IENG505

Problem-1.

What is the increase in dBs of a noise that doubles in intensity?

Solution:

L=20 log (Prms/Pref)= 20xLog(2)= 6.02 dBs.

Problem-2.

In the printing office at EMU, an all-day study revealed the following noise sources:

1. During 1 hour, 105 dBA;
2. During 3 hours 90 dBA;
3. During 4 hours 85 dBA.

a)- What is the Dose Exposure?

Dose= 100(1/1 + 3/8 + 4/16)= 162.5 %

b)- What is the TWA noise level?

TWA=16.61 log(D/100) + 90 = 16.61 log(162.5/100) + 90=93.5 dBA.

c)- Is the printing office in compliance with OSHA standards?

No, since Dose=162.5 > 100 or TWA=93.5>85 dBA.

d)- Consider the first exposure is in the room of Papers-Cutting. That room has 5 identical Paper-cutting machines operating simultaneously. Assume, it is possible not to operate all these identical machines at the same time and do the cutting jobs using any number, less than 5, of such machines. How many machines should the printing office use so that the dose of noise exposure not to exceed 100?

L_{TOT}=105 dBA=10 log(5 x $10^{(X/10)}$) → 10.5 = log(5 x $10^{(X/10)}$) → $10^{(10.5)}$ = 5 x ($10^{(X/10)}$) →

(1/5) x $10^{(10.5)}$ = $10^{(X/10)}$ → log ((1/5) x $10^{(10.5)}$) = X/10 → X= 10 x log ((1/5) x $10^{(10.5)}$) = 98 dBA.

Lets start by operating only one machine in the Papers-Cutting room:

Assume this machine will be used for 1 hour only. Therefore;

Permissible Time for 98 dBA = 8/$2^{((98-90)/5)}$ = 2.64 hours.

Therefore; Dose becomes equal to: 100(1/2.64 + 3/8 + 4 /16)^2 = 100.38 %

So, there is no way, operating even one machine in the Papers-Cutting room is risky on the health of the operator. Therefore; we should perform a 'Noise Administrative Control.