

# Structural Health Monitoring Tools (SHMTools)

## **Header Specifications**

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# 1 Function Header Standard

The SHMTools function header standard specifies various sections of the header. The sections must be listed in the following order:

1. Verbose Function Call
2. Call Methods\*
3. Description
4. Outputs
5. Inputs
6. Default Values
7. See Also
8. Authors\*
9. Date Created\*
10. Modifications\*
11. References\*
12. Sample Data Set\*
13. Data Acquisition\*
14. MATLAB Functions Called\*

*\*These sections are optional.*

All lines in the header must start with “%” to indicate a MATLAB comment line with one exception; a blank line should be entered after the See Also section for use with MATLAB’s help command. Sections begin with a section title in all capital letters followed by a colon. For example the title line of the Verbose Function Call section should look like this:

```
% VERBOSE FUNCTION CALL:
```

## 2 Example Header

The following is an example header that follows the SHMTools specifications:

```
function [out1, out2] = example (in1, in2, in3, in4)
% Module: One-line description of function
%
% VERBOSE FUNCTION CALL:
%   [First Output, Second Output] = Example Function (First Input, Second Input,
%   Third Input, Fourth Input)
%
% CALL METHODS:
%   [out1, out2] = example (in1, in2, in3, in4)
%
% DESCRIPTION:
%   This is an example function header that follows the SHMTools standard.
%
% OUTPUTS:
%   out1 (struct) : an output that is a structure
%
%   out2 (handle) : an output that is a function handle
%
% INPUTS:
%   in1 (integer) : an input that must be an integer
%
%   in2 (logical) : a boolean input
%
%   in3 (scalar) : a numeric input
%
%   in4 (POINTS, COORDINATES) : a list of 2D points, COORDINATES is the
%   ordered set [X, Y]
%
% DEFAULT VALUES:
%   in1 = 1
%
%   in2 = true
%
% SEE ALSO:
%   none
%
% AUTHORS:
%   John Doe
%   Jane Doe
%
% DATE CREATED:
%   March 1, 2010
```

### 3 Short Description

The first line of a MATLAB function must contain the function call which is not a commented line and starts with the word "function." SHMTools allows you to provide a short description in the second line (first line of the header) without a section title. The short description should follow a colon (":"). The space before the colon can be used to indicate other information about the function like a group of functions the function belongs to.

In the example below, the first line contains the function call, and the second line indicates the function module along with a short description after the colon. The module name and description should all be entered on a single line.

```
function [sum] = example (in1, in2)
% Module: One-line description of function
```

## 4 Verbose Function Call

The verbose function call provides more descriptive names for the inputs, outputs, and the function itself. It should match the format of the function call in the first line with the same number of inputs and outputs in the same order. Verbose function call entries may use multiple lines. Inputs and outputs should be entered as comma-separated lists as spaces are allowed in each parameter name.

```
% VERBOSE FUNCTION CALL:  
% [First Output, Second Output] = Example Function (First Input, Second Input,  
% Third Input, Fourth Input)
```

## 5 Call Methods

The call methods section is only necessary for functions that have multiple call methods. The first entry should be identical to the function call in line 1 with each optional call method defined on a new line. Call method entries may use multiple lines.

```
% CALL METHODS:  
%   [out1, out2] = example (in1, in2, in3, in4)
```

## 6 Description

The description section allows you to enter a description for the function that covers multiple lines.

```
% DESCRIPTION:  
% This is an example function header that follows the SHMTools standard.
```



## 7 Outputs and Inputs

The Outputs and Inputs sections use identical formats. Each entry contains the name of the variable, the data format, and a description of the variable. The variable name must match the name used in the function call in line 1 or one of the call methods exactly. The format follows the variable name inside parentheses followed by a colon (":"). The description follows the colon.

```
% OUTPUTS:
%   out1 (struct) : an output that is a structure
%
%   out2 (handle) : an output that is a function handle
%
% INPUTS:
%   in1 (integer) : an input that must be an integer
%
%   in2 (logical) : a boolean input
%
%   in3 (scalar) : a numeric input
%
%   in4 (POINTS, COORDINATES) : a list of 2D points, COORDINATES is the
%   ordered set [X, Y]
```

## 8 Default Values

If a default value is defined for an input within the function, it should be specified in the default values section of the header. Each entry should start with the name of an input identical to an input in the function call in line 1 or one of the call methods. The input name is followed by an equals sign ("=") and the default value.

```
% DEFAULT VALUES:  
%   in1 = 1  
%  
%   in2 = true
```

## 9 See Also

The See Also section contains names of related functions. MATLAB will automatically create links to these functions when the `/emphhelp` command is used. Each entry should appear on a new line.

```
% SEE ALSO:  
%   function1  
%   function2  
%   function3
```

*Note: The see also section has special meaning in MATLAB. Each function referenced in this section should be entered on its own line.*

## 10 Other Allowed Sections

The following sections are allowed by the SHMTools header standard to provide additional information not required to use the function. Each section should start with a title line following the same specifications as other sections.

- Authors
- Date Created
- Modifications
- References
- Sample Data Set
- Data Acquisition
- MATLAB Functions Called