Rayong Electricity Generating Co.,Ltd.

(REGCO)

18 February 2005

REGCO CASES' APPLICATION FOR PROCESS-IT

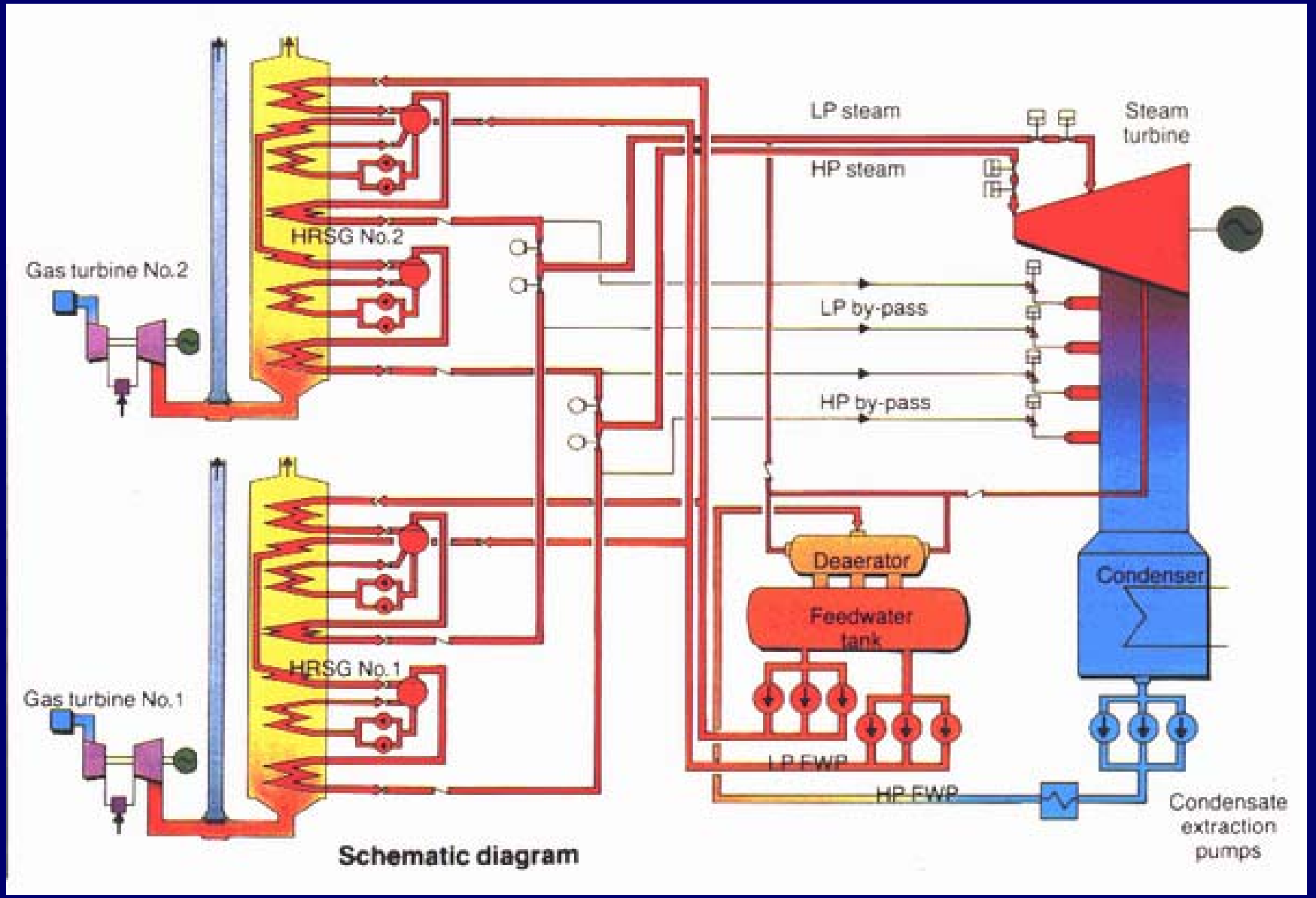
Requirements for Process-IT

- Provide Database for Plant Historical Data
- Provide Analytic Tool for Diagnostic
- Monitor&Improve Plant Performance
- Summarize all necessary Data for better tracking
- Provide Data Source for Engineer & Supervisor as required

Users for Process-IT

- Operator (all levels) - for basic functions
- Operator - for Data Logging via PDA
- Supervisor & Engineer for Analytic Functions (Historical and Special Trends)
- Efficiency for all functions
- Maintenance
- Executive & Management Levels

REGCO Simplify Diagram



Cases' Application

I) ST-20 start-up **too slow** by HRSG-21 after schedule outage.

II) Sometimes, ST-40 start-up **faster than** ST-10, ST-20, and ST-30 .

