# Integrated Validation System for a thermal-hydraulic system code, TASS/SMR-S

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# Background

- Usually thermal-hydraulic safety analysis computer codes are consist of massive amount of source codes.
- The development including enhancement and modification of these codes is indispensable to a new reactor.
- In accordance with code modification, the validation is required.
- The physical effect of thermal-hydraulics in computer code can be validated by various separate effect tests (SET). The compound effect could be compared with the results of an integral effect test (IET).
- There are so many SETs and IETs for code validation. So the validation process of thermal-hydraulic computer code requires lots of comparison with the experimental data, especially for nuclear reactor system.

# Introduction

- **IVS**
  - **The Integrated Validation System (IVS) for the thermal-hydraulic system code, TASS/SMR-S**
  - **TASS/SMR-S (Transient And Setpoint Simulation/System-integrated Modular Reactor-Safety)**
- **Necessity for Development**
  - **The development including enhancement and modification of thermal-hydraulic system computer code is indispensable to a new reactor.**
  - **Whenever the code is modified, such as a physical model change or modification, the code validation is required.**
  - **Lots of SET and IET test data could be utilized for code validation.**
- **Automate of Code Validation**
  - **IVS can automate these time-consuming computer works efficiently.**

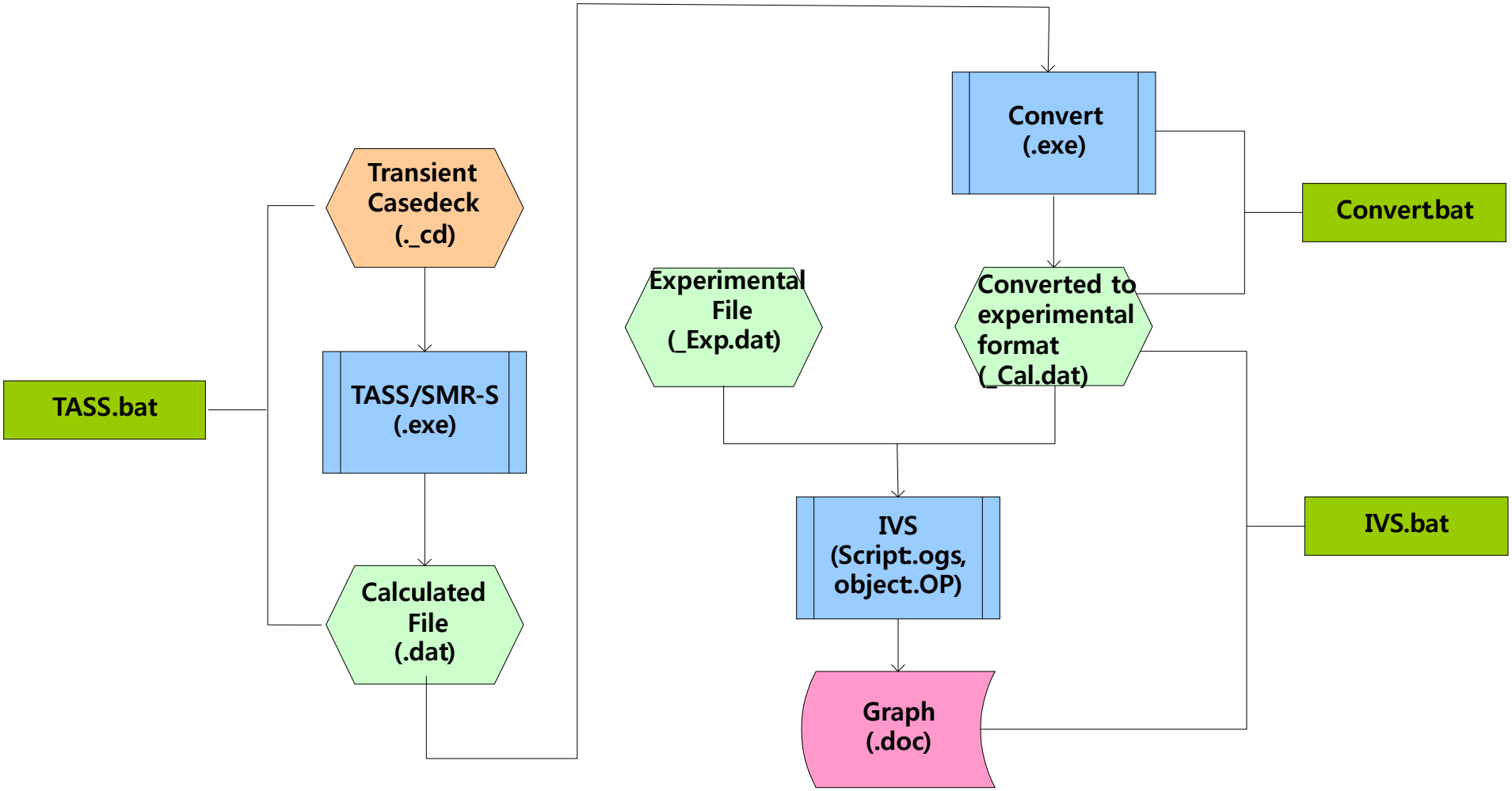
# IVS Software

- **Software required:**
  - **Origin 8.1 or later**
  - **MS Word for graphs output**
  - **MS Excel for data information file**
- **IVS program files:**
  - **ReadDraw.ogs: IVS script file**
  - **GraphDoc.OP: Origin C object program file (portable format)**
  - **LetterStyle.otp: graph template file**
- **IVS run files:**
  - **InputDesign.xlsx: input data information**
  - **Input data file: test data with a spreadsheet style**
  - **Run.bat: IVS batch file**

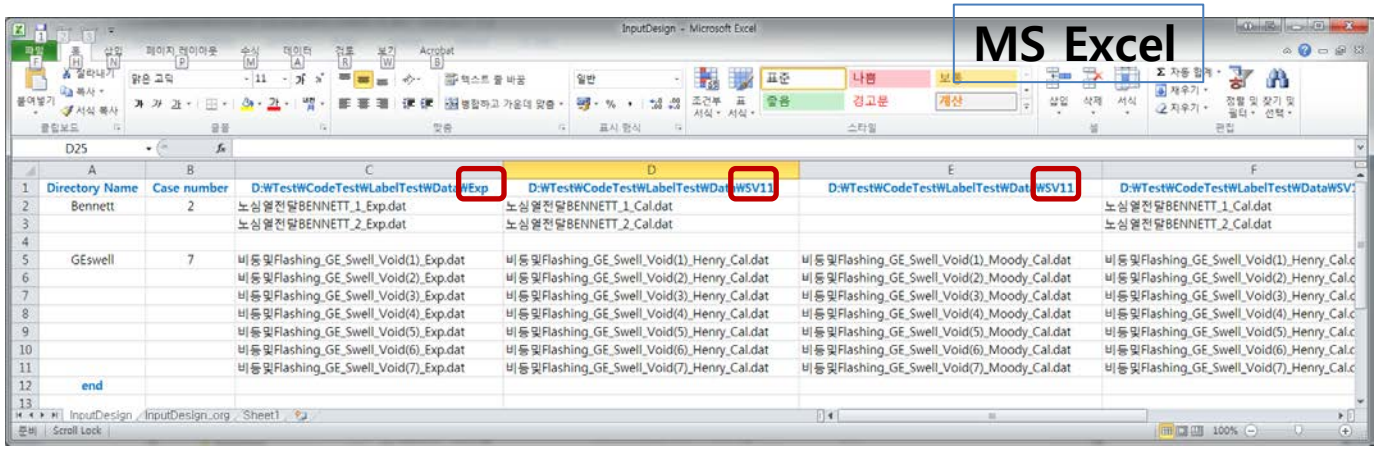
# IVS Running Procedures

- **Prepare reference data**
  - Experimental results
  - XY spreadsheet style
- **Run TASS code**
  - Batch file run
  - Generating calculated results
- **Prepare comparable data**
  - Convert calculated results into experimental format
- **Run IVS**
  - Generate Origin graphs
  - Generate Word files
  - Check results using Word files

