Ctag – Sample and Data Tracking System for Concrete

Tyler Ley, Qinang Hu, Jake LeFlore, Austin Ross, Zane Lloyd

Why I do what I do

I believe concrete is the best material in the world.

I want to making it easier to construct, more durable, lower cost, and more sustainable.

I build people and tools to make the concrete industry better.

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Overview

Field problem

The Journey

The Future!

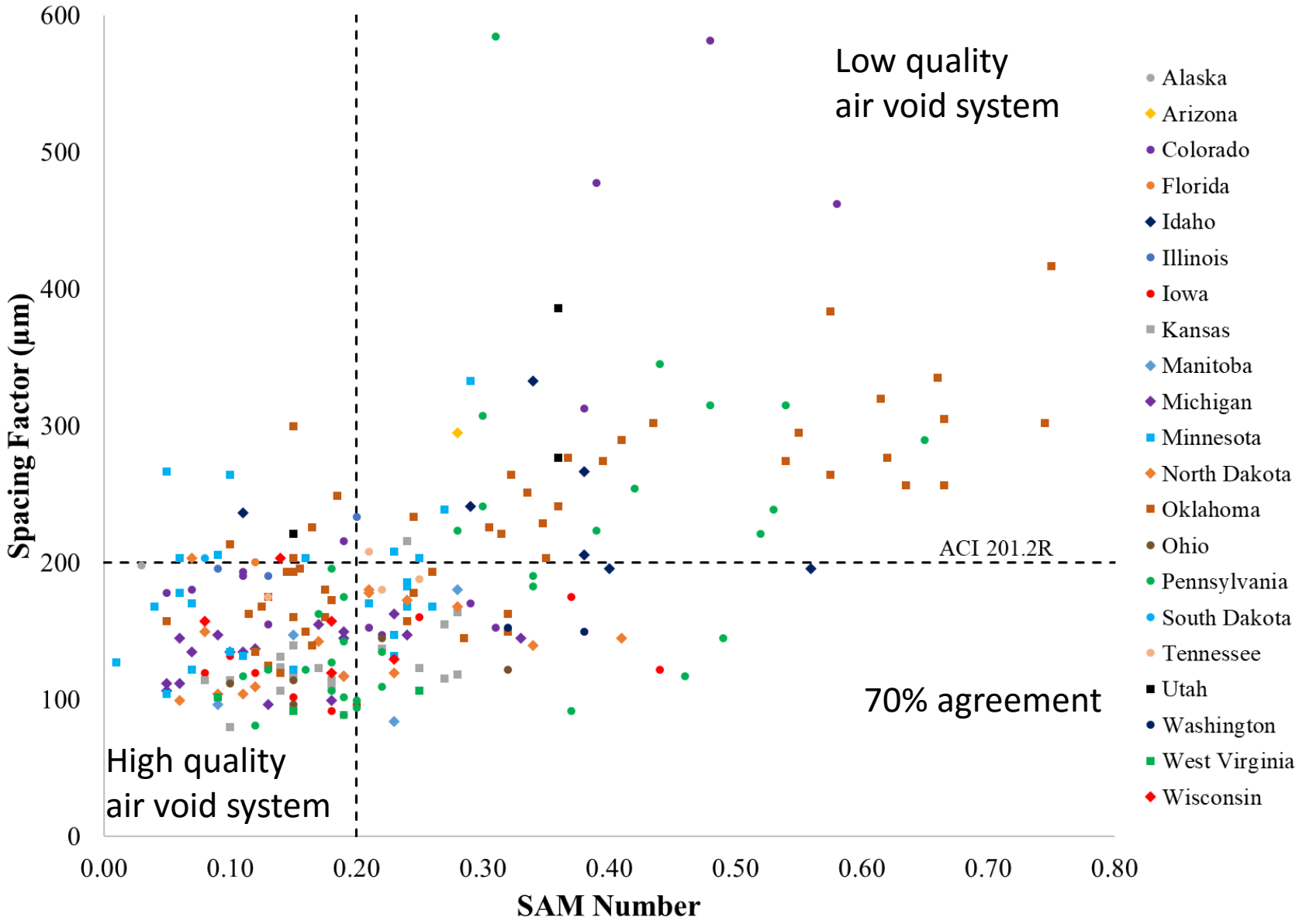
Ask

SAM field study (2016-2017)

231 samples from 110 different projects

21 different states

231 field mixes



Thank you!!!

- Alaska
- Arizona
- Colorado
- Florida
- Idaho
- Illinois
- Iowa
- Kansas
- Manitoba
- Michigan
- Minnesota
- North Dakota
- Oklahoma
- Ohio
- Pennsylvania
- South Dakota
- Tennessee
- Utah
- Washington
- West Virginia
- Wisconsin
- FHWA Mobile Lab

SAM field study (2016-2017)

325 samples were sent

231 samples were samples

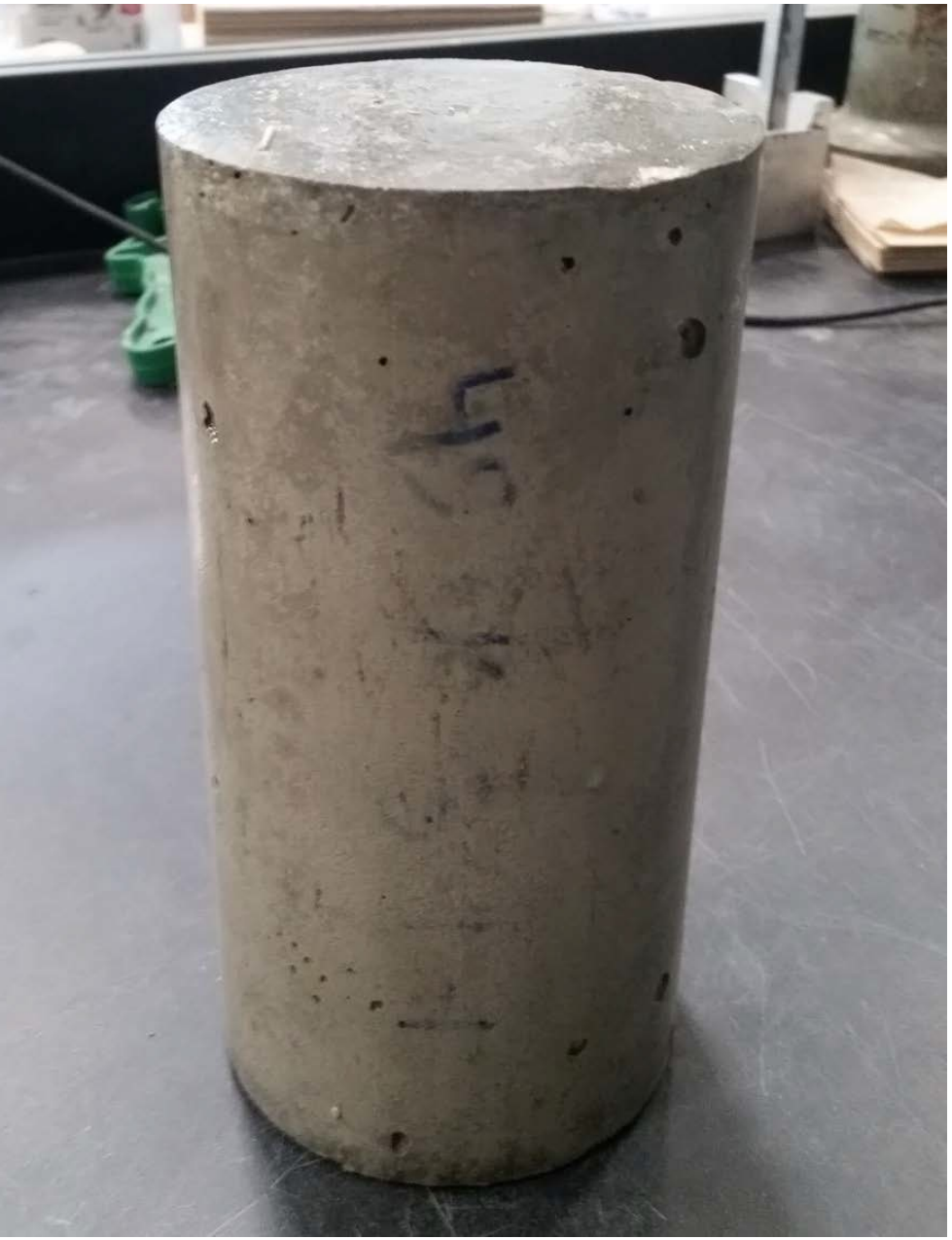
SAM field study (2016-2017)

325 samples were sent

231 samples were samples

94 samples were poorly labeled or could not link sample to field data

30% of total!



There has to be a better way!!!

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There has to be a better way!!!

What are the benefits?

Reduce paperwork

Increase productivity

Maintain inventory

Track chain of custody

Decrease human errors

What are the benefits?

An acceptable data entry rate is 1%.

An acceptable bar code entry rate is 0.01%.

What are the benefits?

> 5 billion bar codes used every day!!!!!

Bar codes used to travel to NCC

Drivers license x 4

Plane ticket x 3

Checked Luggage

Air port food x 3

Rental car

12 total bar code uses!

How do we get barcodes on concrete?

We need to label both the specimen and the mold

What if we could label the fresh concrete as it is being made and disturb it.

The label must be durable and inexpensive.

There has to be a better way!!!

The Concrete Tag or **CTag**

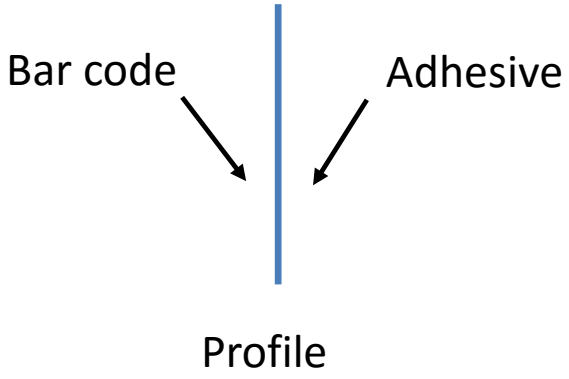
Tag 1

Tag 2

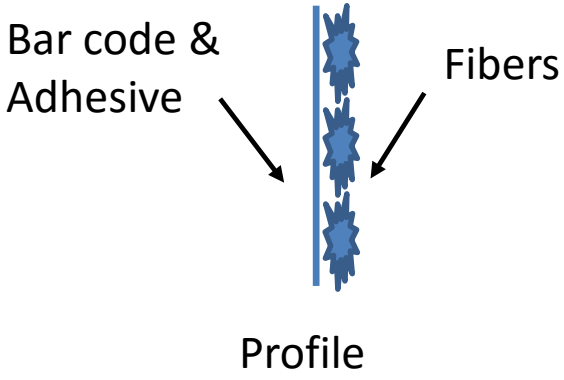
The barcodes on Tag 1 and 2 match!!!

The Concrete Tag or **CTag**

Tag 1



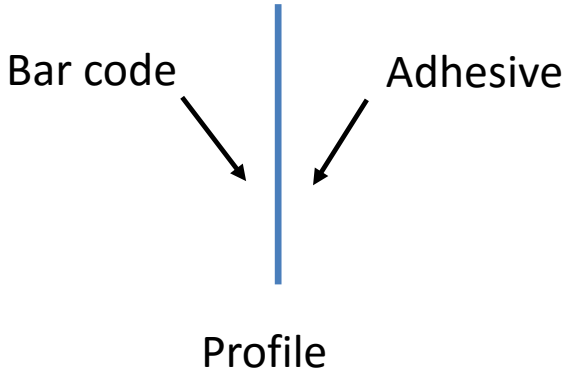
Tag 2



The barcodes on Tag 1 and 2 match!!!