Case-I: Steam Turbine-20

I) ST-20 start-up **too slow** by HRSG-21 after schedule outage.

"After schedule outage, board operators feel that ST-20 start-up too slow by HRSG-21, when compared with start-up by HRSG-22 or other units"

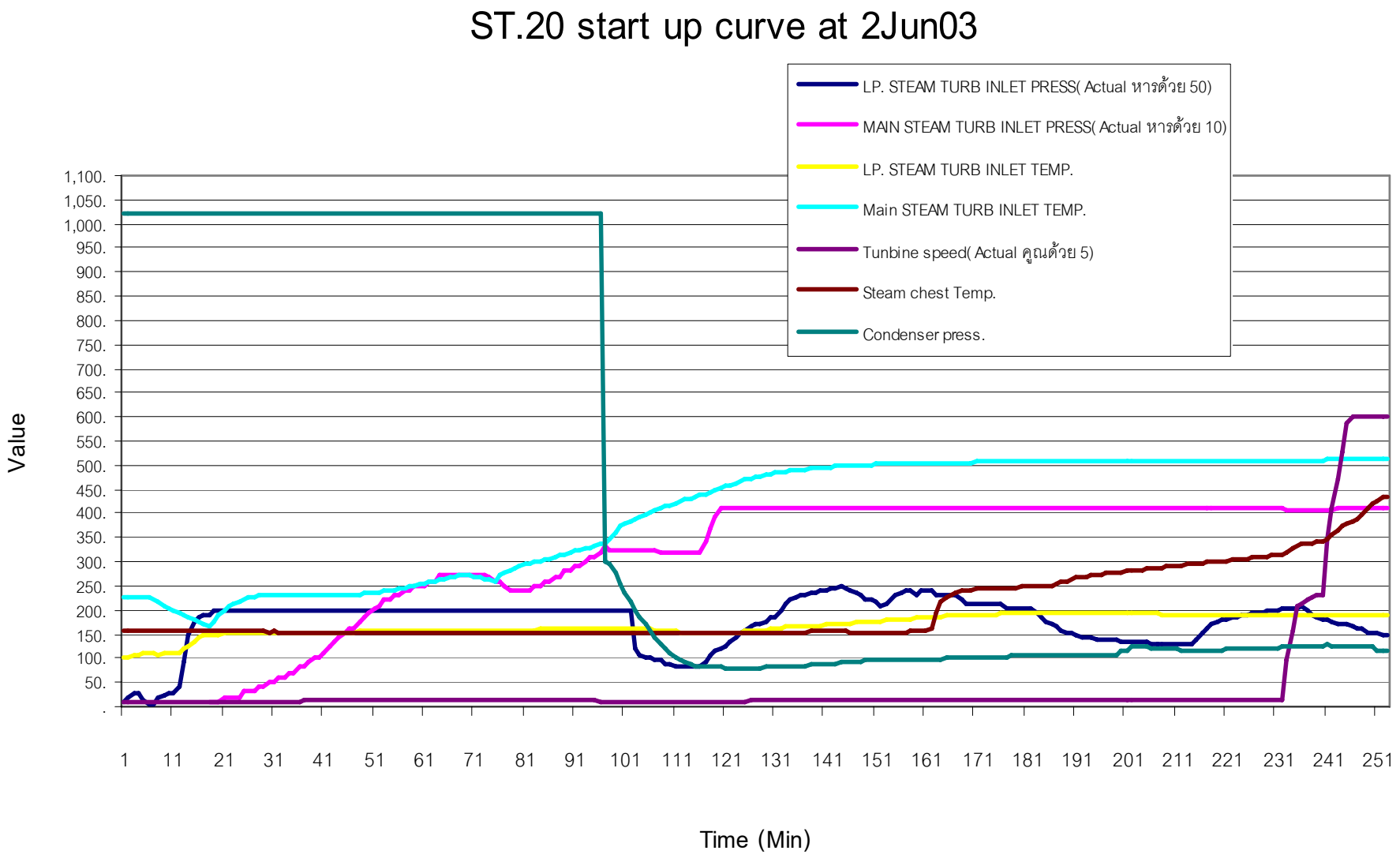
Case-I: Steam Turbine-20

I) ST-20 start-up **too slow** by HRSG-21 after schedule outage.

