoustic flow transducers which can also be used for most of the same things.) Costs/time ME-40, EE-120

4. Perform independent Index tests as needed to compare to the ITB results. About 80hrs ME per test. 80 Hrs EE for one time to learn the process and figure out how to improve techniques for lower cost and correlation to the ITB result. Make the test process use the same transducers and inputs as much as possible.

Mass Implementation processes

5. Determine the best way to implement the ITB function for all projects. The current thought is having a stand alone ITB server connected to the GDACS network. Coordinate with GDACS GMT and GMC. Costs/time ME-40, EE-120 Probably start deployment in 07 so this is an 06 and 07 job.

6. Create a desk or test bed simulation that can prove correct results and add regression tests for calculation results. Costs/time ME-10, EE-80

7. Add W-K pressure input to GDACS PLC for transmittal to ITB. Assume a new type of high speed analog I/O is required and a special filter in the PLC to reduce the data blast. Costs/time ME-15, EE-120

4

8. Add W-K cleanout controls in GDACS PLC. Costs/time EE-100

Elements to obtain data better or faster, if needed

9. Evaluate the criteria for accepting data points versus the accuracy of the resulting performance profiles and cam curves. The data points for the above sentence are MWs and Winter Kennedy pressures that make it through the filter created to determine when the unit is in a stable operating condition. Answer the question: can we get better results by changing the criteria. Costs/time ME-120, EE-40

10. Determine how best to change generation levels so that the Index Test Box records a span of needed performance data in a short time. This may not be needed if the ITB proves to be able to obtain a lot of good data points with normal operating conditions. Costs/time ME-40, EE implementation work120

11. Formalize a protocol to utilize the results of the Index Test Box in the most effective manner. Establish a process to get the new data approved and then put into the control equipment for real use. The process needs to weed out bad data, possibly acquire approval of the fish passage plan personnel, and then go to GDACS and other appropriate users for coordinated implementation. Create a mechanism to identify cam data sets in use so that use of incorrect data from the wrong unit can be easily uncovered. Consider a header with revision date, who did it and a check sum for the table to assure it isn't corrupt. Costs/time ME-100, EE-100

12. Automate the process of implementing partial new curve data for gate-blade relationships. [We should check out what tools TVA is using for this. –Ed]. Costs/time ME-160, EE-120

13. If proven need arises, consider using a larger speed regulation dead band in order to minimize movement during data collection periods. Costs/time EE-40

2007 or as need arises

14. Modify the unit control logic in GDACS to provide a control function that can be turned on by the ITB so that both blades and gates approach the next data point in the opening direction. Presume the unit is in a new "test" mode for this. Costs/time ME-20, EE-120 Other Criteria?
15.

16. Evaluate the sensitivity of the resulting performance profiles and optimum cam curves to consider data quality impact if adjacent units are on or off. Costs/time ME-40?, EE-20

17. Develop a technique to easily and periodically monitor the accuracy of the Index Test Box results. That is, check if the results of ongoing calculations continue to track the installed curve. To avoid nuisance reporting the mechanism is to only be enabled after a curve update and matching is anticipated. Also the allowed dead band before determining a mismatch will likely need to be dynamic based on how close the results are to the actual data taken vs extrapolated data. Costs/time ME-5, EE-90

6

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EPM

The following are some possible future development activities for the Index Test Box in FY 2006 or beyond.

18. Design & implement a GDACS function appropriate for the Winter-Kennedy tap signal sensing and to control the flushing mechanism. This is a reproducible version not a one time test version. Albright will be making a demonstration version that will likely need to be modified for reproduction purposes, that is lower cost and maintainability. [Probably Doug Albright would perform part of the work and GMT, or their contractor, the other part.] It would be nice to be able to buy a single assembled part. Costs/time _ME-0, EE-80

19. Create a health check type output when ongoing results indicate a step change that should not exist. This can be due to such things as a bad transducer or blocked water passage. Costs/time ME-0, EE-120

20. Add a calculation to determine head from the Winter-Kennedy tap pressure transducers. Compare results with head telemetry to determine problems. Possible problems that can be uncovered are 1) trash build up; 2) calibration errors; 3) W-K clogging; 4) and many other much less likely problems that impact efficiency. (This assumes we won't have acoustic flow transducers which can also be used for most of the same things.) Costs/time ME-40, EE-120

21. Perform independent Index tests as needed to compare to the ITB results. About 80hrs ME per test. 80 Hrs EE for one time to learn the process and figure out how to improve techniques for lower cost and correlation to the ITB result. Make the test process use the same transducers and inputs as much as possible.

Mass Implementation processes

22. Determine the best way to implement the ITB function for all projects. The current thought is having a stand alone ITB server connected to the GDACS network. Coordinate with GDACS GMT and GMC. Costs/time ME-40, EE-120 Probably start deployment in 07 so this is an 06 and 07 job.

23. Create a desk or test bed simulation that can prove correct results and add regression tests for calculation results. Costs/time ME-10, EE-80

7

24. Add W-K pressure input to GDACS PLC for transmittal to ITB. Assume a new type of high speed analog I/O is required and a special filter in the PLC to reduce the data blast. Costs/time ME-15, EE-120

25. Add W-K cleanout controls in GDACS PLC. Costs/time EE-100

Elements to obtain data better or faster, if needed

26. Evaluate the criteria for accepting data points versus the accuracy of the resulting performance profiles and cam curves. The data points for the above sentence are MWs and Winter Kennedy pressures that make it through the filter created to determine when the unit is in a stable operating condition. Answer the question: can we get better results by changing the criteria. Costs/time ME-120, EE-40

27. Determine how best to change generation levels so that the Index Test Box records a span of needed performance data in a short time. This may not be needed if the ITB proves to be able to obtain a lot of good data points with normal operating conditions. Costs/time ME-40, EE implementation work120

28. Formalize a protocol to utilize the results of the Index Test Box in the most effective manner. Establish a process to get the new data approved and then put into the control equipment for real use. The process needs to weed out bad data, possibly acquire approval of the fish passage plan personnel, and then go to GDACS and other appropriate users for coordinated implementation. Create a mechanism to identify cam data sets in use so that use of incorrect data from the wrong unit can be easily uncovered. Consider a header with revision date, who did it and a check sum for the table to assure it isn't corrupt. Costs/time ME-100, EE-100

29. Automate the process of implementing partial new curve data for gate-blade relationships. [We should check out what tools TVA is using for this. –Ed]. Costs/time ME-160, EE-120

30. If proven need arises, consider using a larger speed regulation dead band in order to minimize movement during data collection periods. Costs/time EE-40

2007 or as need arises

31. Modify the unit control logic in GDACS to provide a control function that can be turned on by the ITB so that both blades and gates approach the next data point in

the opening direction. Presume the unit is in a new "test" mode for this. Costs/time ME-20, EE-120 Other Criteria?

32.

33. Evaluate the sensitivity of the resulting performance profiles and optimum cam curves to consider data quality impact if adjacent units are on or off. Costs/time ME-40?, EE-20

34. Develop a technique to easily and periodically monitor the accuracy of the Index Test Box results. That is, check if the results of ongoing calculations continue to track the installed curve. To avoid nuisance reporting the mechanism is to only be enabled after a curve update and matching is anticipated. Also the allowed dead band before determining a mismatch will likely need to be dynamic based on how close the results are to the actual data taken vs extrapolated data. Costs/time ME-5, EE-90

9