LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
-LIGO-
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Technical Note	**LIGO-T020207- 00- D**	12/05/02

Design Tool: Minimum Blade Thickness

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This is an internal working note
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```
function [] = min_thickness();

C300yield=2e9;                                          %Pascals
allowed_stress= .25 * C300yield;        % 20% of yield is 4e8 Pascals
width_ratio = .5;                                       % base/length

g=9.8;
LBperNEWTON=2.204/9.8;                          % pounds per Newton;

 % masses of the stages (kg)
Mouter   = 700;
Minner   = 750;
Mpayload = linspace(0,1000,10);                         % kg of static load

InnerLoad = g*(Minner+Mpayload)/3;                      % three springs
OuterLoad = g*(Mouter+Minner+Mpayload)/3;       % three springs

min_thick_inner = sqrt(6/width_ratio) * sqrt(InnerLoad/allowed_stress);
min_thick_outer = sqrt(6/width_ratio) * sqrt(OuterLoad/allowed_stress);

figure
plot(Mpayload,min_thick_inner,'b',...
        Mpayload,min_thick_outer,'m')
xlabel('payload (kg)')
ylabel('thickness (m)')
title('Minimum thickness of the blade springs')
text(600,.009,{'3 springs per stage','stg 1 = 700 kg,','stg 2 = 750 kg'})
text(Mpayload(2),min_thick_inner(2),'inner stage')
text(Mpayload(2),min_thick_outer(2),'outer stage')
```