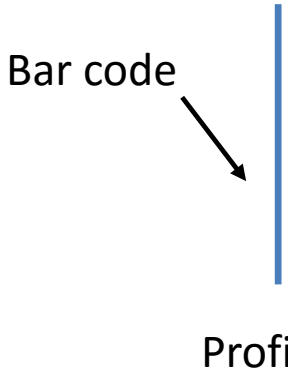
The Concrete Tag or **CTag**

Tag 1



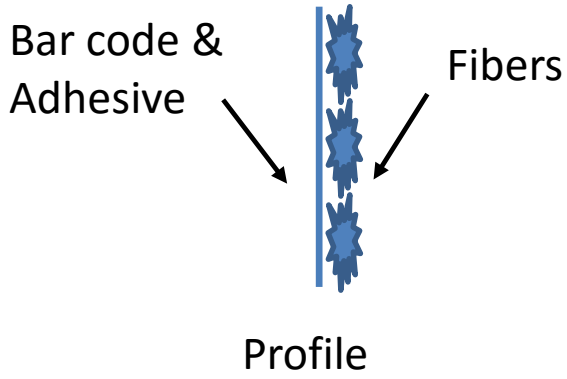
The Concrete Tag or **CTag**

Tag 1



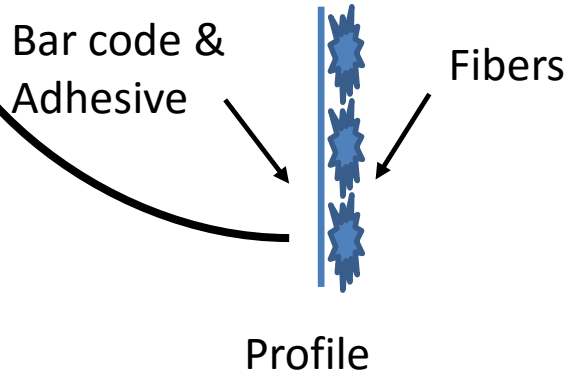
The Concrete Tag or **CTag**

Tag 2



The Concrete Tag or **CTag**

Tag 2



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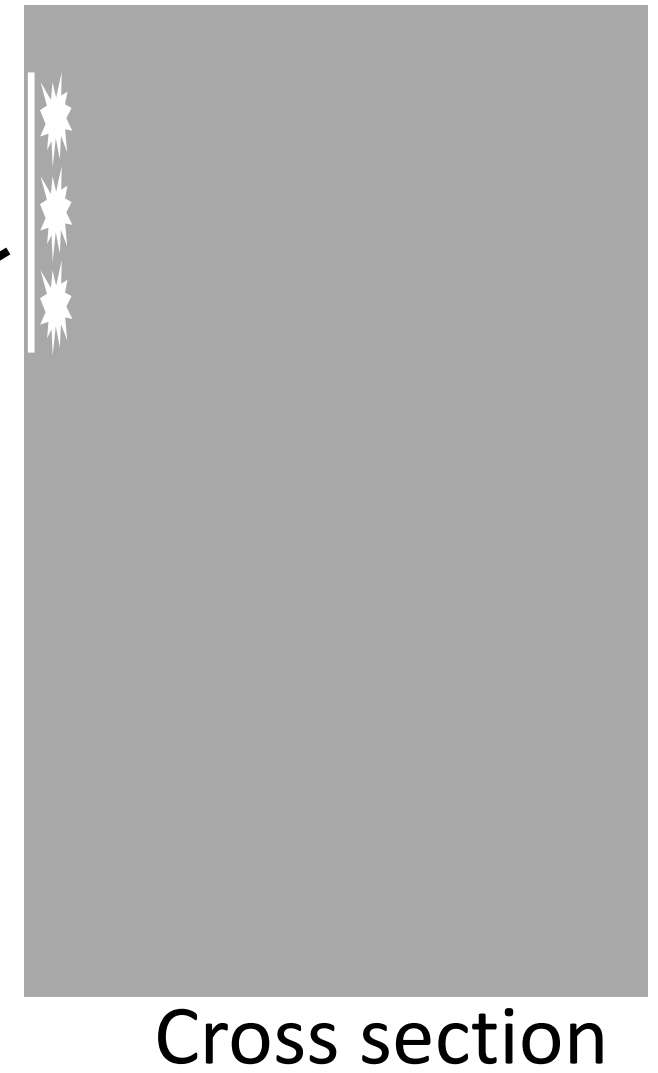
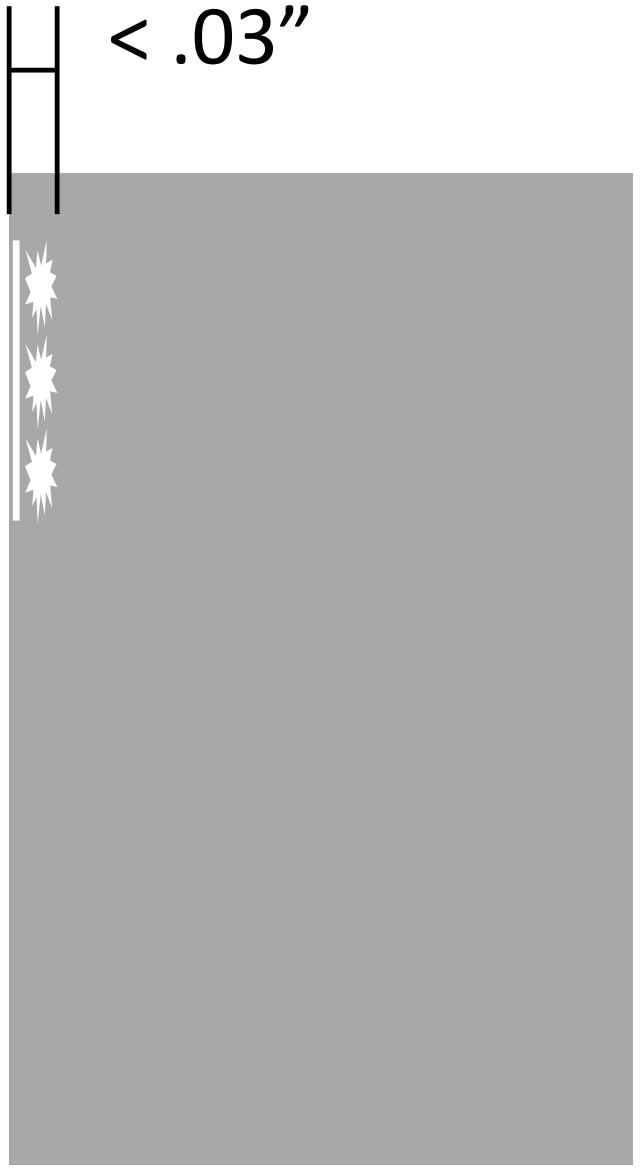