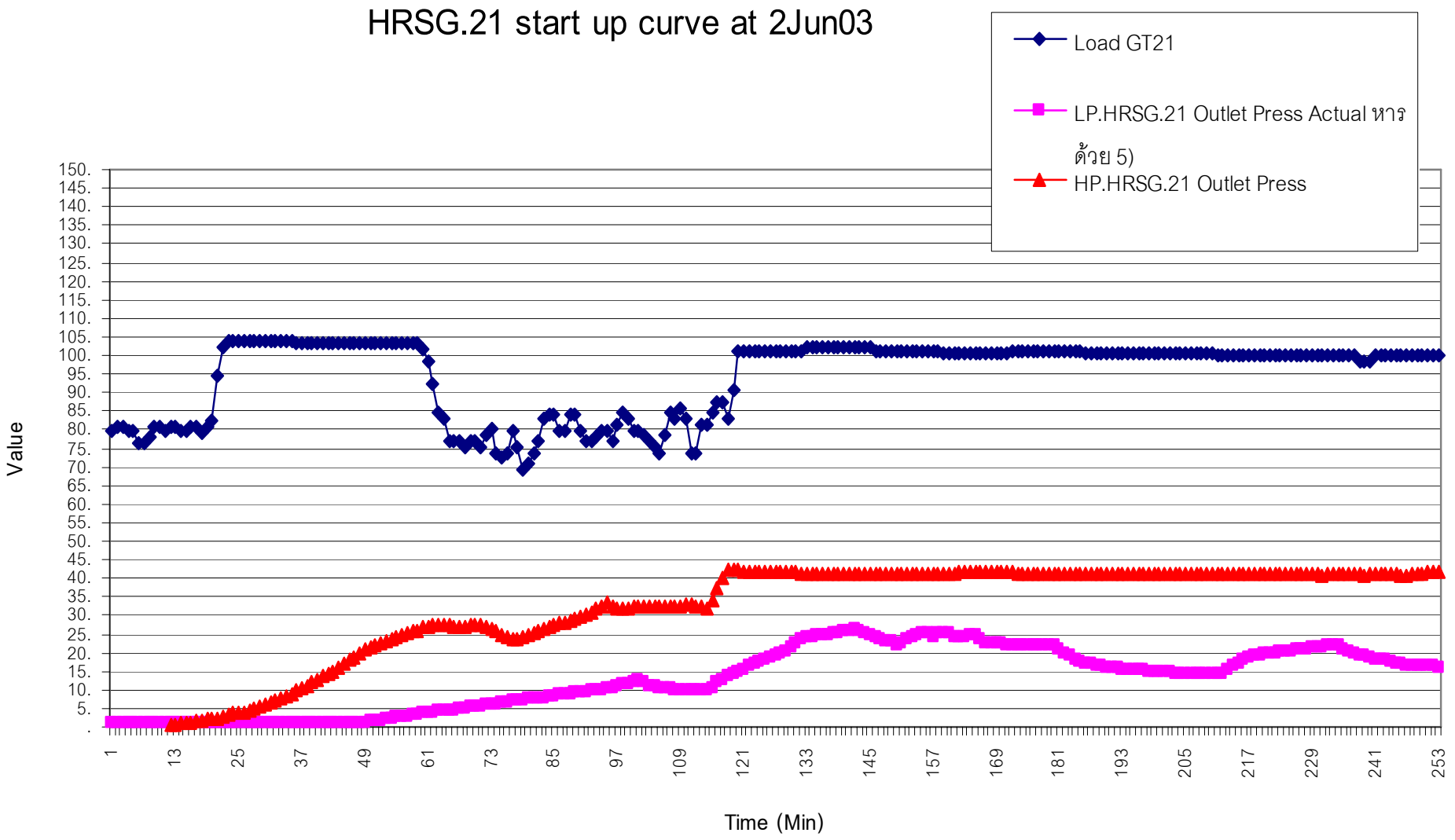
Possible Causes of problem

- GT-21 compressor fouling ----> OK
- HRSG-21 Coil problems ---------> *more data*
- Bypass Damper leakage ---------> OK
- No Problem (only feel) ----------> OK

