# [FunctionName] Reference

**Version**: 1.8 (R2024b) 01-Oct-2025
**Location**: `Base/[FunctionName].m`

## Function Overview

[Brief description of what the function does and its primary purpose]

### Category

**Function Type**: [Data Model | Analysis | Display | Save/Export | Utility | GUI]

### Key Features

- **Feature 1**: [Description]
- **Feature 2**: [Description]
- **Feature 3**: [Description]

## Syntax

```
output = FunctionName(input)
output = FunctionName(input, 'Parameter', value)
output = FunctionName(input, 'Param1', value1, 'Param2', value2)
```

## Description

[Detailed description of what the function does, including:]

- [Main functionality]
- [Processing steps]
- [Expected workflow]
- [Integration with other TaesLab components]

## Input Arguments

### Required Arguments

`input` — [Description of the main input]
*Data Types*: `char` | `string` | `cDataModel` | `cResultSet`
*Additional Details*: [Any constraints, expected format, or validation requirements]

## Name-Value Arguments

 **`'Parameter1'`** — [Description] *(optional)*
*Data Types*: `char` | `string`
*Valid Values*: `'option1'` | `'option2'` | `'option3'`
*Default*: `'option1'`

 **`'Parameter2'`** — [Description] *(optional)*
*Data Types*: `logical`
*Valid Values*: `true` | `false`
*Default*: `false`

 **`'State'`** — State name for analysis *(optional)*
*Data Types*: `char` | `string`
*Valid Values*: Valid state name from data model
*Default*: First available state

 **`'Show'`** — Display results in console *(optional)*
*Data Types*: `logical`
*Valid Values*: `true` | `false`
*Default*: `false`

 **`'SaveAs'`** — Output filename for saving results *(optional)*
*Data Types*: `char` | `string`
*Valid Values*: Valid filename with extension
*Default*: No file output

 **`'Debug'`** — Enable debug information *(optional)*
*Data Types*: `logical`
*Valid Values*: `true` | `false`
*Default*: `false`

# Output Arguments

 **`output`** — [Description of the output]
*Data Types*: `cResultInfo` | `cDataModel` | `cThermoeconomicModel`
*Structure*: [If applicable, describe the structure or contents]

## Output Contents (if applicable)

When the function returns a `cResultInfo` object, it contains the following tables:

| Table Name | Description | Type |
|---|---|---|
| `table1` | [Description] | `cTableCell` |
| `table2` | [Description] | `cTableMatrix` |
| `table3` | [Description] | `cTableData` |

# Examples

## Basic Usage

```matlab
% Load data model
data = ReadDataModel('model.json');

% Run basic analysis
result = FunctionName(data);

% Display results
disp(result);
```

## With Optional Parameters

```matlab
% Run analysis with specific state
result = FunctionName(data, 'State', 'design');

% Run with debug information
result = FunctionName(data, 'Debug', true, 'Show', true);
```

## Advanced Usage with Multiple Parameters

```matlab
% Comprehensive analysis
result = FunctionName(data, ...
    'State', 'design', ...
    'Parameter1', 'advanced', ...
    'Show', true, ...
    'SaveAs', 'results.xlsx');

% Check if analysis was successful
if isValid(result)
    % Process results
    ShowResults(result, 'View', 'HTML');
end
```

## Integration with ThermoeconomicModel

```matlab
% Using with model object
model = ThermoeconomicModel('model.json');
result = FunctionName(model.DataModel, 'State', model.CurrentState);

% Save results through model
SaveResults(result, 'analysis_output.xlsx');
```

## Algorithm Details

### Processing Steps

1. **Input Validation**: [Description of validation performed]
2. **Data Preparation**: [How input data is processed]
3. **Core Computation**: [Main algorithm or analysis performed]
4. **Results Assembly**: [How results are organized and packaged]

### Mathematical Background (if applicable)

[Brief description of the mathematical or thermodynamic principles used]

# Error Handling

### Common Errors

- **Invalid Input File**: File does not exist or is not readable
- **Invalid Data Model**: Data model object is not valid or corrupted
- **Missing State**: Specified state name does not exist in the data model
- **Parameter Validation**: Invalid parameter values or combinations

### Error Messages

The function uses standardized TaesLab error messages:

- `cMessages.DataModelRequired` - When data model is missing or invalid
- `cMessages.InvalidInputFile` - When filename is invalid
- `cMessages.FileNotFound` - When specified file does not exist
- `cMessages.NarginError` - When required arguments are missing

# Performance Considerations

- **Memory Usage**: [Information about memory requirements]
- **Processing Time**: [Expected execution time for typical models]
- **Scalability**: [How performance scales with model size]

# Dependencies

### Required Classes

- `cDataModel` - For data model handling
- `cResultInfo` - For results management
- `cTaesLab` - Base class functionality

### Required Functions

- `isValid` - Object validation
- `isFilename` - Filename validation
- `isObject` - Object type checking

# Workflow Integration

## Typical Usage Pattern

```matlab
% 1. Load Data
data = ReadDataModel('model.json', 'Debug', true);

% 2. Run Analysis
results = FunctionName(data, 'State', 'design', 'Show', false);

% 3. Display Results
ShowResults(results, 'View', 'HTML');

% 4. Save Results
SaveResults(results, 'output.xlsx');
```

## Integration Points

- **Input Sources**: [Where data typically comes from]
- **Output Destinations**: [Where results typically go]
- **Related Functions**: [Functions commonly used together]

# Version History

## Current Version (1.8)

- [List of current features and capabilities]
- [Recent improvements or changes]

## Compatibility

- **MATLAB**: R2019b or later
- **Octave**: 6.0 or later (with limitations)
- **Dependencies**: [Required toolboxes or additional software]

# Tips and Best Practices

## Recommended Usage

- **Performance**: Use `'Show', false` for batch processing

- **Debugging**: Enable `'Debug', true` when troubleshooting
- **File Management**: Use descriptive filenames with `'SaveAs'`

## Common Pitfalls

- [Common mistakes users make]
- [How to avoid typical errors]
- [Best practices for parameter selection]

# See Also

## Related Base Functions

- `RelatedFunction1` - [Brief description]
- `RelatedFunction2` - [Brief description]
- `RelatedFunction3` - [Brief description]

## Related Classes

- `cRelatedClass1` - [Brief description]
- `cRelatedClass2` - [Brief description]

## Demos and Examples

- **Function Demo** - Interactive demonstration
- **Tutorial** - Step-by-step guide
- **Use Cases** - Real-world applications

# Reference Links