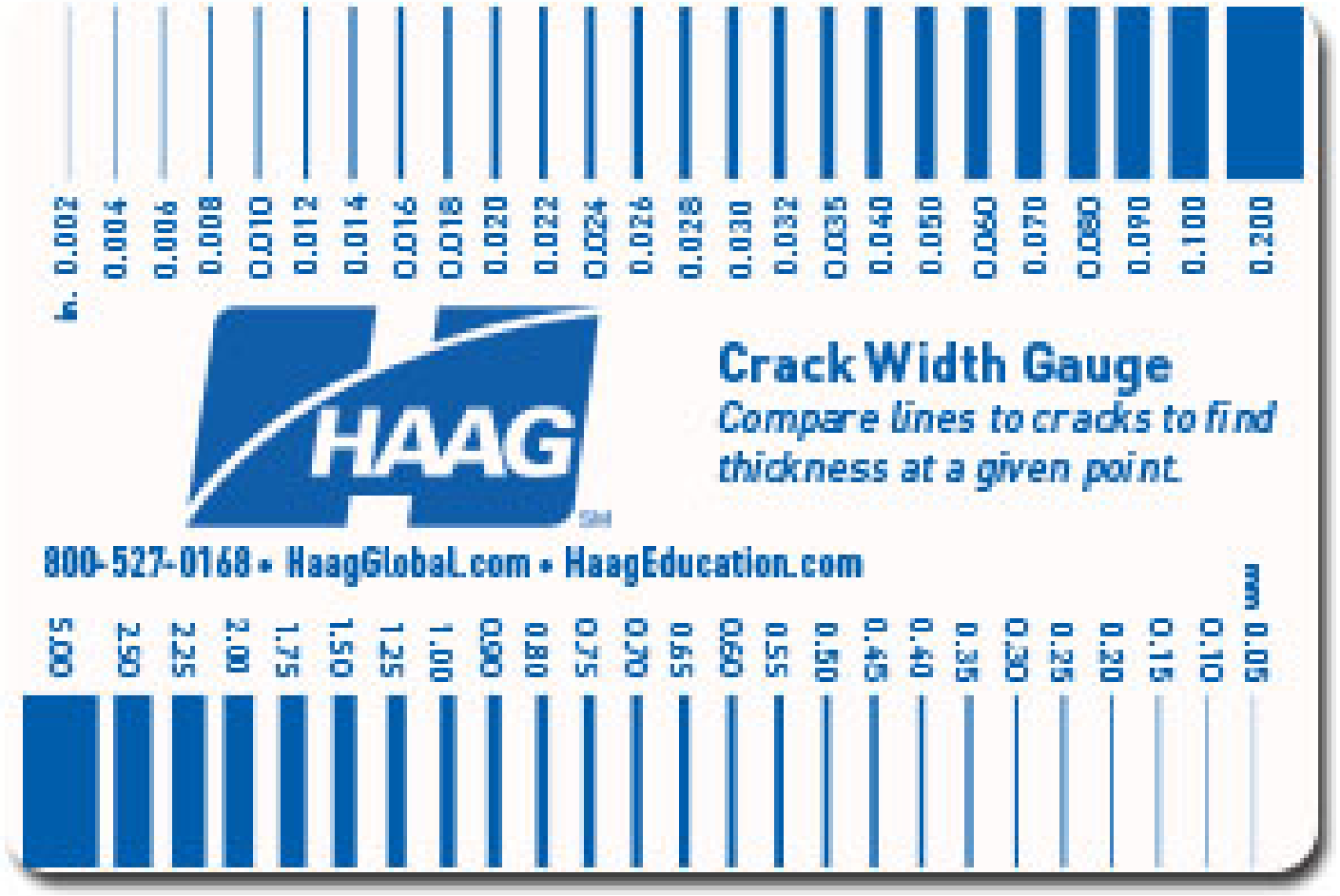
Cross section

The Concrete Tag or **CTag**

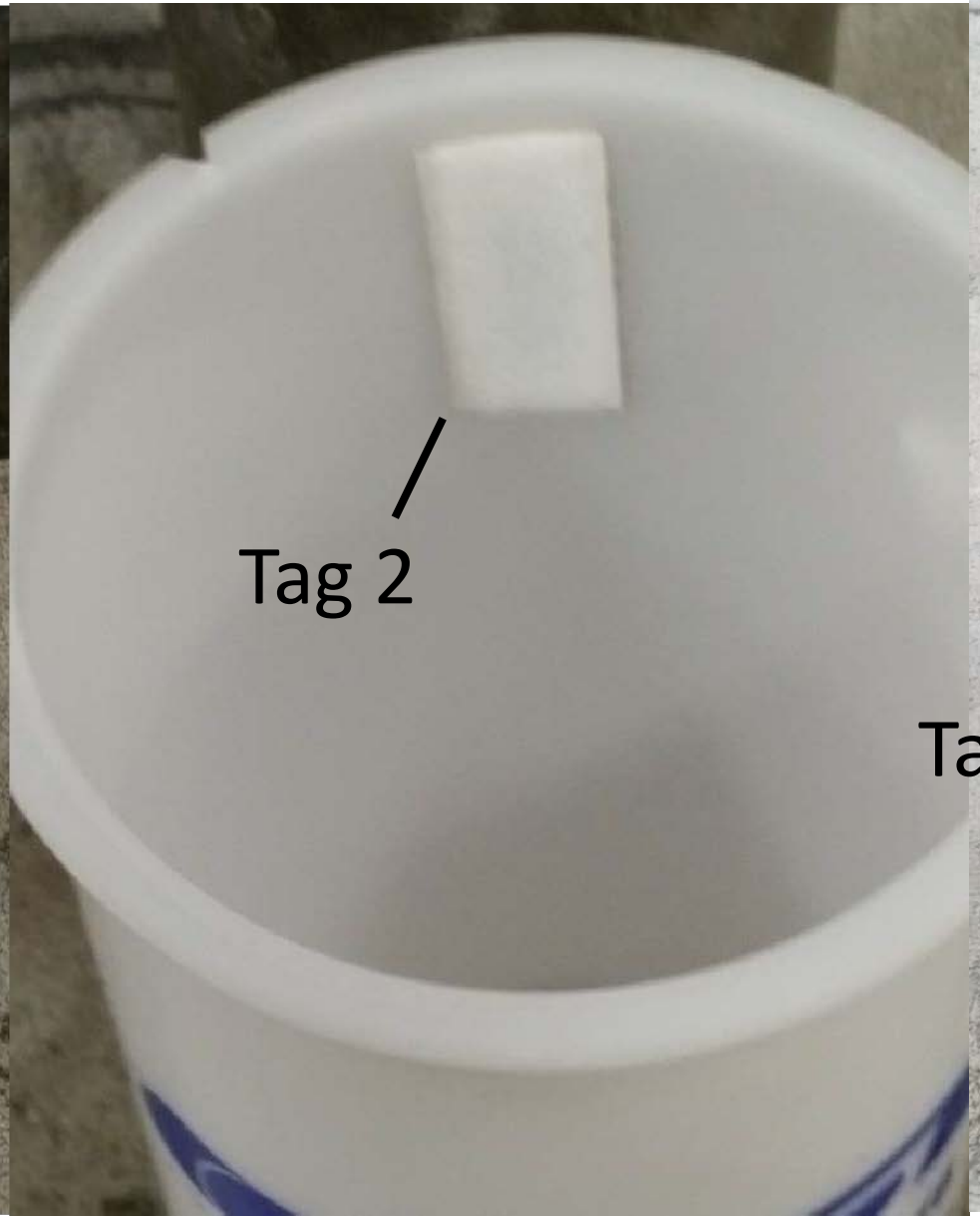


Cross section

Width of Tag 2



Summary



Summary

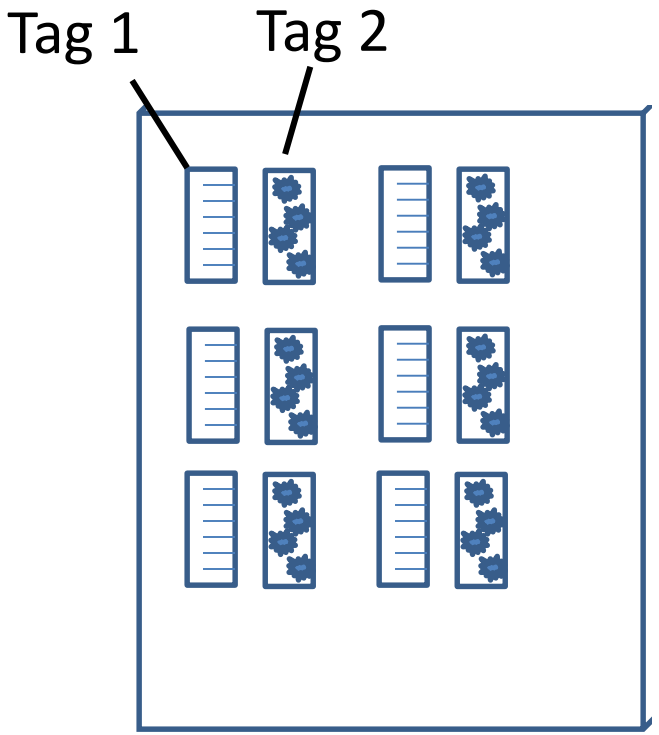
The Ctag is a label that can be used on the inside and outside of the cylinder

The Ctag bonds to the surface of the concrete and allows for easy labeling of the concrete

How do we make them?

How do we make them?

We made the first versions by hand and distributed them in sheets.

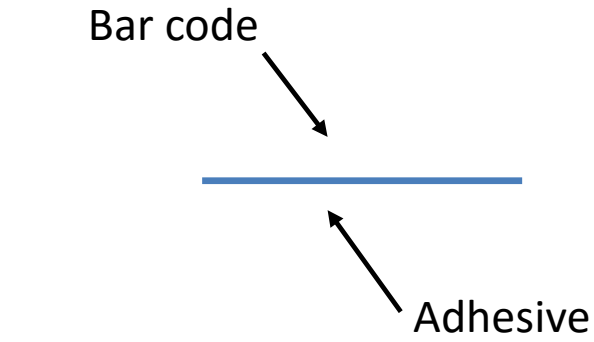


How do we make them?

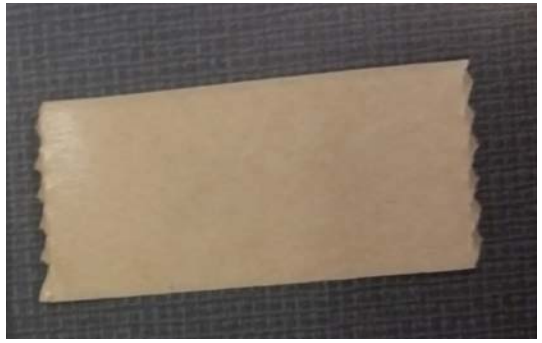
This was a pain and so we started to make them in rolls.

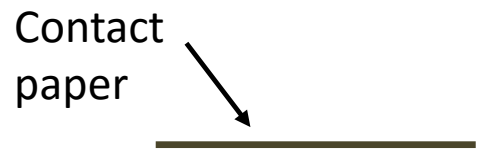
To do this we made our own machine!!!