Case-I: Steam Turbine-20



Case-I: Steam Turbine-20



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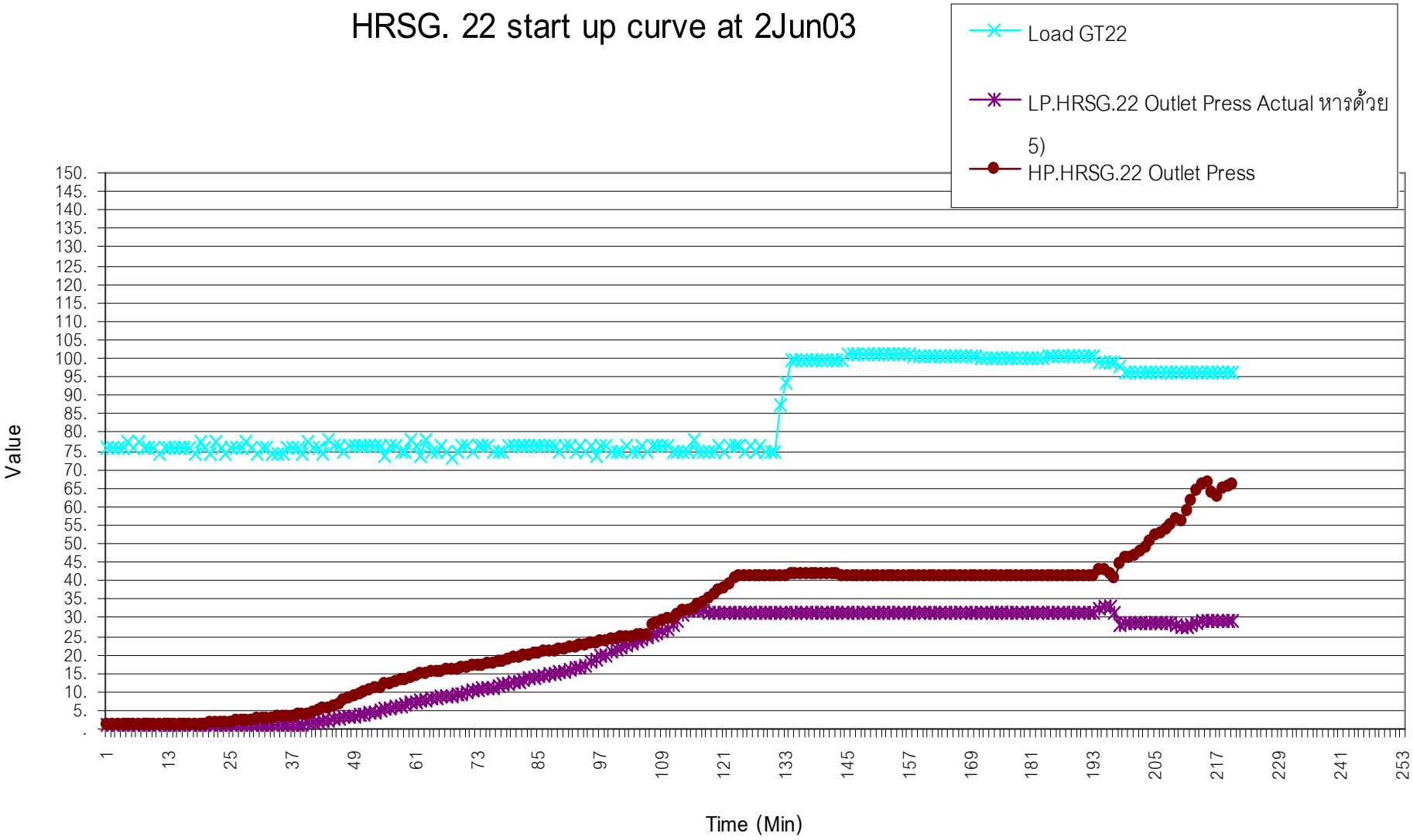

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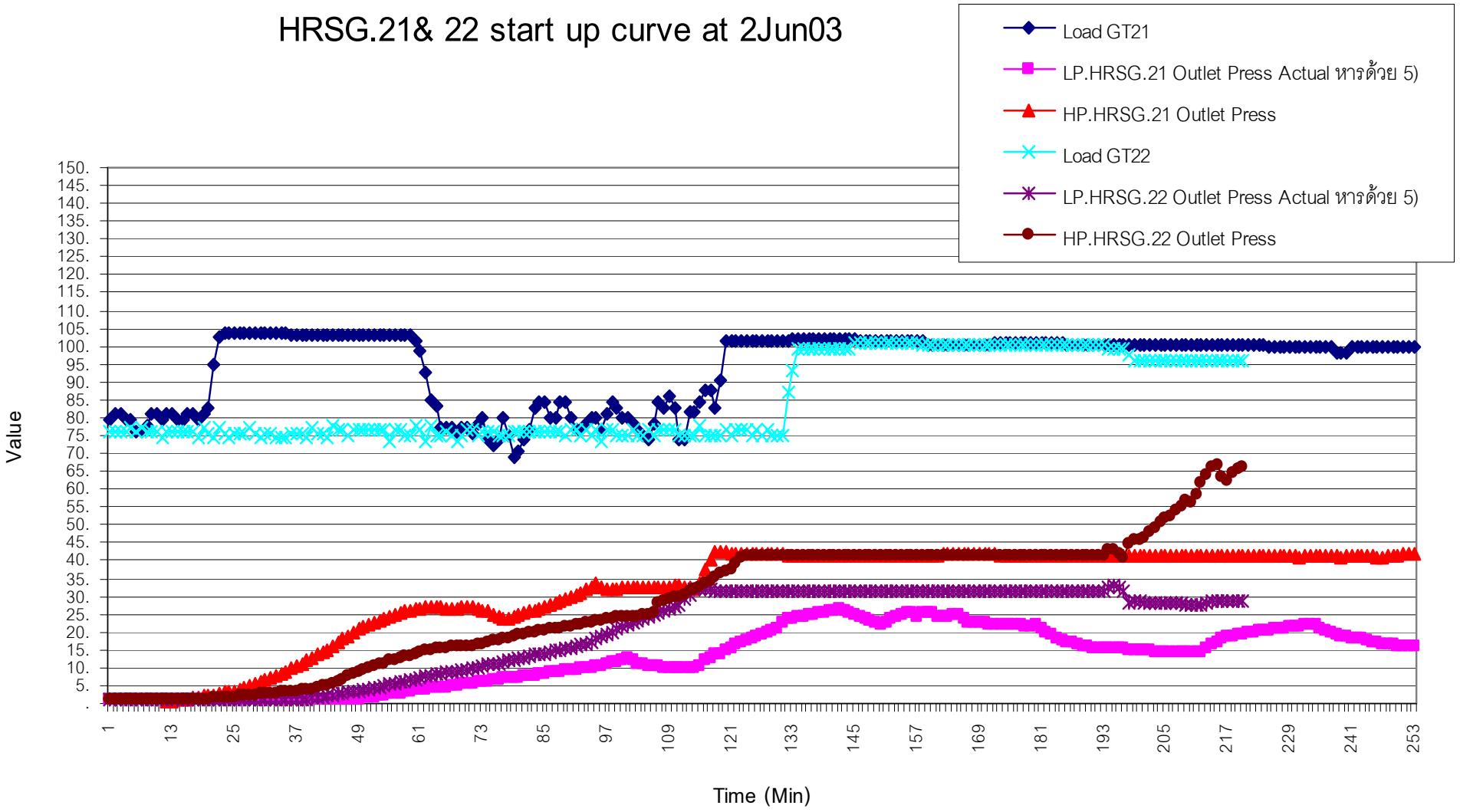