# IVS Structure

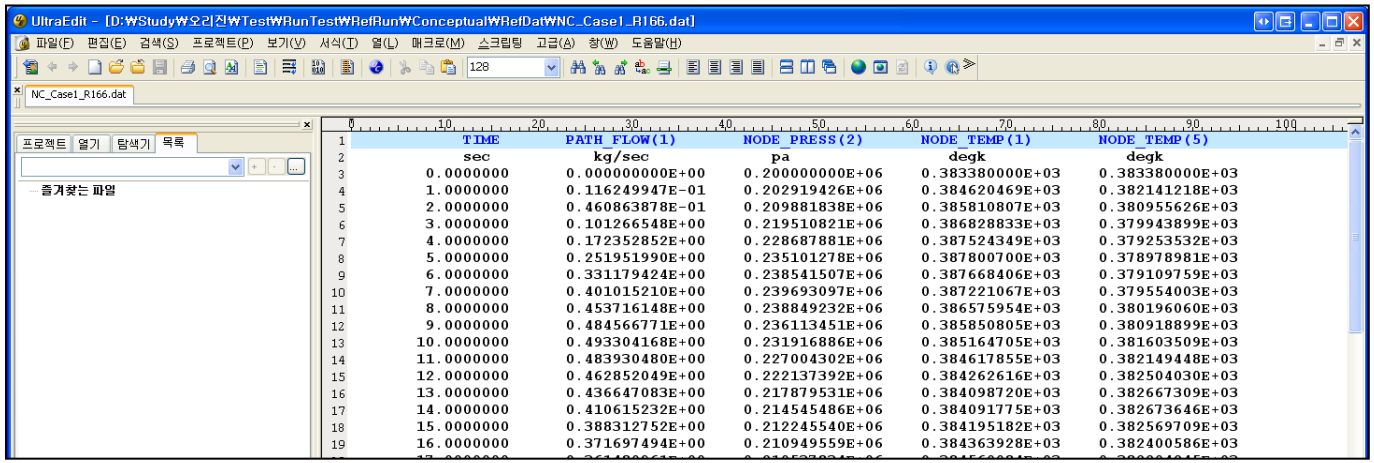


# IVS Run: Input Files



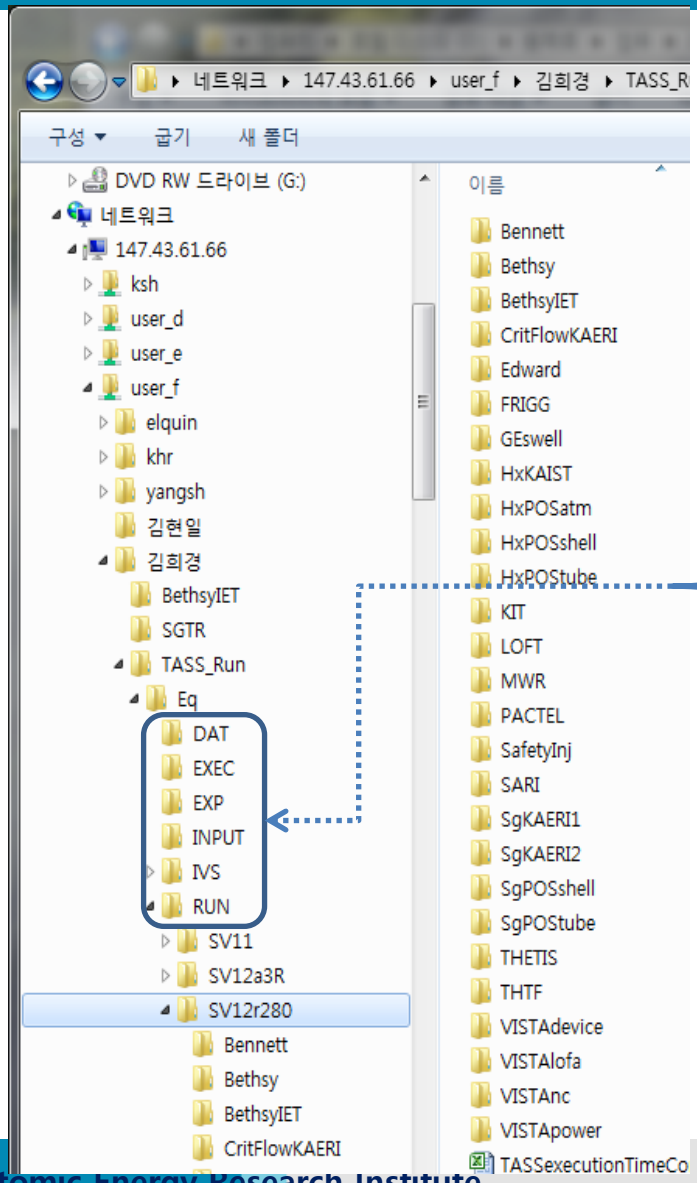

**InputDesign.xlsx**

- **TASS code version**