Tag 1

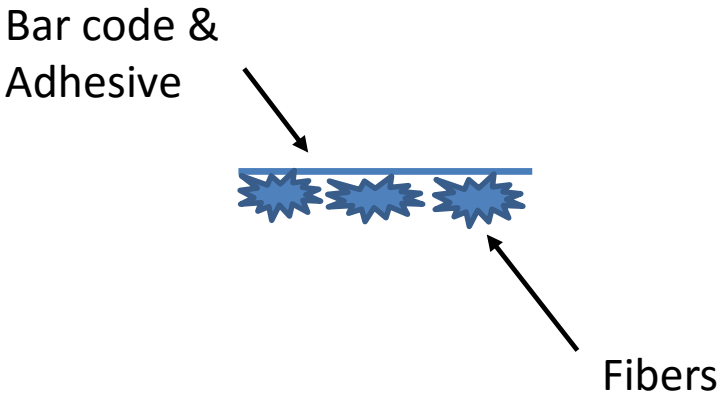


Contact Paper



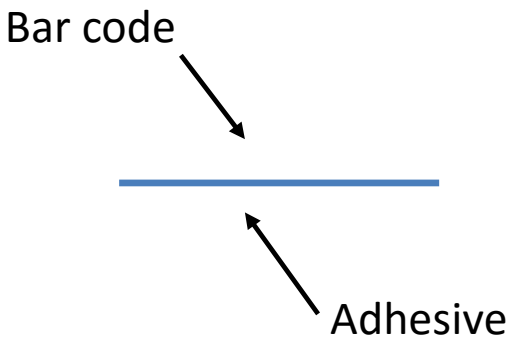


Tag 2

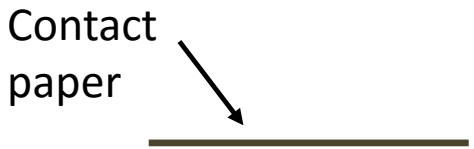


Profile

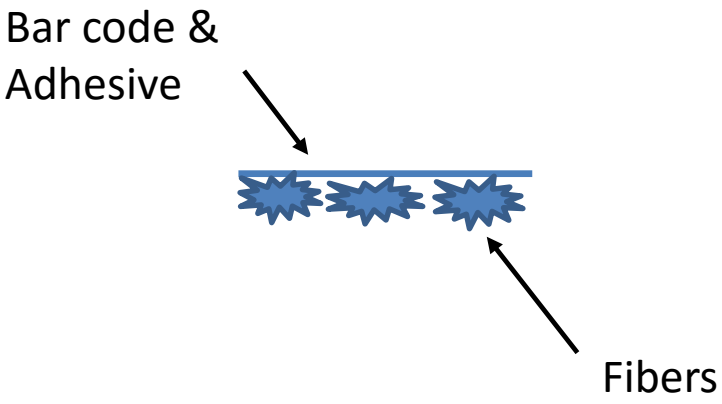
Tag 1



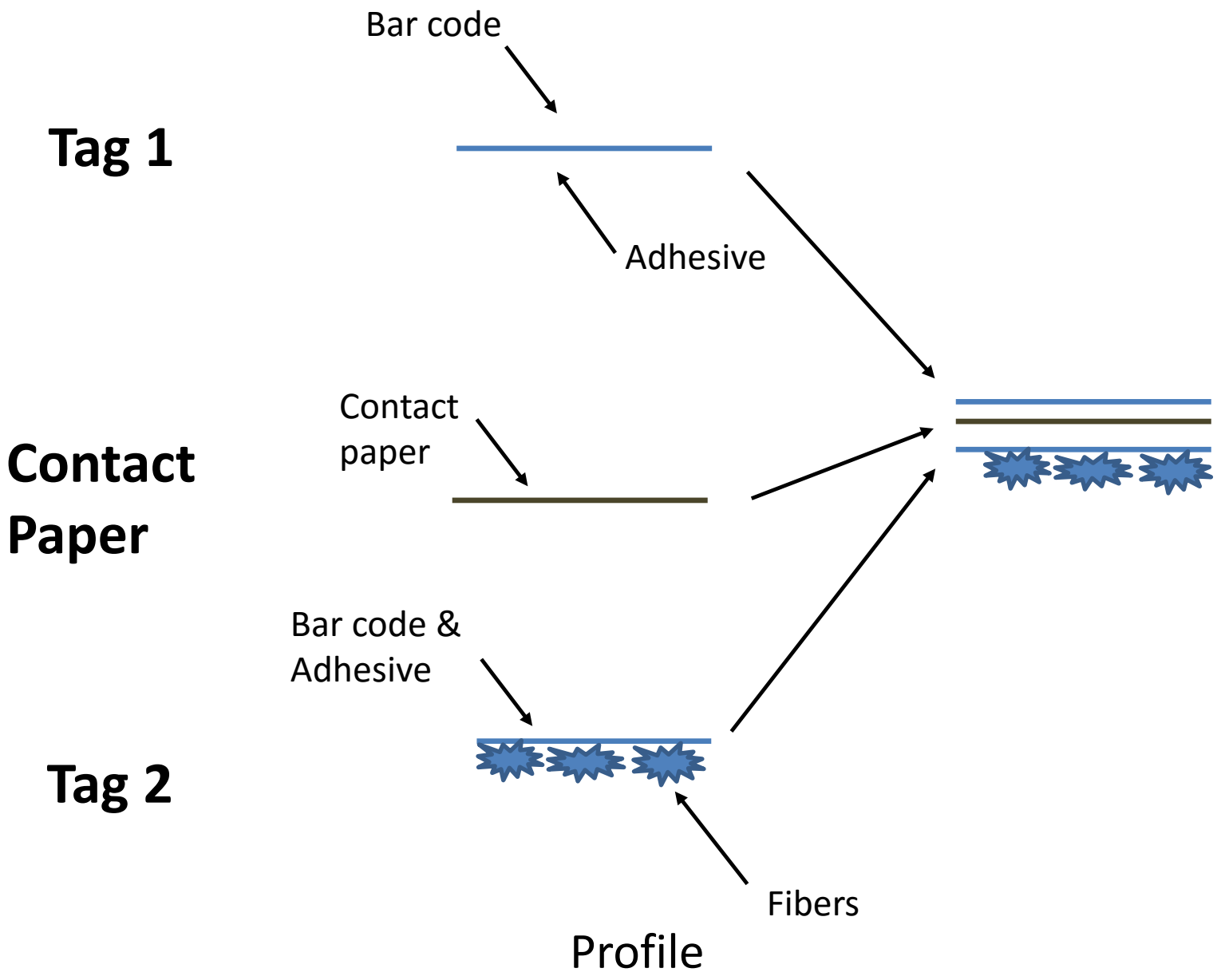
Contact Paper

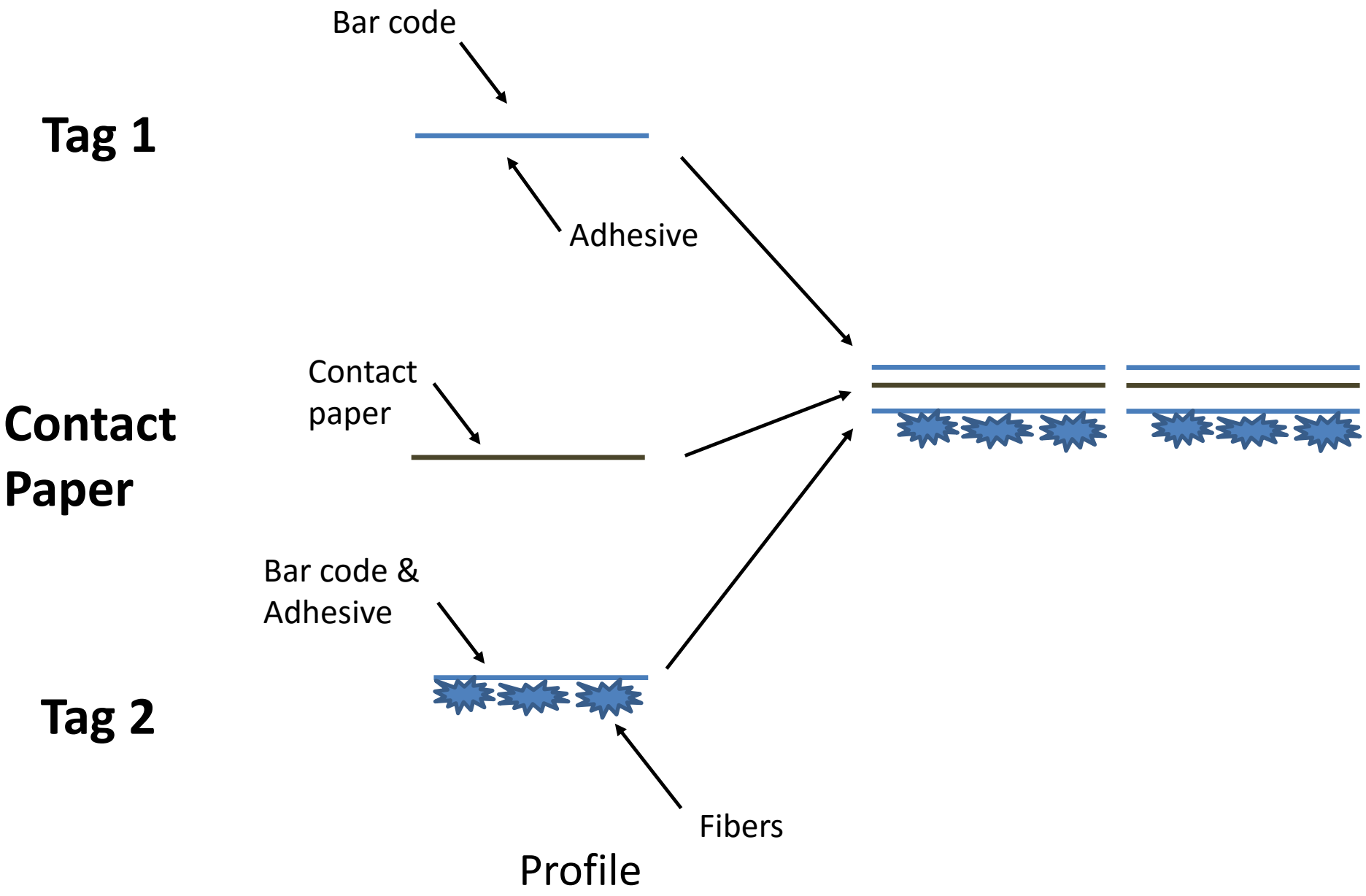


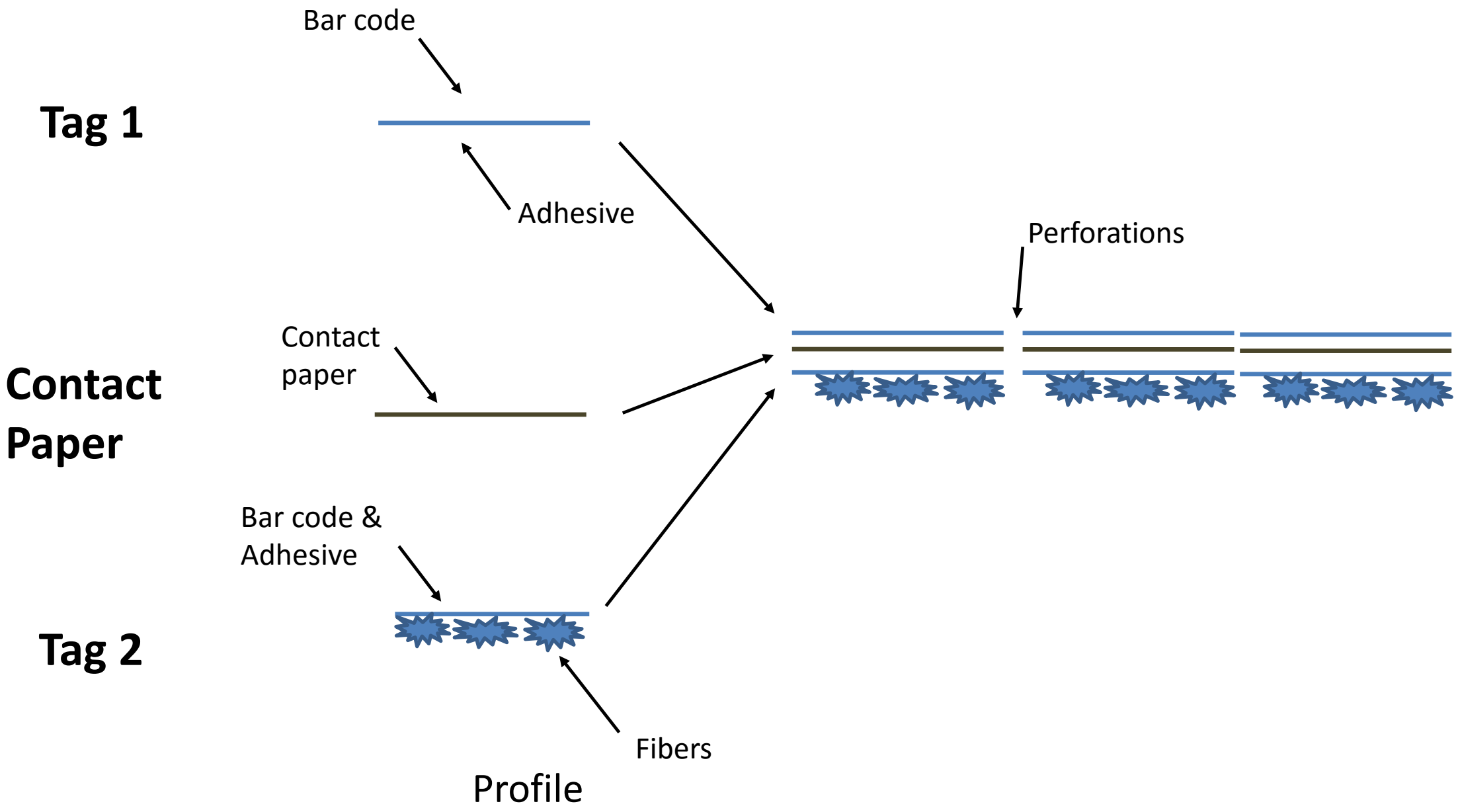
Tag 2



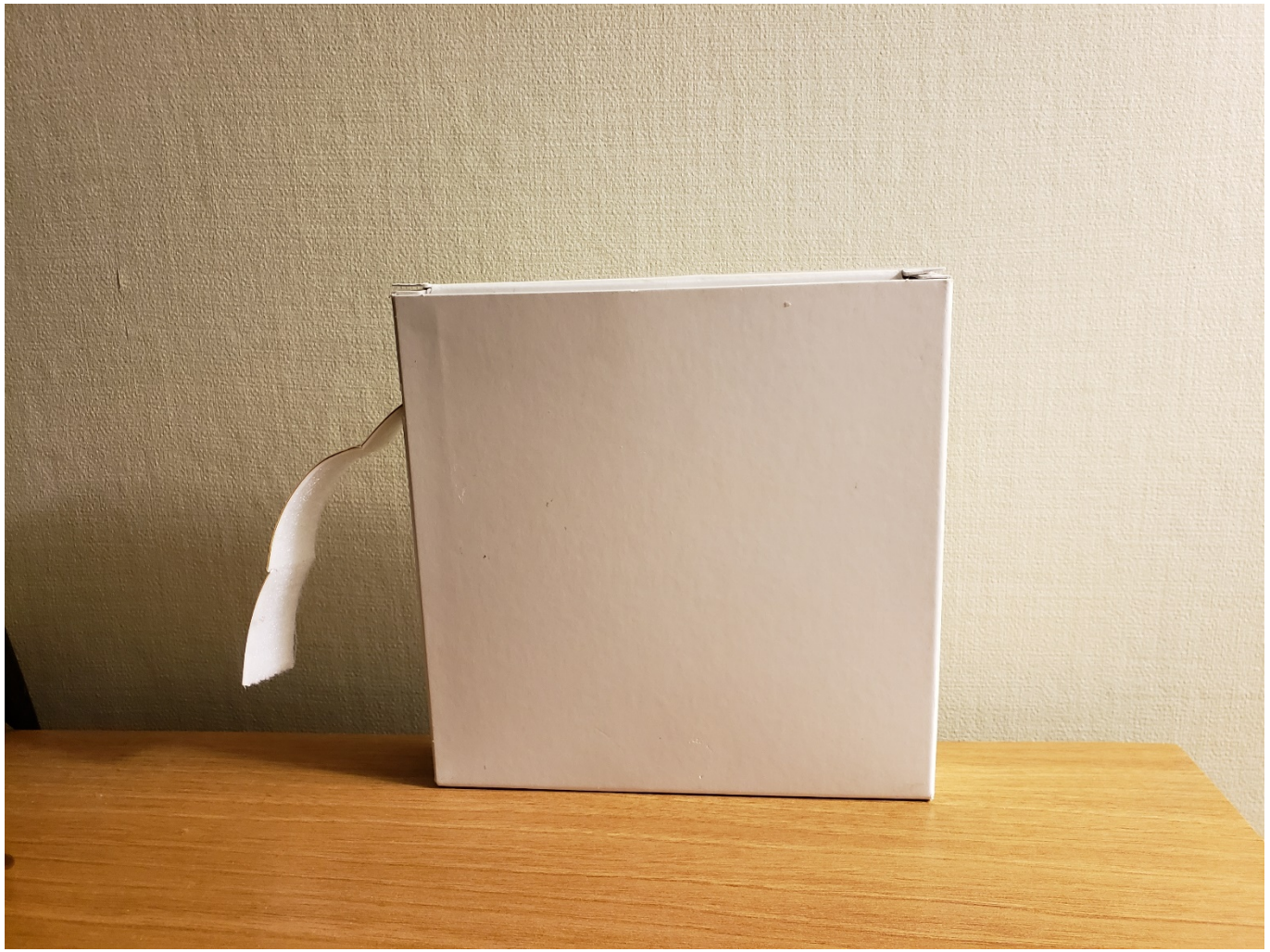
Profile


Tag 1
Bar code
Adhesive
Contact Paper
Contact paper
Bar code & Adhesive
Tag 2
Fibers
Profile