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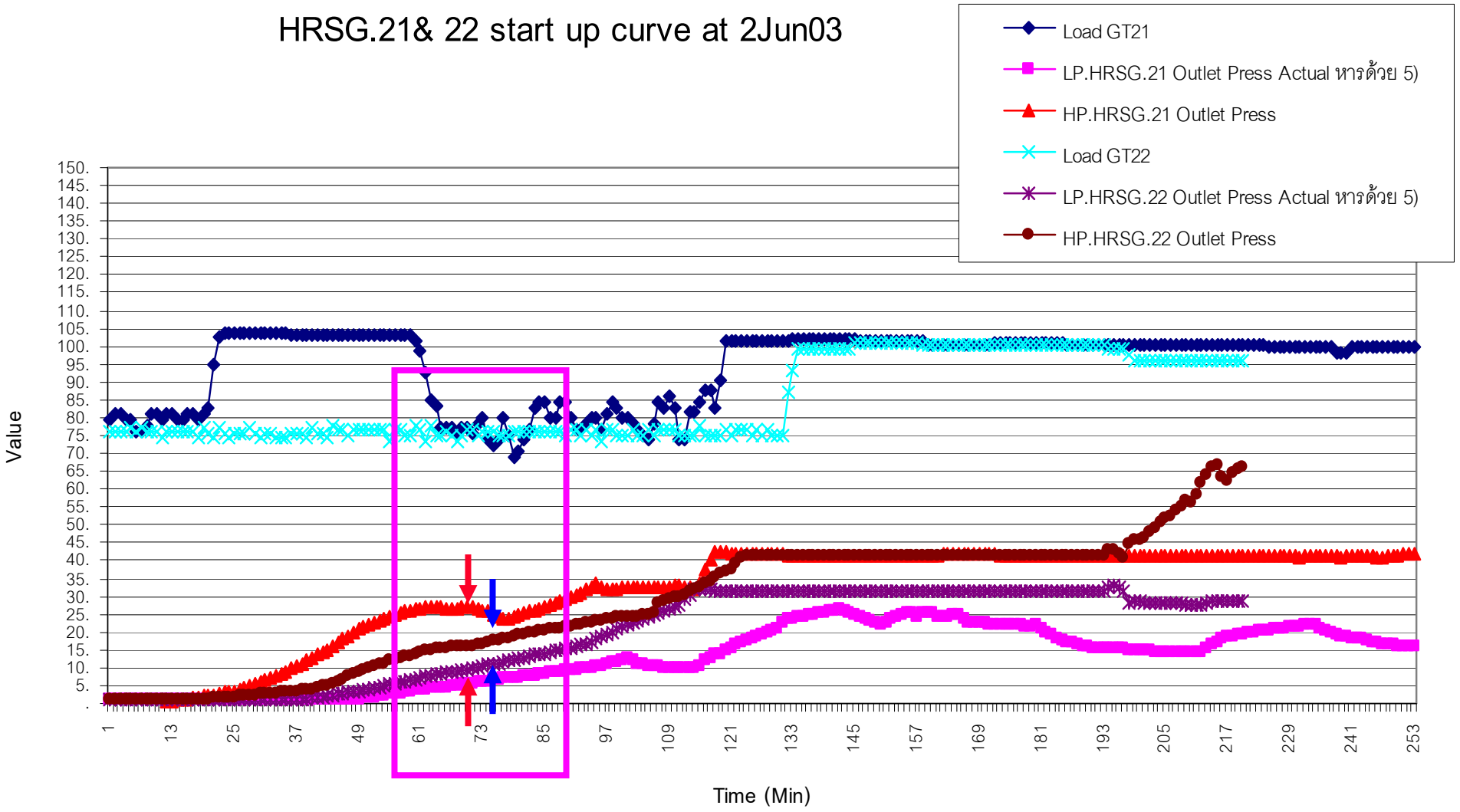
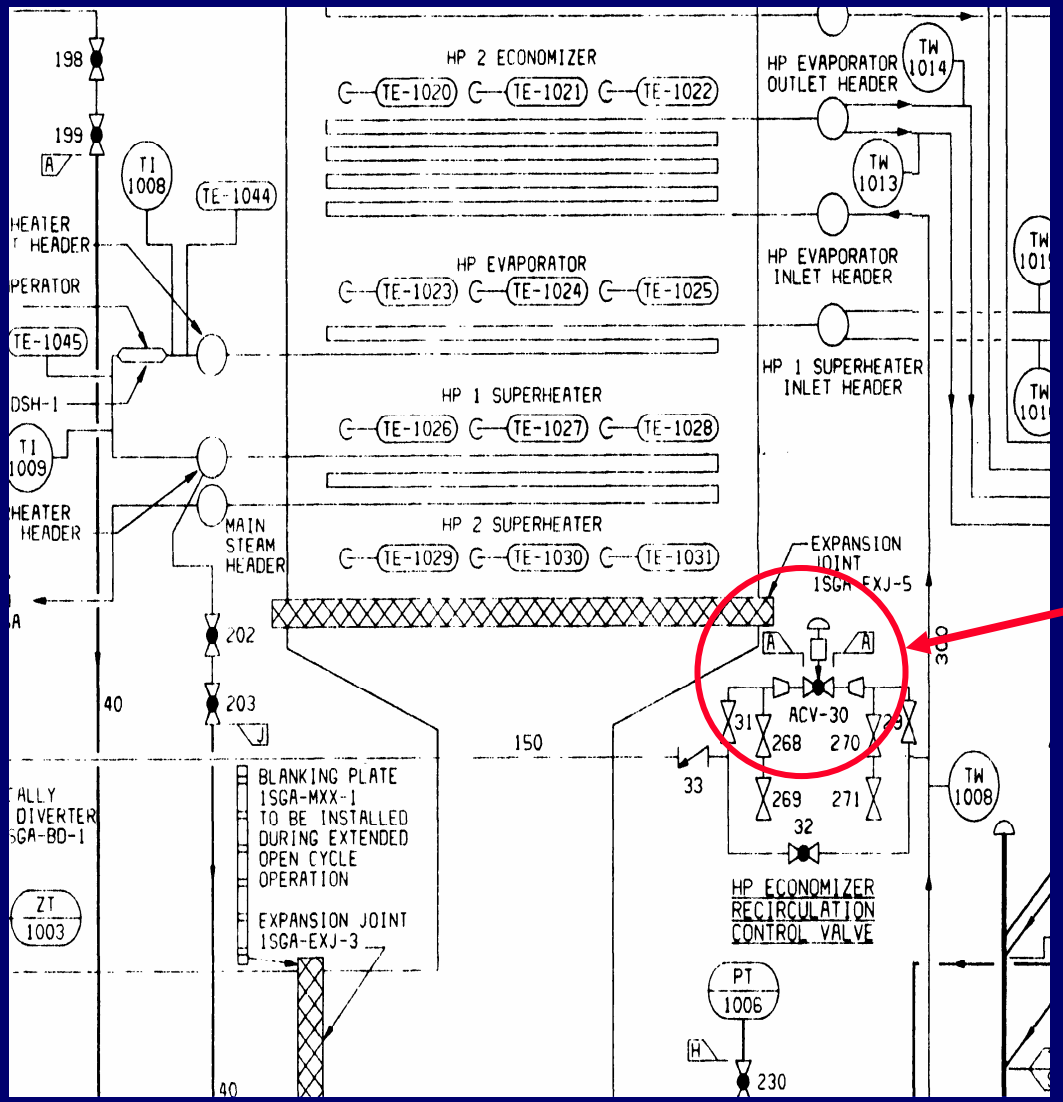


