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# Generate Coil

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`s=generate_coil(coil_name,X,sigma,w,h,nhinc,nwinc,rh,rw)`

Packages geometry,conductor information and discretization information into a struct the struct is compatible with the function `fasthenry_Creator` @TODO: Convert coils into a class

## Parameters

- @param **coil\_name** Coil Identifier
- @param **X** Coil Geometry X(1,:) X points X(2,:) Y points X(3,:) Z points
- @param **sigma** Conductor Conductivity
- @param **w** Coil Width
- @param **h** Coil Height
- @param **nhinc** Conductor Discretization Height
- @param **nwinc** Conductor Discretization Width
- @param **rh** Discretization range
- @param **rw** Discretization range
- @retval **s** Struct Packaged Coil

## Code

```
function s=generate_coil(coil_name,X,sigma,w,h,nhinc,nwinc,rh,rw)

field = 'X';
field0 = 'coil_name';
field1 = 'sigma';           %Conductivity
field2 = 'w'; field3 = 'h';  %Conductor Width,Height
field4 = 'nhinc'; field5 = 'nwinc'; %Conductor Discretization
field6 = 'rh'; field7 = 'rw'; %Discretization range
%field8 = 'wx'; field9 = 'wy'; field10 = 'wz';
s =
struct(field0,coil_name,field1,sigma,field2,w,field3,h,field4,nhinc,field5,nwinc,
```

## Discretization

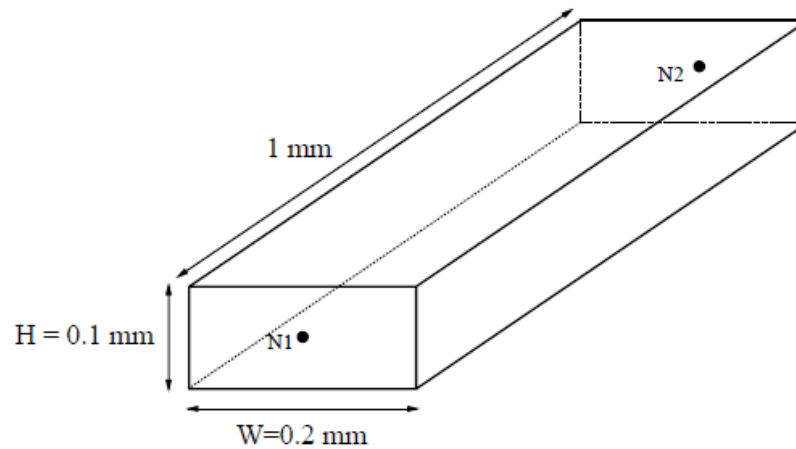


Figure 1: Example Segment for Sample Input File

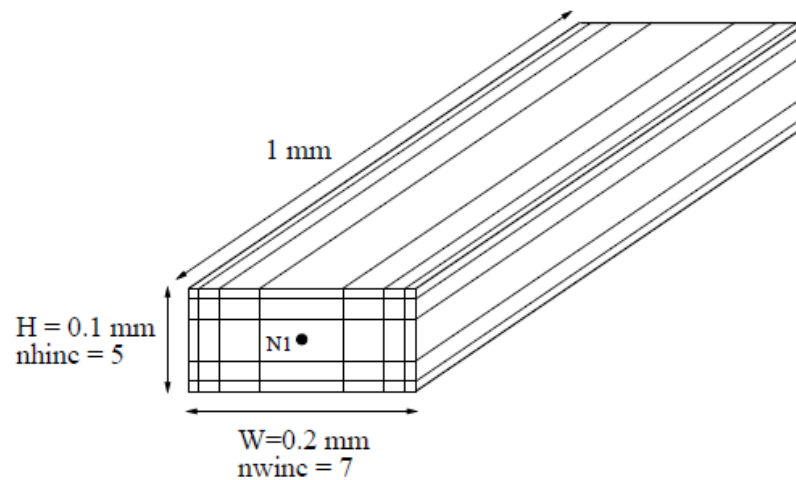


Figure 2: Segment discretized into 35 filaments

## AWG Standard sizes

```
%{
  Conductor      |  Ampacity[A]
-----|-----
AWG  Diam[mm]  Area[mm2]  mOhm/m    |  60 Â°C  75 Â°C  90 Â°C
-----|-----
1    7.348    42.4    0.4066   110  130  145
2    6.544    33.6    0.5127    95  115  130
3    5.827    26.7    0.6465    85  100  115
```

```

4  5.189  21.2  0.8152      70  85  95
5  4.621  16.8  1.028      -  -  -
6  4.115  13.3  1.296     55  65  75
7  3.665  10.5  1.634      -  -  -
8  3.264  8.37  2.061     40  50  55
9  2.906  6.63  2.599      -  -  -
10 2.588  5.26  3.277     30  35  40
11 2.305  4.17  4.132      -  -  -
12 2.053  3.31  5.211     20  25  30
13 1.828  2.62  6.571      -  -  -
14 1.628  2.08  8.286     15  20  25
15 1.450  1.65  10.45      -  -  -
16 1.291  1.31  13.17      - 18  -
17 1.150  1.04  16.61      -  -  -
18 1.024  0.823 20.95     10 14 16
19 0.912  0.653 26.42      -  -  -
20 0.812  0.518 33.31      5 11  -
21 0.723  0.410 42.00      -  -  -
22 0.644  0.326 52.96      5  7  -
23 0.573  0.258 66.79      -  -  -
24 0.511  0.205 84.22      2.1 3.5  -
25 0.455  0.162 106.2      -  -  -
26 0.405  0.129 133.9     1.3 2.2  -
27 0.361  0.102 168.9      -  -  -
28 0.321  0.0810 212.9     0.83 1.4  -
29 0.286  0.0642 268.5      -  -  -
30 0.255  0.0509 338.6     0.52 0.86  -
31 0.227  0.0404 426.9      -  -  -
32 0.202  0.0320 538.3     0.32 0.53  -
33 0.180  0.0254 678.8      -  -  -
34 0.160  0.0201 856.0     0.18 0.3  -
35 0.143  0.0160 1079      -  -  -
36 0.127  0.0127 1361      -  -  -
37 0.113  0.0100 1716      -  -  -
38 0.101  0.00797 2164      -  -  -
39 0.0897 0.00632 2729      -  -  -
40 0.0799 0.00501 3441      -  -  -

%}

```

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