Tag 1
Bar code
Adhesive
Contact Paper
Contact paper
Bar code & Adhesive
Tag 2
Fibers
Profile


Tag 1
Bar code
Adhesive
Contact Paper
Contact paper
Perforations
Tag 2
Bar code & Adhesive
Fibers
Profile

How do we make them?



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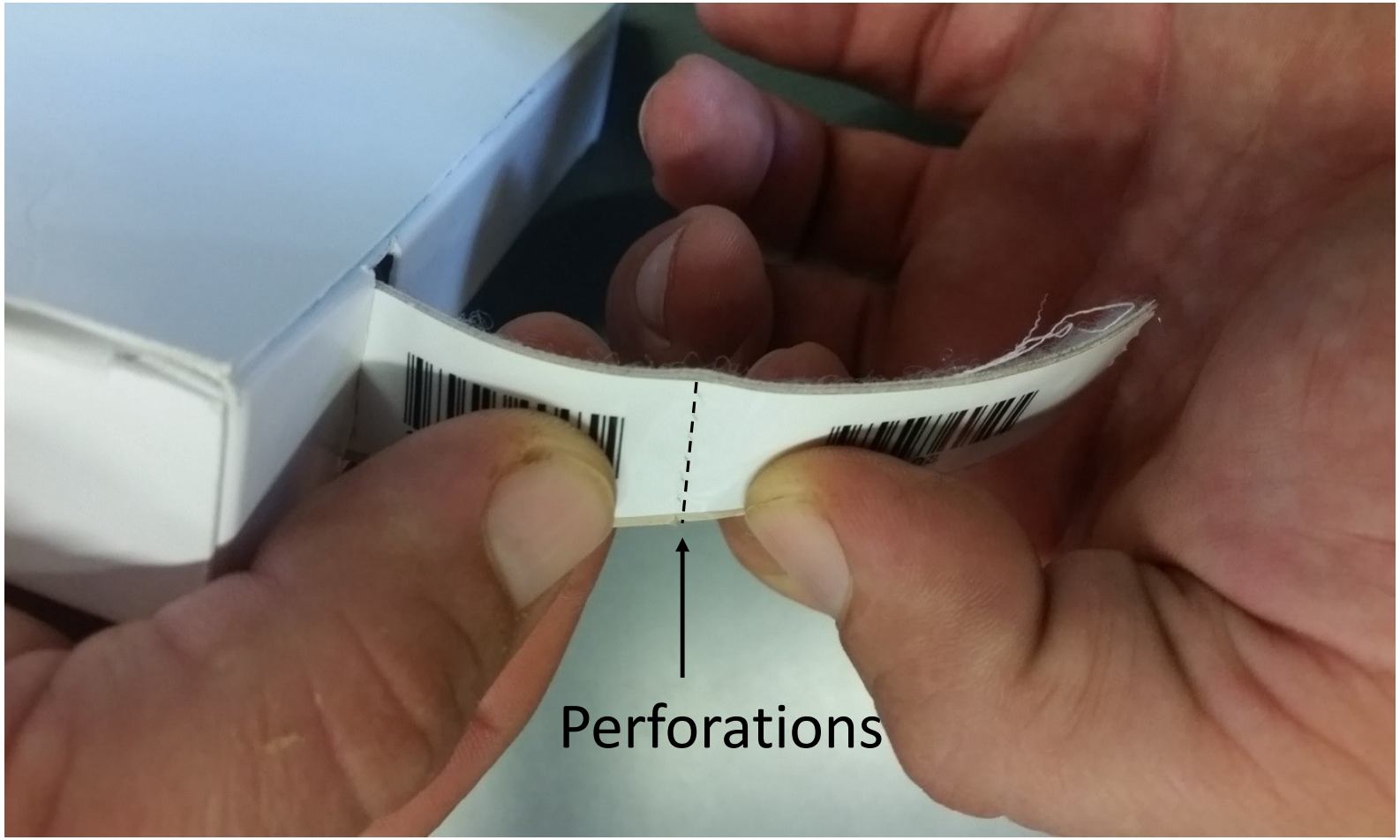
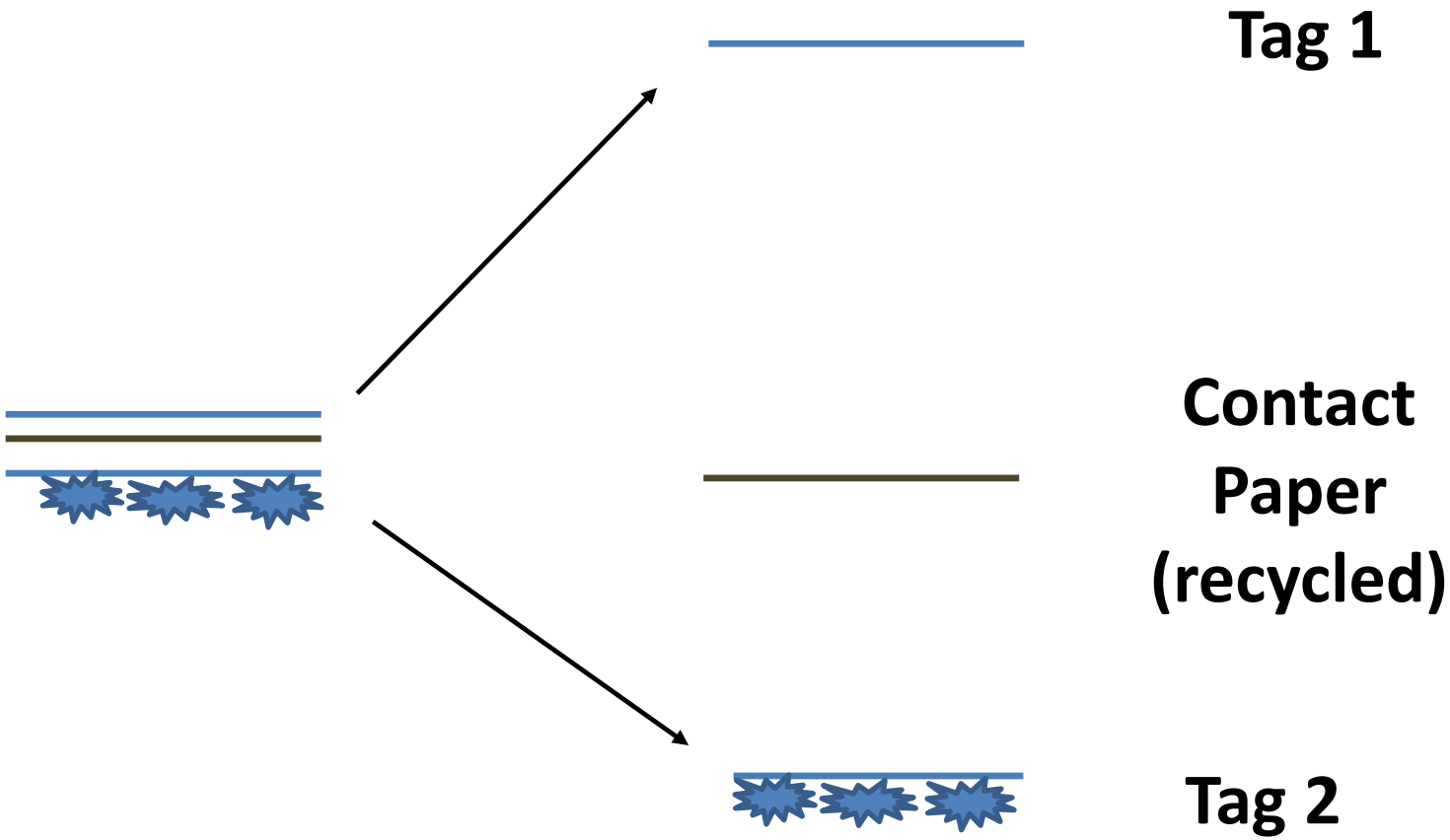


How do you get them apart?

How do you get them apart?



Profile

Summary

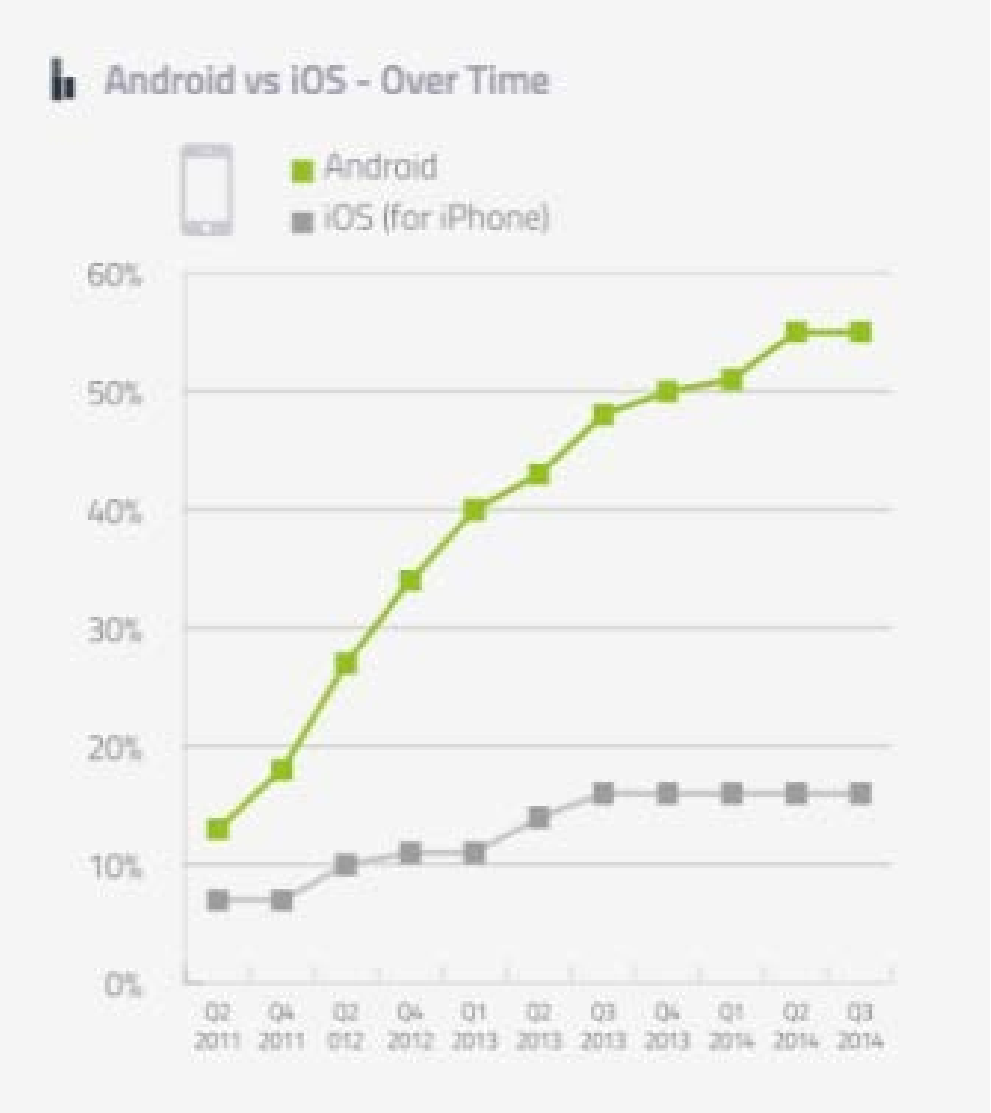
A machine was made to produce perforate, and place them in a roll.