Case-I: Steam Turbine-20

- HP Pressure for HRSG-21 increases faster than HRSG-22, but LP Pressure for HRSG-21 increases slower than HRSG-22 at same load.
- Possible cause: HP water flow for HRSG-21 is higher than normal and causes heat absorption from exhaust gas instead of LP water flow.
- Different water flow from design **But How?**

Case-I: Steam Turbine-20



Possible Cause for Flow changes

- LP Eco. Coil problems
- LP Circulation Pump problems
- HP Economizer Recirculation valve is not working properly

“ After testing of HP Economizer Recirculation valve, this valve is not operated as designed (full open during start-up) and cause changing of HP and LP flow. ”

“The compress air supply for this ACV is closed manually”

Case-II: Steam Turbine-40

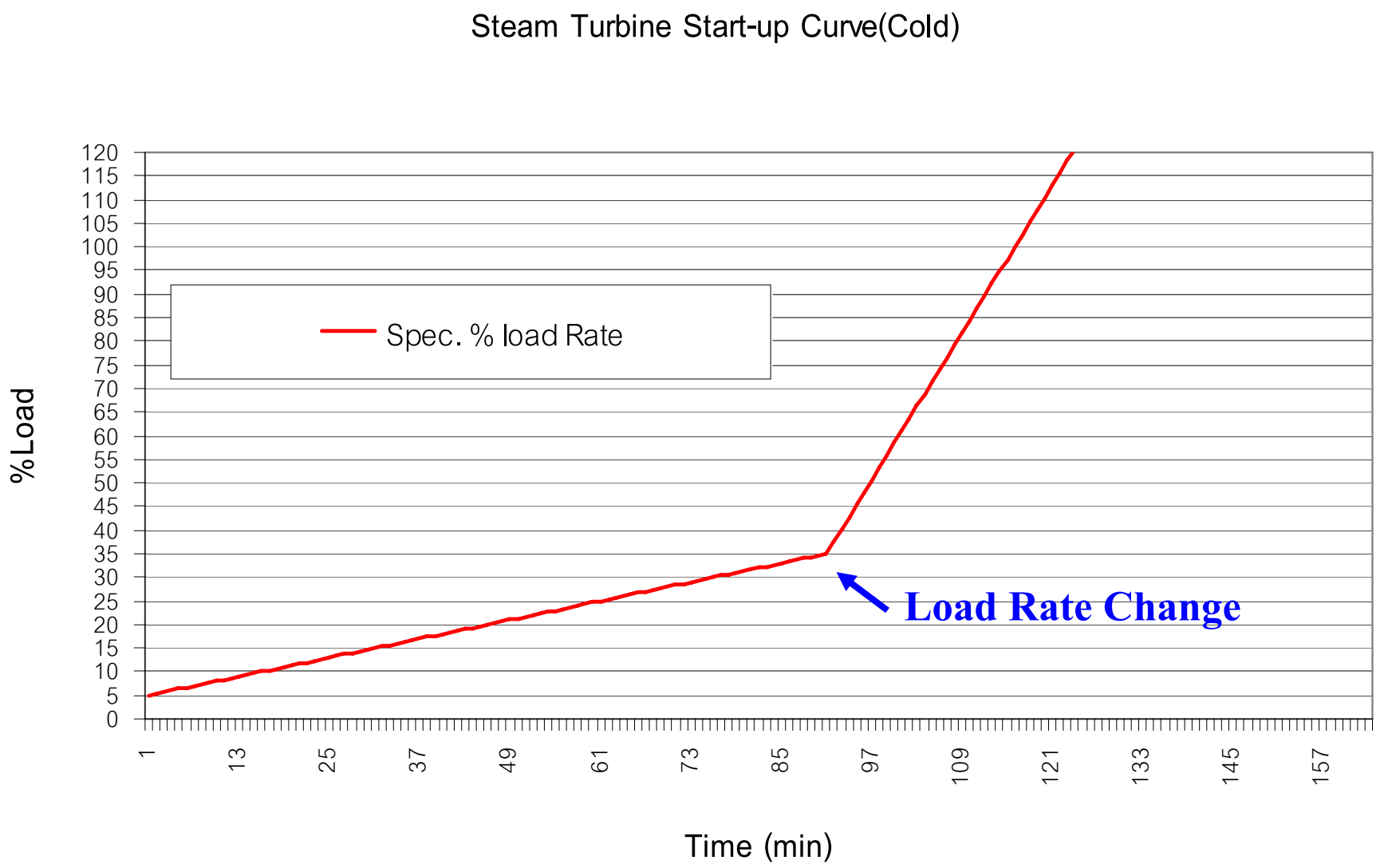
II) ST-40 start-up **faster than** ST-10, ST-20, and ST-30.