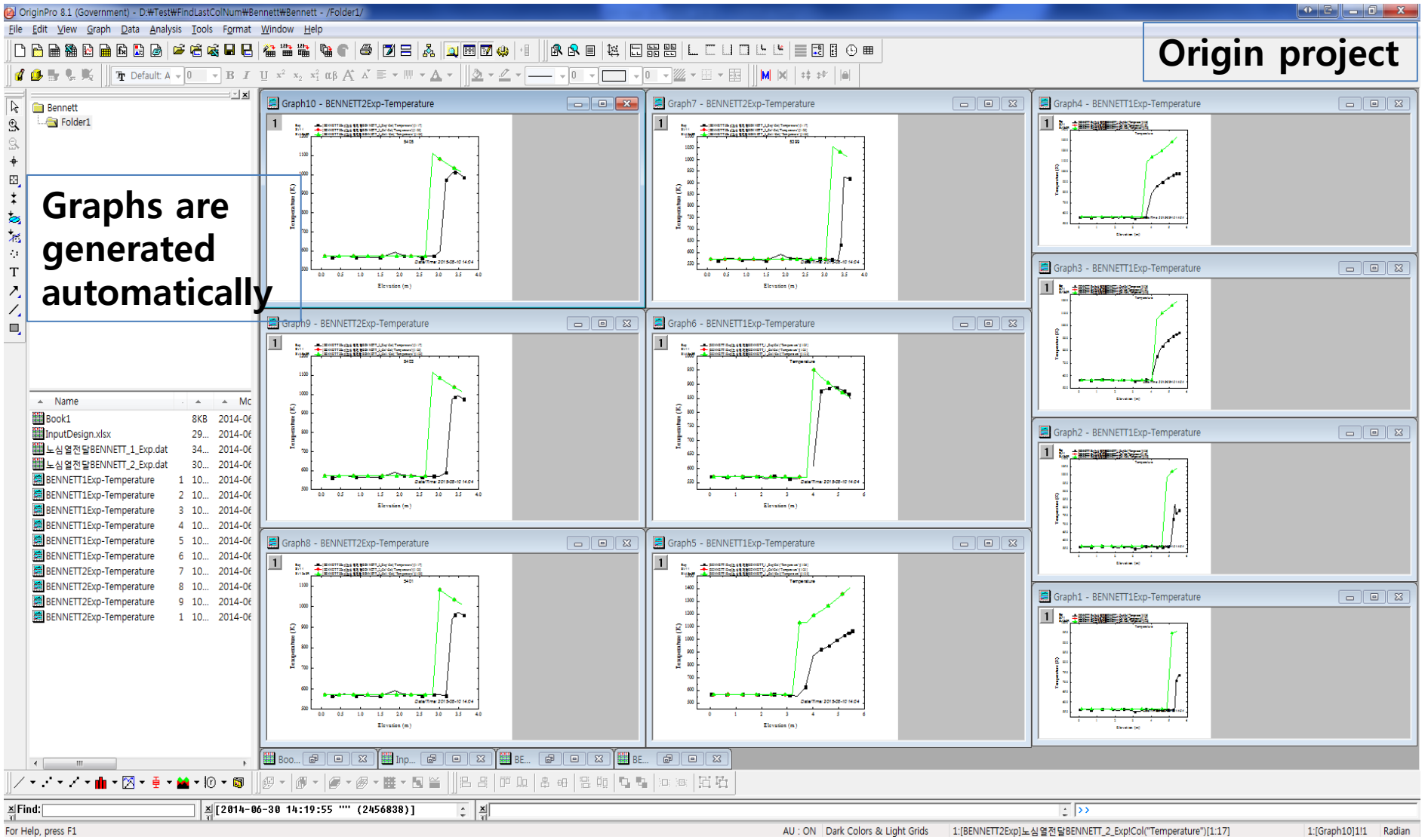

**Input File: Spreadsheet style**

# IVS Run: Folder Structure

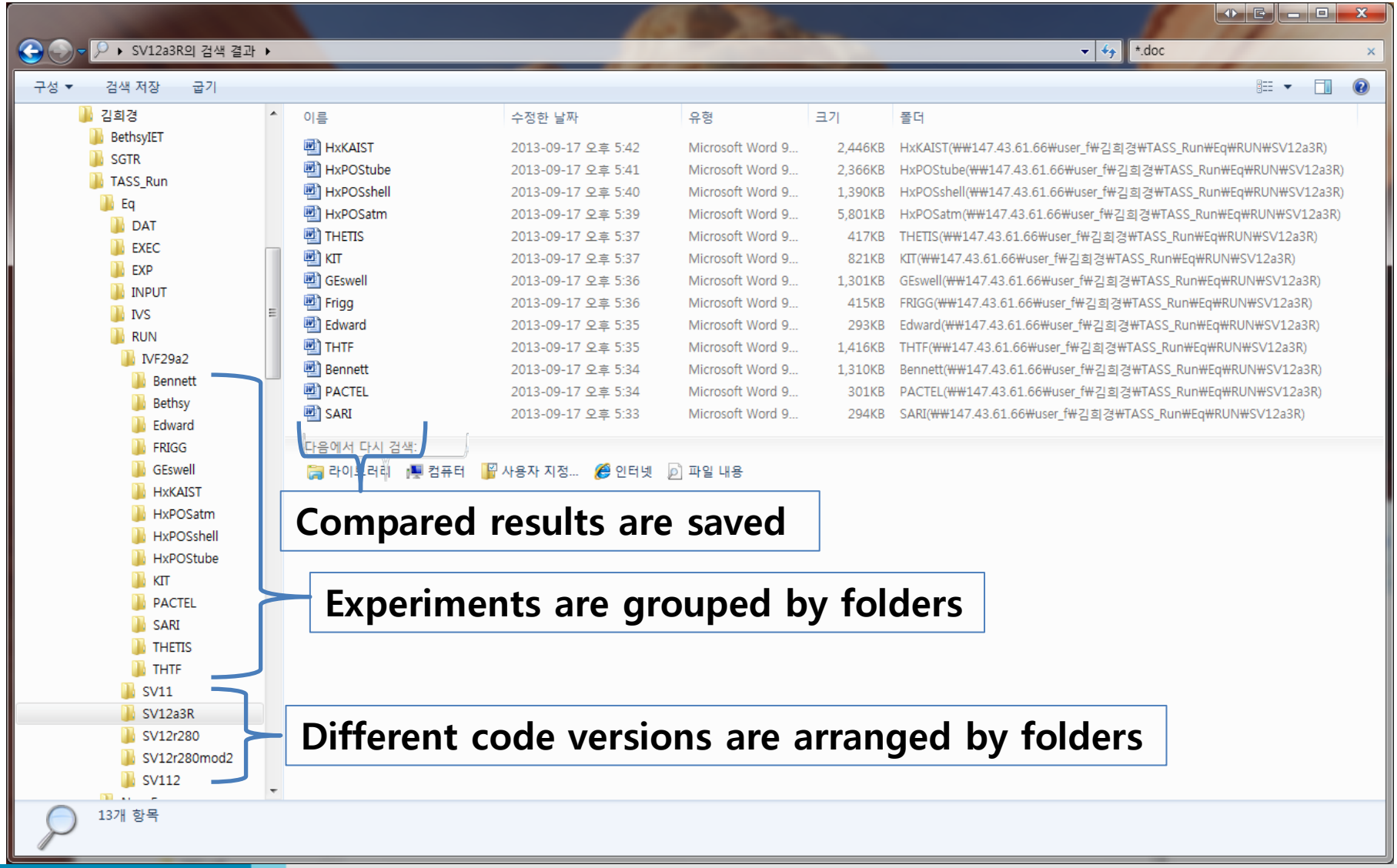



- **DAT**: TASS calculated results
- **EXEC**: TASS execution file
- **EXP**: Experimental data
- **INPUT**: TASS casedecks
- **IVS**: IVS execution files
- **RUN**: IVS execution result files