They come in boxes of 100!

How do you read them?

How do you read them?

How do you read them?



Android

Apple

How do you read them?

We started using existing apps for inventory management.

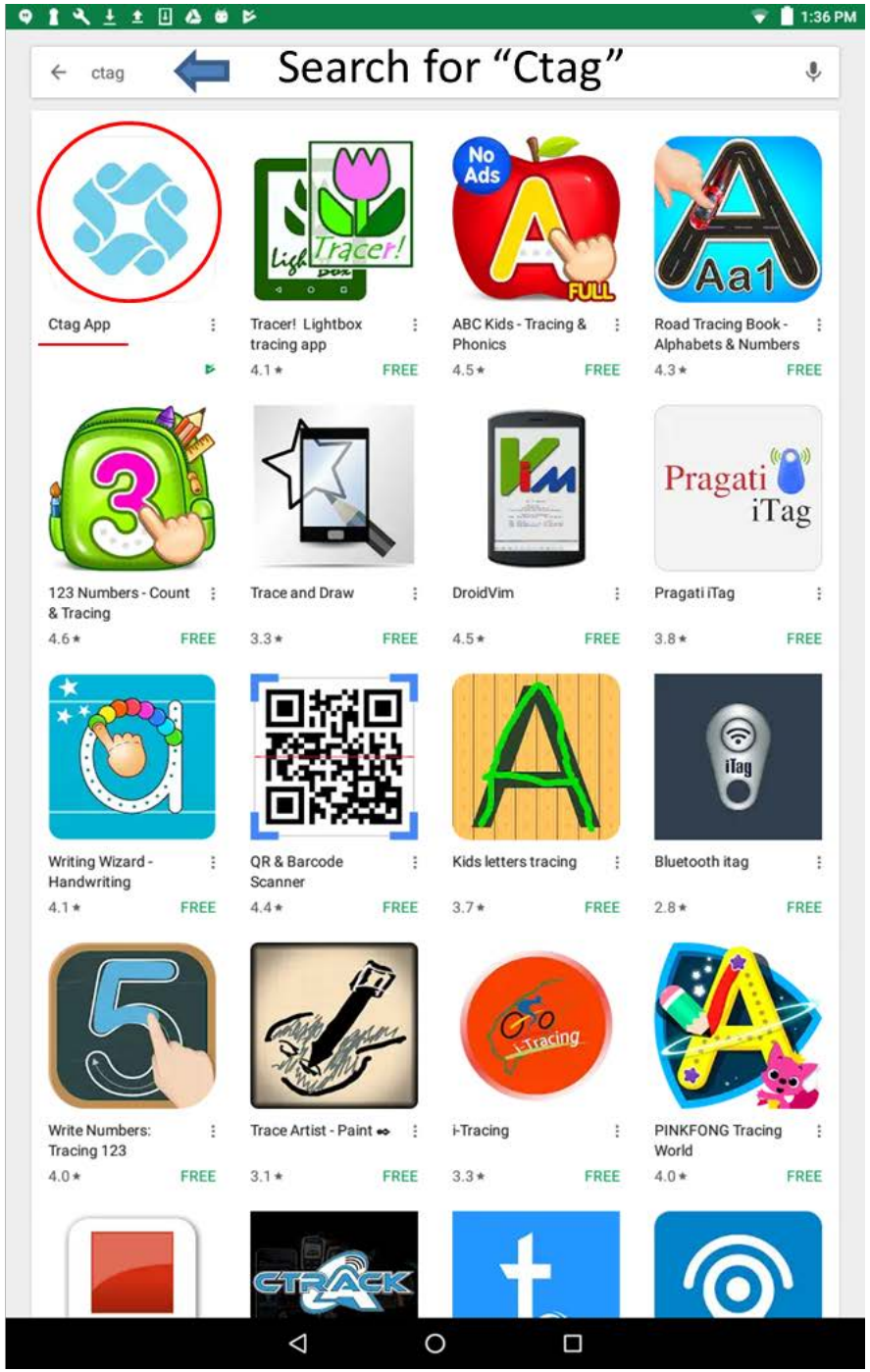
They were not very flexible and costly.

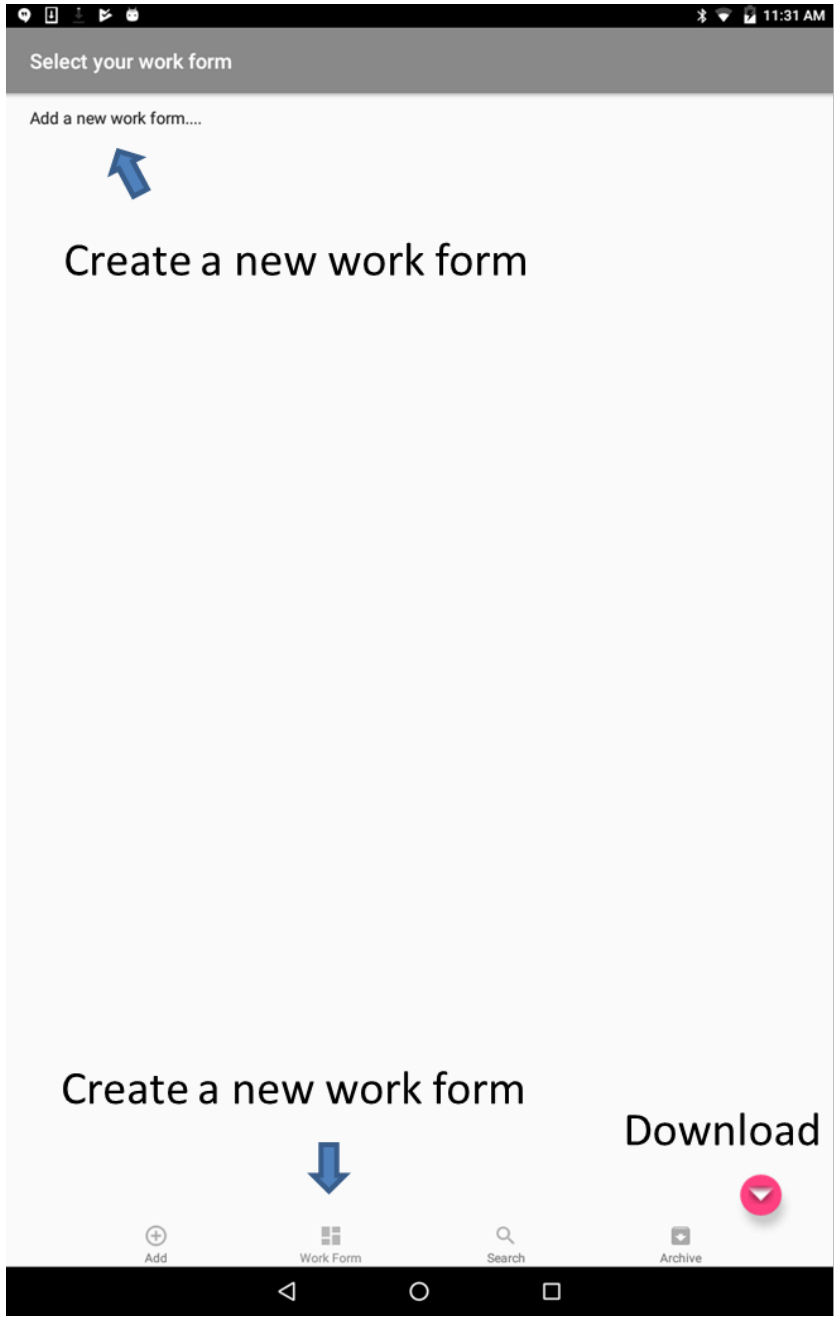
So, they made their own.

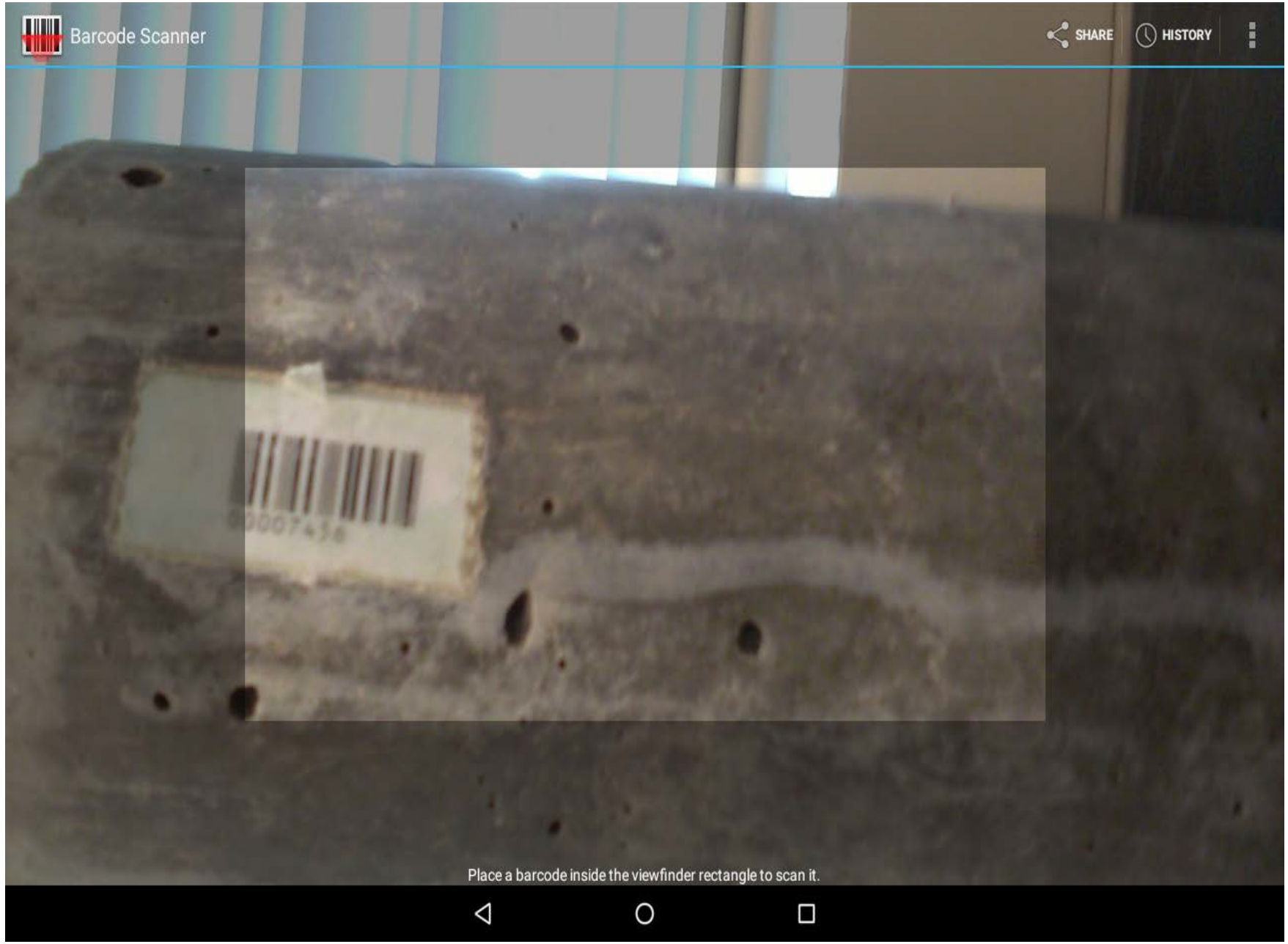
How do you read them?