"For many times, Steam Turbine 40 start-up faster than other units (10,20, and 30). However, ST-40 always start-up as normal as other units. "

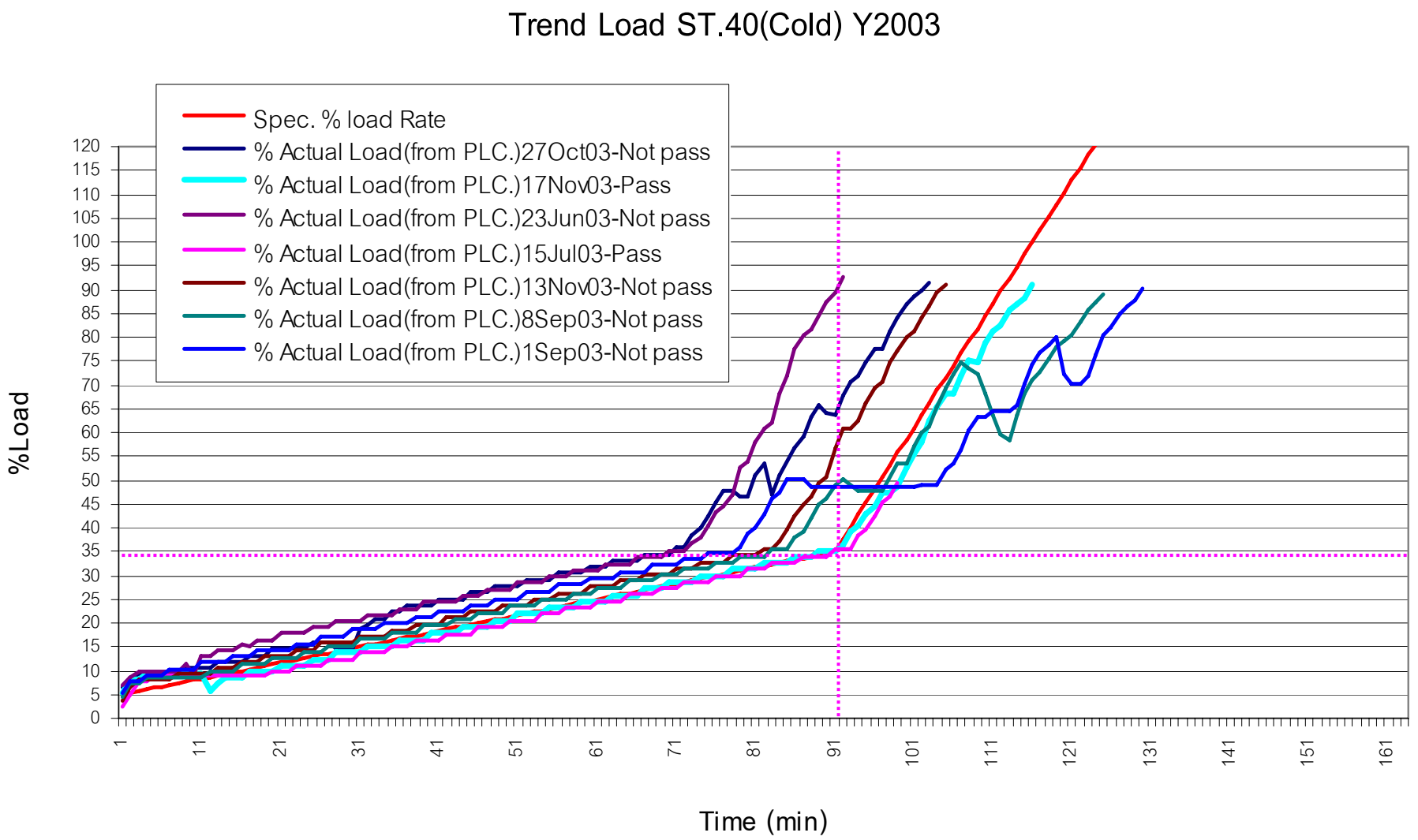
Case-II: Steam Turbine-40

- Steam Turbines are controlled by EHC for start-up, shutdown, loading, and protective devices.
- REGCO's steam turbines are designed for 3 start-up modes; Cold, Warm, and Hot.
- For Cold Start-up Mode (casing temp. below 330^{o}C), Steam Turbine is started and loaded with 2 load-rate, 0.333%/min when load is less than 35%, and 2.60%/min when load is higher than 35%)

Case-II: Steam Turbine-40



Case-II: Steam Turbine-40



Case-II: Steam Turbine-40

- Process-IT Data(23 Jun - 17 Nov 2003), were shown that ST-40 were started 7 times with designed load rate only 2 times, while 5 times of start-up were faster than design curve.
- The problems were caused by prior command from EHC to change load-rate from 0.333%/min to 2.6%/min before 35% load.

"After EHC checking, EHC was found that command signal was not stable and caused prior command. EHC Card was changed"

Epilogue

- At the starting point, Process-IT at REGCO are utilized as one of analytic tools for operation & maintenance persons to find out causes of problems. Moreover, the application could be extended due to skill and expertise of users to apply the large amount of information for their purposes.

"A large amount of data/information without utilization is equal to less data"

Thank you ...

REGCO