

TP105 -- Sample Planner for Attributes

About the Bed Bug Option

The Bed Bug auditing option in TP105 gives you a statistically valid acceptance plan to verify the effectiveness of bed bug removal, or to verify the absence of bed bugs. Or if bed bugs are found, to trigger removal and cleanup throughout the facility.

The bed bug option uses statistical discovery sampling to determining the number of locations to monitor. Use it when you want to collect evidence of a clean facility yet cannot monitor 100% of the facility's locations.

The ideas is that you can specify a "percent confidence" that the facility is below some small bed bug amount.

H & H Servicco Corp. designed the bed bug auditing option into the program TP105 (Acceptance Sample Planner for Attributes) to be used by anyone with knowledge of facility operations -- hotels, hospitals, dormitories, cruise ships, etc. Statistical training is not necessary.

Instructions:

Install TP105 by double clicking the ".exe" file that you received.

Start TP105 from the start menu item: [Samplingplans] [TP105]



Select the option "Audit for bed bugs" to bring up the following window:

Calculate the number of locations to monitor for bed bugs

Replace the example data with your data. ie: replace "locations" with rooms, beds, cabins, etc. and replace "facility" with hotel, dormitory, hospital, ship, etc.

Monitored Item = Facility Type =

Total number of locations in the facility =

Demonstrate that the fraction of locations infected is less than = = 25 locations Max.

Risk of failing to discover if infected level is above max = = 90 % Confidence

The window will already contain data so that you can see the type of data the program "expects". Your task is to change it to match your application.

First add names specific to your facility.

Enter the name of the type of items or locations to monitor and the type of facility.

Specify the three essential properties of the bed bug audit plan:

- (1) Enter the total number of locations in the facility.
- (2) For the entire facility, enter the maximum fraction of items or locations which, if infected, justifies 100% decontamination throughout the facility.

TIP -- You might have a natural tendency to specify a very low number here. But not having bed bugs now does not mean they won't show up in the future. So once you have completed a sample audit not finding any bed bugs, you have the option to repeat the audit again on a different sample of locations. So you don't have to have absolutely perfect information on the first cycle.

- (3) Enter a small, but necessary risk of the "trigger" failing. (risk of a false negative.) I suggest that you use 0.10 here -- which is customary. 0.10 means that if no bed bugs are discovered in the monitored sample, you can be 90% confident that the total contaminated locations in the facility is no higher than the maximum you specified in step (2) above.

That completes your part in designing the audit plan. Now TP105 can calculate the audit plan

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Monitor 29 of the 500 locations in the facility.
The 29 locations are 6% of the total.

Decision rule: Inspect 29 locations, take corrective action if any of the locations are found to be infested.

Consumer's Point: RQL = 0.05 at Beta = 0.10
If a facility has 0.05 fraction locations infested (25 locations)
then the probably of not triggering corrective action (false negative) is 0.10
and the probably of correctly triggering corrective action is 0.9

Click on the [Calculate] button.

The sample size displays next to the [Calculate] button. It tells you how many locations to monitor in order to meet the requirements you specified in steps (1), (2), and (3). This example tells you to monitor 29 locations.

The Decision Rule:

The decision rule tells you how to respond to the data you collect.

Depending on the results:**If any location reveals one or more bed bugs:**

The decision rule tells you to decontaminate all locations in the facility. This is called "sampling with rectification".

If the plan does not reveal any bed bugs:

You can be statistically correct to say that you are 90% confident that, for the entire facility, the fraction or number of infected locations is no more than the maximum you specified.

In the example:

You chose to take a $0.10=10\%$ chance of a false negative. A false negative is to not find any bed bugs when in reality 25 items/locations are infected. So if no bed bugs are found, you are 90% confident that bed bugs are in no more than 25 locations. The actual number of affected locations could be zero. The 25 and 10% only reflect a limitation of what you can prove by sampling 29 out of 500 locations.

TIP -- Referring to the example, if you think 29 locations is too many to monitor, and want to lower that number, there are two ways:

- 1) increase the 0.05 maximum fraction infected, or
- 2) increase the 0.10 risk.

You should expect to have to modify your input numbers and recalculate a few times until you reach an acceptable balance.

Summary:

Here you are trying to strike a balance between cost, information, quality, and time. This "audit for bed bugs" option enables you to develop a plan to verify the absence or presence of bed bugs in your facility -- with confidence and without monitoring 100% of the locations.