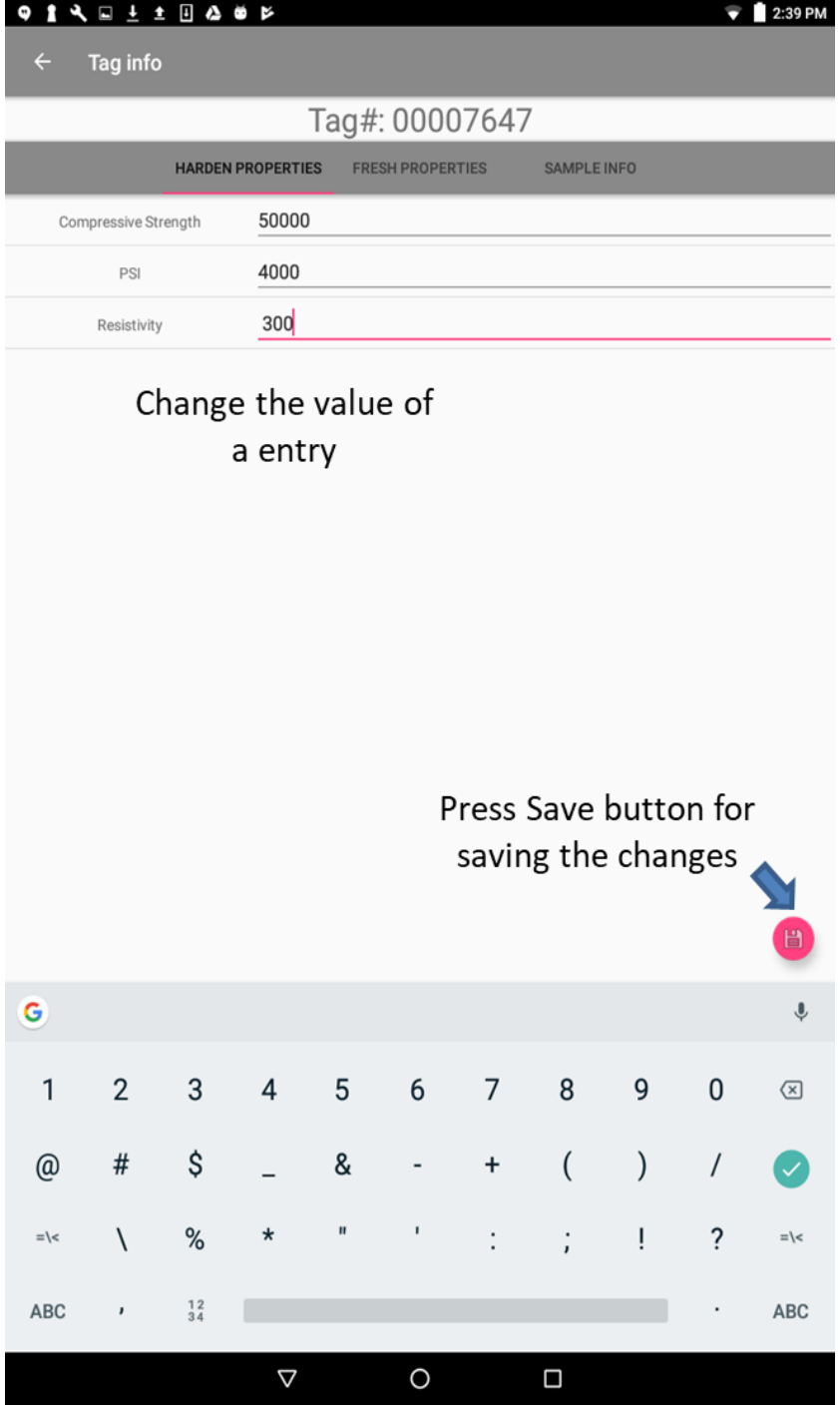
Search Ctag on the Google Play Store

1:50 PM
Google
1:50
PM
SUN, FEBRUARY 11
SearchData
Hu_datasheets
Google
Lenovo
26
Calendar
Downloads
Gmail
Settings
Google Play

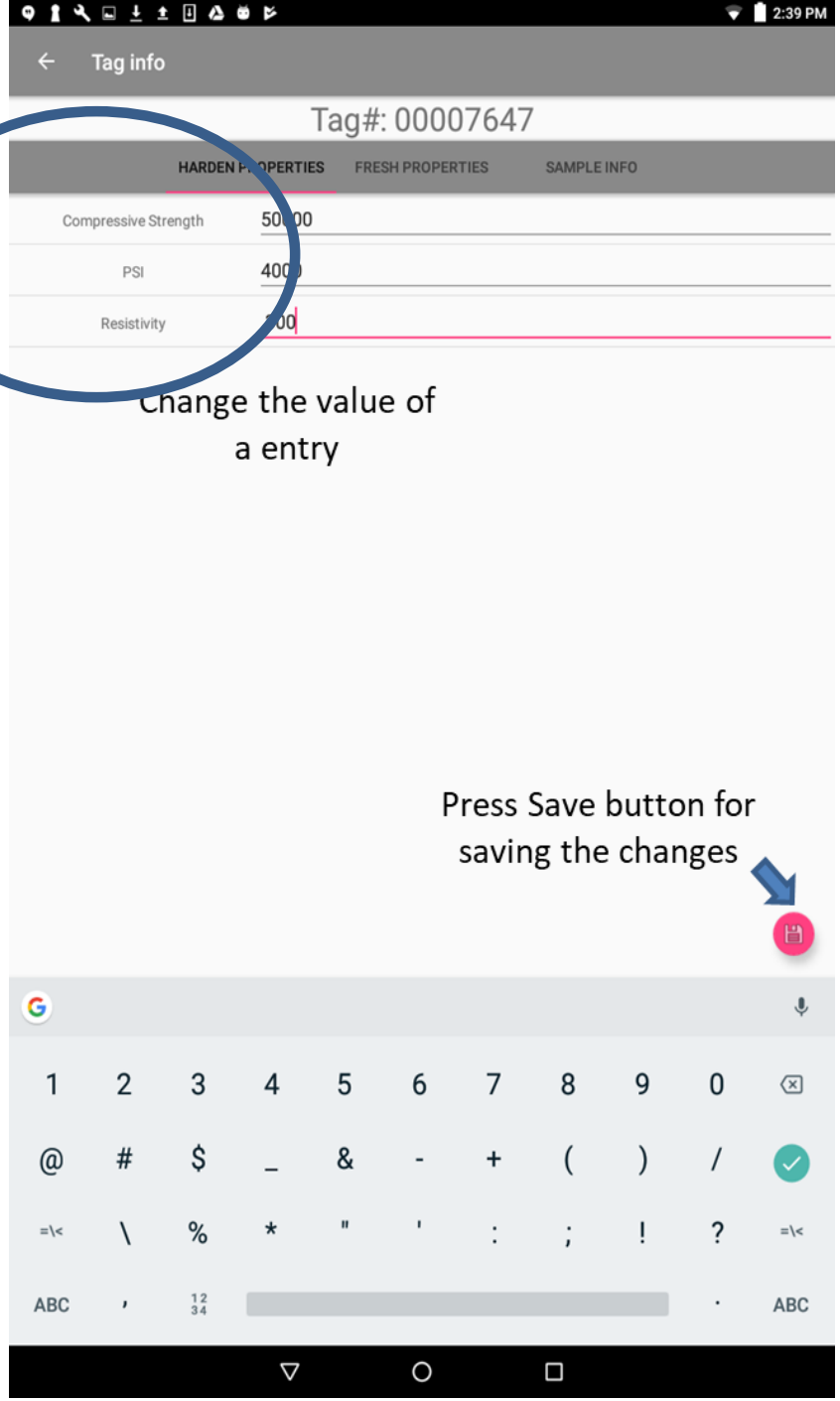

1:36 PM
ctag
Search for “Ctag”
Ctag App
Tracer! Lightbox tracing app
4.1★ FREE
ABC Kids - Tracing & Phonics
4.5★ FREE
Road Tracing Book - Alphabets & Numbers
4.3★ FREE
123 Numbers - Count & Tracing
4.6★ FREE
Trace and Draw
3.3★ FREE
DroidVim
4.5★ FREE
Pragati iTag
3.8★ FREE
Writing Wizard - Handwriting
4.1★ FREE
QR & Barcode Scanner
4.4★ FREE
Kids letters tracing
3.7★ FREE
Bluetooth itag
2.8★ FREE
Write Numbers: Tracing 123
4.0★ FREE
Trace Artist - Paint
3.1★ FREE
i-Tracing
3.3★ FREE
PINKFONG Tracing World
4.0★ FREE


11:31 AM
Select your work form
Add a new work form....
Create a new work form
Create a new work form
Download
Add
Work Form
Search
Archive


Barcode Scanner
SHARE
HISTORY
Place a barcode inside the viewfinder rectangle to scan it.


2:39 PM
Tag info
Tag#: 00007647
HARDEN PROPERTIES
FRESH PROPERTIES
SAMPLE INFO
Compressive Strength
50000
PSI
4000
Resistivity
300
Change the value of a entry
Press Save button for saving the changes
1 2 3 4 5 6 7 8 9 0
@ # $ _ & - + ( ) /
=\< \ % * " ' : ; ! ? =\<
ABC , . ABC

Can I change these???