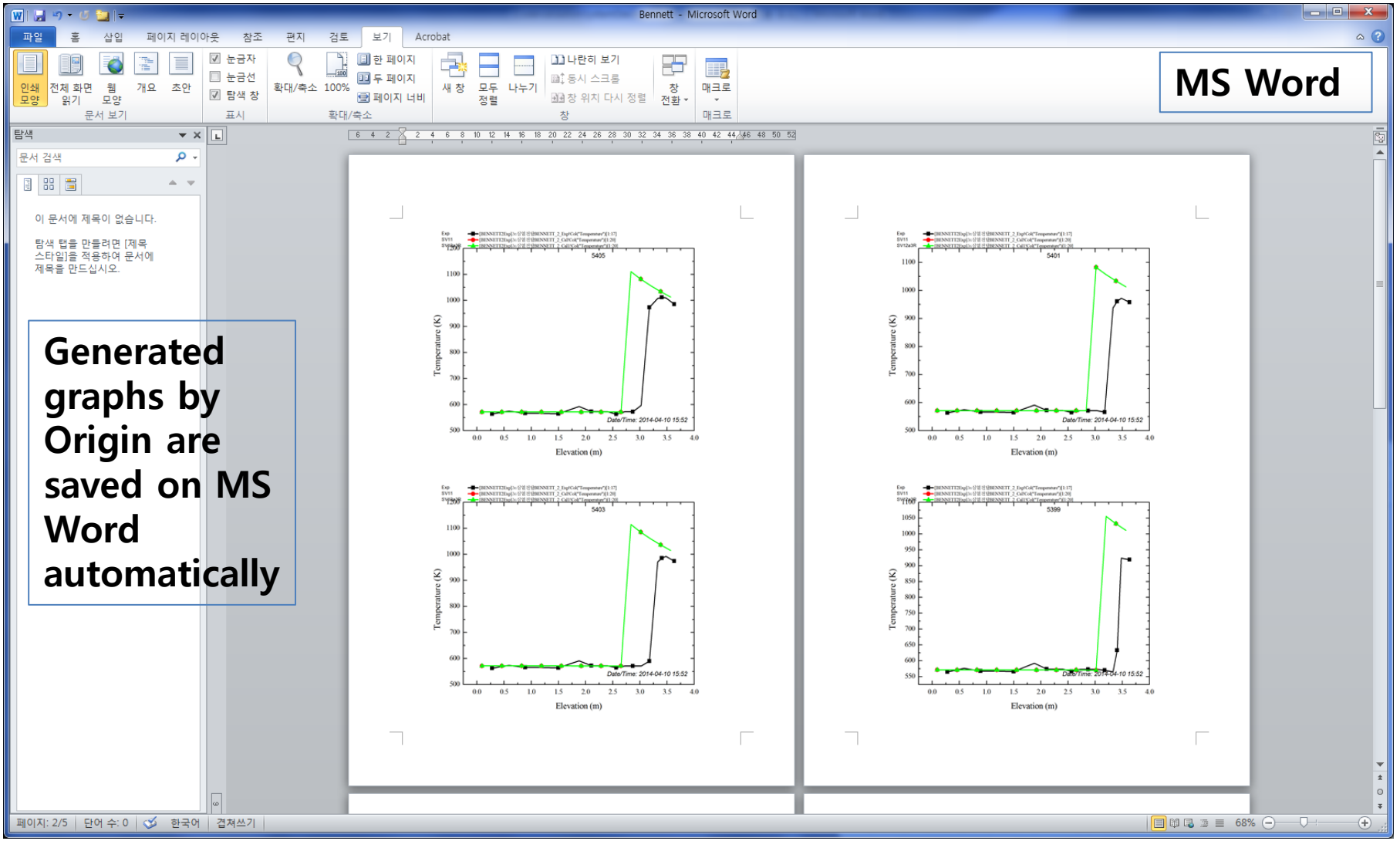
# IVS Results: Compared graphs



# IVS Results: Folder & Files



# IVS Results: File contents



# Conclusions

- **IVS was developed for an automated validation of TASS/SMR-S code.**
- **The code validation could be achieved by a comparison code calculation results with corresponding test results.**
- **IVS could be applicable to other software's validation with minor modifications.**