# ASSA ABLOY ENTRANCE SYSTEMS

AN INTERNSHIP EXPERIENCE SHARED BY ERIC REINECKE

**ASSA ABLOY**

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# WHO IS ASSA ABLOY

- Assa abloy is a company that specializes in everything and anything related to functioning automatic doors.

- They have a wide array of different automatic doors for all sorts of uses, most known for their doors used at popular retail locations such as Walmart, Target, CVS, Rite Aid, and also known for their doors because of the high level of security that they offer.

- They are responsible for repairing, installing, and conducting planned maintenance for their doors at many locations, again most notably the retail locations described above.

- Assa Abloy is widely considered to be the #2 company specializing in automatic doors in all of the United States.

# MY RESPONSIBILITIES

- Major goal: Using proven statistical methods and procedures, create a better inventory list so that the first time fix rate would be as high as 90%, assuming a 3-day period for parts orders to re-stock inventory.

- Initially given an excel document of data that was about 800,000 line entries long, including variables such as item description, quantity used, service order, customer name, installation description, etc.

- First few weeks consisted of cleaning the data of unnecessary things; considering I wanted to look at parts only, entries such as "planned maintenance" and "work hours/overtime hours" were unnecessary.

- Final document that I worked with consisted of only about a little over 200,000 line entries.

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It's somewhat difficult to see but this is the example of part of the document I had to work with, of what I had to delete from the data (as working, hours for calls is of course not a part used to repair a door and thus not of interest to me).

The main column of interest really was the quantity column of course as I was trying to use this to figure out the best inventory set up to improve the first time fix rate.

| Part Description | 148486 | Invoice Count | 3 Day Avg | Standard Deviation | Means | Significance | Ndistribution Values | Inventory Count |
|---|---|---|---|---|---|---|---|---|
| Bottom | 6676 | 5.362248996 | 17 | 1.584087732 | 2.126123427 | 0.8 | 3.459325299 | 59 |
| T-Block | 5451 | 4.378313253 | 14 | 1.562946133 | 2.4270776 | 0.95 | 4.997895216 | 70 |
| Gearbox | 4737 | 3.804819277 | 12 | 0.254535572 | 1.056575892 | 0.95 | 1.475249651 | 18 |
| Spacer,F | 4605 | 3.698795181 | 12 | 1.384844054 | 2.257980456 | 0.95 | 4.535846221 | 55 |
| Weather | 3930 | 3.156626506 | 10 | 52.55980692 | 47.71335878 | 0.95 | 134.1665478 | 1342 |
| Sensr,W | 3297 | 2.648192771 | 8 | 0.661011969 | 1.325750682 | 0.95 | 2.413018616 | 20 |
| Kit,Botto | 3286 | 2.63935743 | 8 | 0.902447039 | 1.299452222 | 0.95 | 2.783845507 | 23 |
| SC53-M | 3170 | 2.546184739 | 8 | 0.810082185 | 1.407886435 | 0.95 | 2.740353055 | 22 |
| Decal,Ca | 2527 | 2.029718876 | 7 | 4.346646953 | 4.177285319 | 0.95 | 11.32688332 | 80 |
| Sensor, | 1948 | 1.564658635 | 5 | 0.589687242 | 1.318788501 | 0.95 | 2.288737699 | 12 |
| SC53-M | 1898 | 1.524497992 | 5 | 0.704177631 | 1.358798736 | 0.95 | 2.517067867 | 13 |
| Sensr, W | 1861 | 1.494779116 | 5 | 0.634238131 | 1.321869962 | 0.95 | 2.365098852 | 12 |
| Extr,Plas | 1791 | 1.438554217 | 5 | 12.49606857 | 15.65092127 | 0.95 | 36.20512498 | 182 |
| Roller, h | 1750 | 1.40562249 | 5 | 2.331199686 | 3.221857143 | 0.95 | 7.056339401 | 36 |
| Control, | 1673 | 1.3437751 | 5 | 0.192963887 | 1.032277346 | 0.95 | 1.349674696 | 7 |
| Shaft,Lo | 1464 | 1.175903614 | 4 | 1.75478382 | 2.245218579 | 0.95 | 5.13158111 | 21 |

This is a draft of the final result that I gave to Mr. Cassiliano. The part description lists every part (it is a list of about 3,000 different parts) and the number in the column next to that is the amount of times that it was used in a repair, with 148,486 repairs taking place in the course of the 4-6 years of collected data.

"Invoice Count" is the average amount of repairs that the part was used in on any given day and 3 day average is that number multiplied by 3. Then I calculated the sample standard deviation and mean for each part and used excel to calculate the required amount per repair in the "Ndistribution values" column, which then computed the suggested amount of inventory for each item for a 3-day period.

# THE CHALLENGES

- The biggest challenge with this internship was the lack of excel knowledge. Mr. Cassiliano was extremely proficient with excel compared to myself and as a result it was hard to keep up with the demands. Very often he would do something in mere minutes that might have taken me an hour or longer, just because I was not fast with keyboard shortcuts or even knew that they existed.

- Another big challenge was the fact that my computer had trouble loading and performing actions that I wanted it to in the excel document, leaving me waiting for my computer to do the work.

- The final challenge was trying to think logically of the best process to improve the first time fix rate, as initially the way that the problem was worded made it seem like it was an impossibility at first.

# HOW DID MY CLASSES HELP ME?

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- After all was said and done, the main class that helped me the most was regular statistics. It was the main tool that allowed me to give the final numbers to Mr. Cassiliano, and really wasn't that difficult to do.

- Survey and sampling design would have been a helpful class as well, as there were unanswered questions near the end that this class would have helped me with, but I had not taken that class yet.

- One of the main objectives that would have helped me from survey and sampling design was the idea of stratified sampling, as Mr. Cassiliano was very interested in breaking down smaller categories of the country to make the list more accurate.

# SO, WHAT DID I LEARN?

- Don't be afraid of referencing old textbooks, internet sources (of course, make sure that they are credible first), or even fellow/old students. A lot of what I used I actually really didn't 100% remember.

- At first, I felt bad that I didn't remember how to use everything I had learned from statistics, but I learned that feeling bad for wanting to get the results definitively correct by checking myself was actually probably a good practice and not bad whatsoever.

- Try not to get too scared out of what you're supposed to be doing by your supervisors. Mr. Cassiliano told me that what I was doing was extremely important and that getting it wrong would be detrimental, and to be honest, I think it made me far too careful in everything I did, making everything take so much more time than it should have.

# FURTHER CONSIDERATIONS

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- Using stratified sampling to further improve the estimates by reducing variances; throughout regions (area, zip code, county, state), by company (i.e. Walmart, Target, Rite Aid, CVS all might use different automatic doors), by season (different parts might break more often in Winter than Summer). Cluster sampling may also be effective for some of these considerations.

- Is the data normal? I.e., is the distribution of amount of parts used on a given repair normally distributed, or should we be looking at nonparametric statistical methods?

- How do we account for misbilled parts? Is the data collected here reliably accurate or should we be looking over it for errors (I had no where near enough experience with what most of the data meant to do this myself)

- Should also consider the parts that are fractional and are not (for example, they use an adhesive tape that is listed in inventory by feet for repairs, whereas other parts are whole parts and thus fractional parts of those doesn't make intuitive sense)

- Can we make a list with all of these considerations so accurate a team of programmers can write a program to automatically order enough parts for a given time period?

# Any questions?



Normal Distribution

Paranormal Distribution