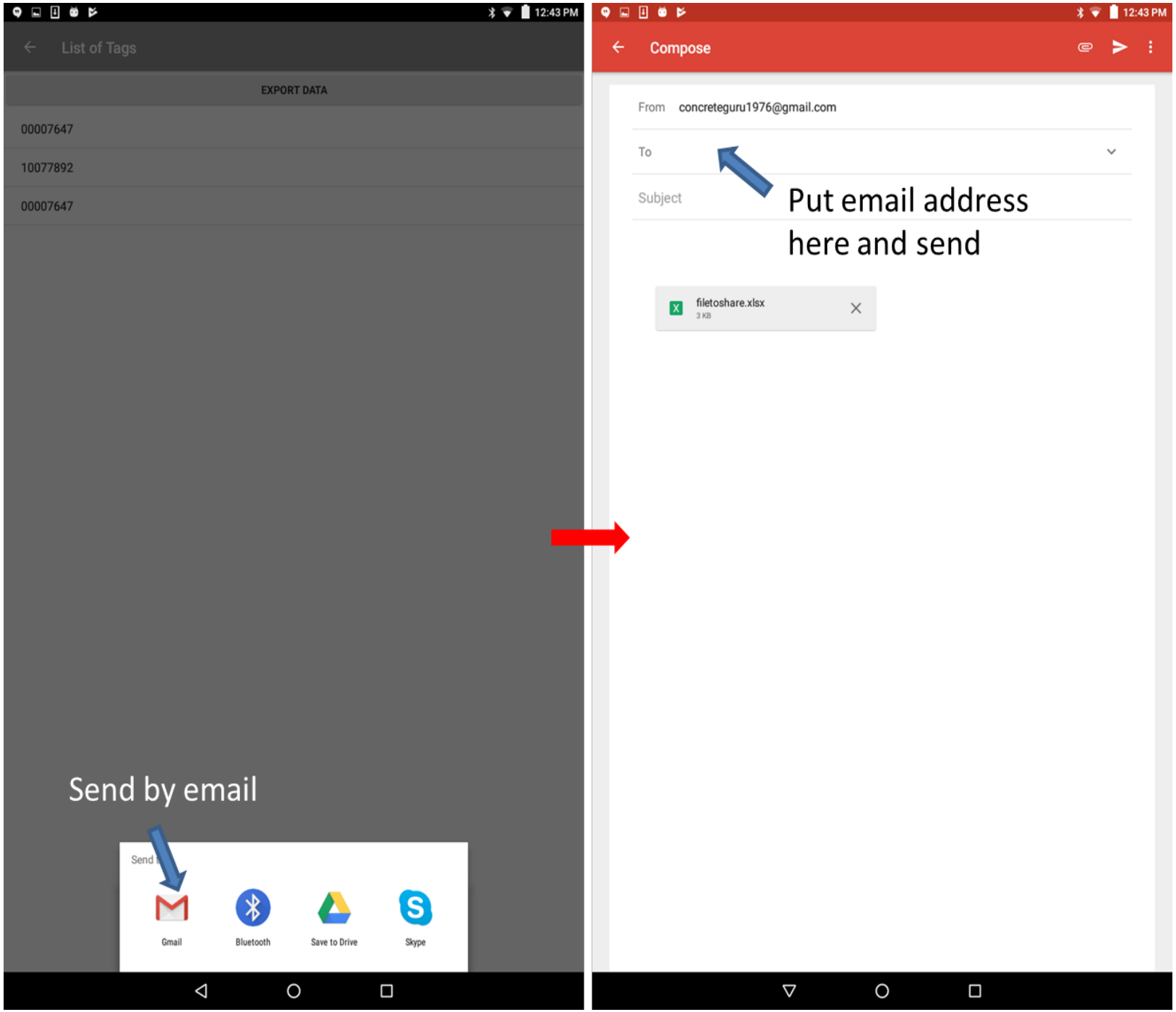


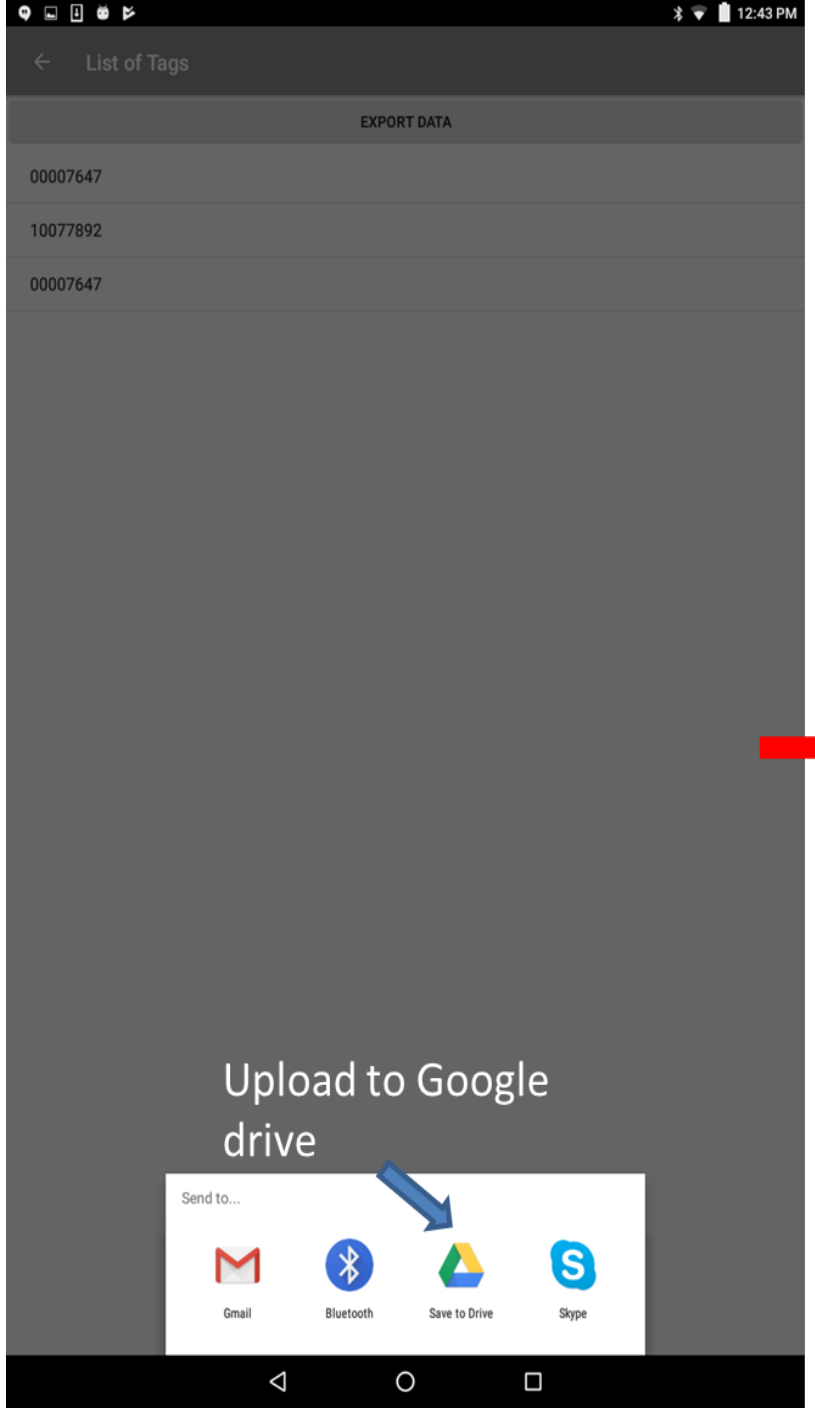
Can I change the entries?

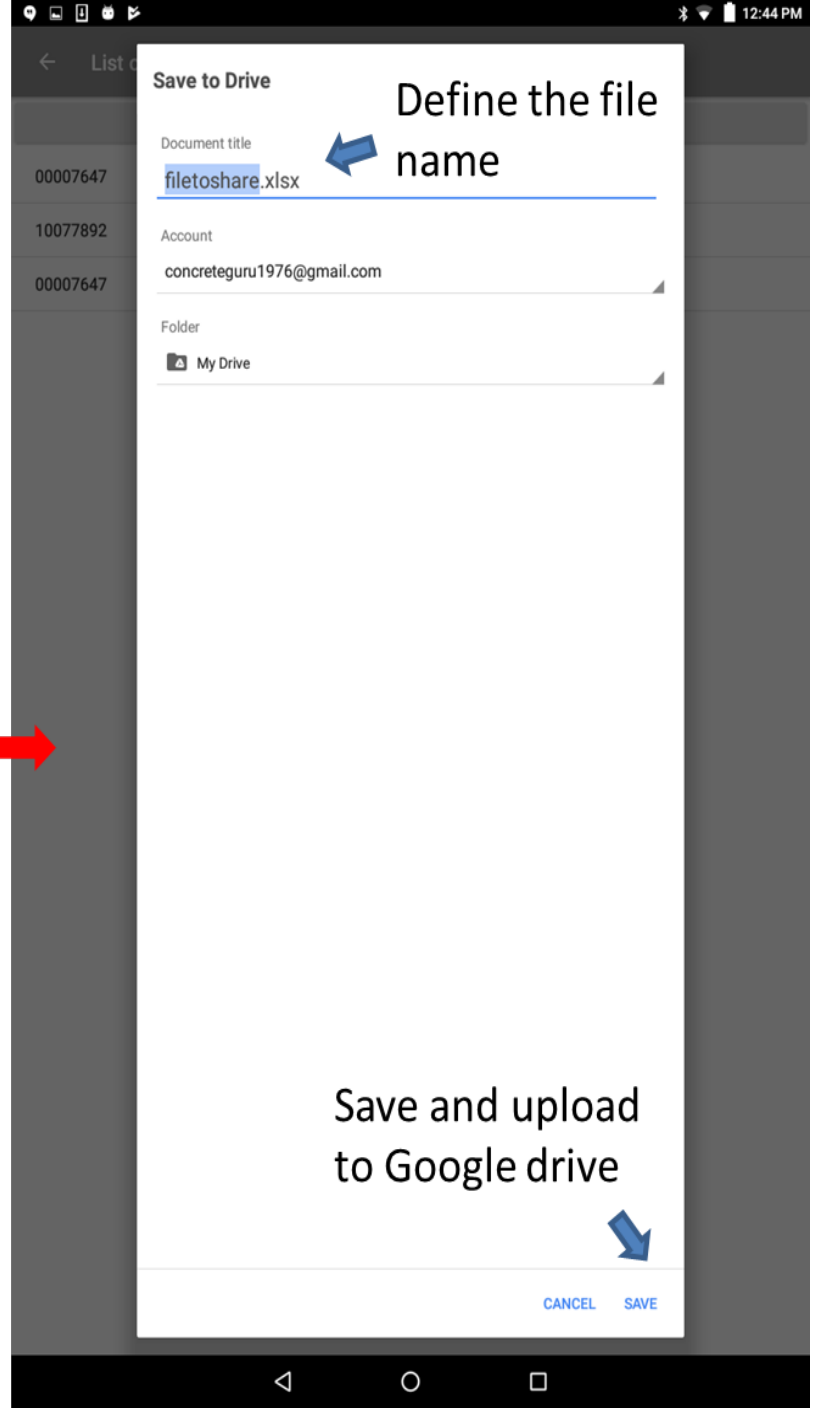
The app allows you to change any entry that you want.

You can also build forms in excel an upload it to the app.

How do I get my data?


12:43 PM
List of Tags
EXPORT DATA
00007647
10077892
00007647
Send by email
Gmail
Bluetooth
Save to Drive
Skype
12:43 PM
Compose
From concreteguru1976@gmail.com
To
Subject
Put email address here and send
filetoshare.xlsx
3 KB


12:43 PM
List of Tags
EXPORT DATA
00007647
10077892
00007647
Upload to Google drive
Send to...
Gmail
Bluetooth
Save to Drive
Skype


12:44 PM
Save to Drive
Define the file name
Document title
filetoshare.xlsx
Account
concreteguru1976@gmail.com
Folder
My Drive
Save and upload to Google drive
CANCEL
SAVE

Summary

An app was created to read the Ctags and manage the data that corresponds to the samples.

The app is simple and flexible.

The app is constantly improving.

Roll out 1.0

These groups have already received Ctags and played with a previous version of the app.

Oklahoma DOT

Michigan DOT

Minnesota DOT

Texas DOT

FHWA Mobile Trailer

Dolese Bros.

Ozinga Ready Mix

Michelle’s Ready Mix

Roll out 2.0

We are about to collect a lot of data with PEM testing.

This would be a great time to make sure that the results and samples are well documented.

If you are interested then please sign up!

What are the benefits?

Reduce paperwork

Increase productivity

Maintain inventory

Track chain of custody

Decrease human errors

Other possible benefits

Real time data sharing of data for owners, contractors, etc.

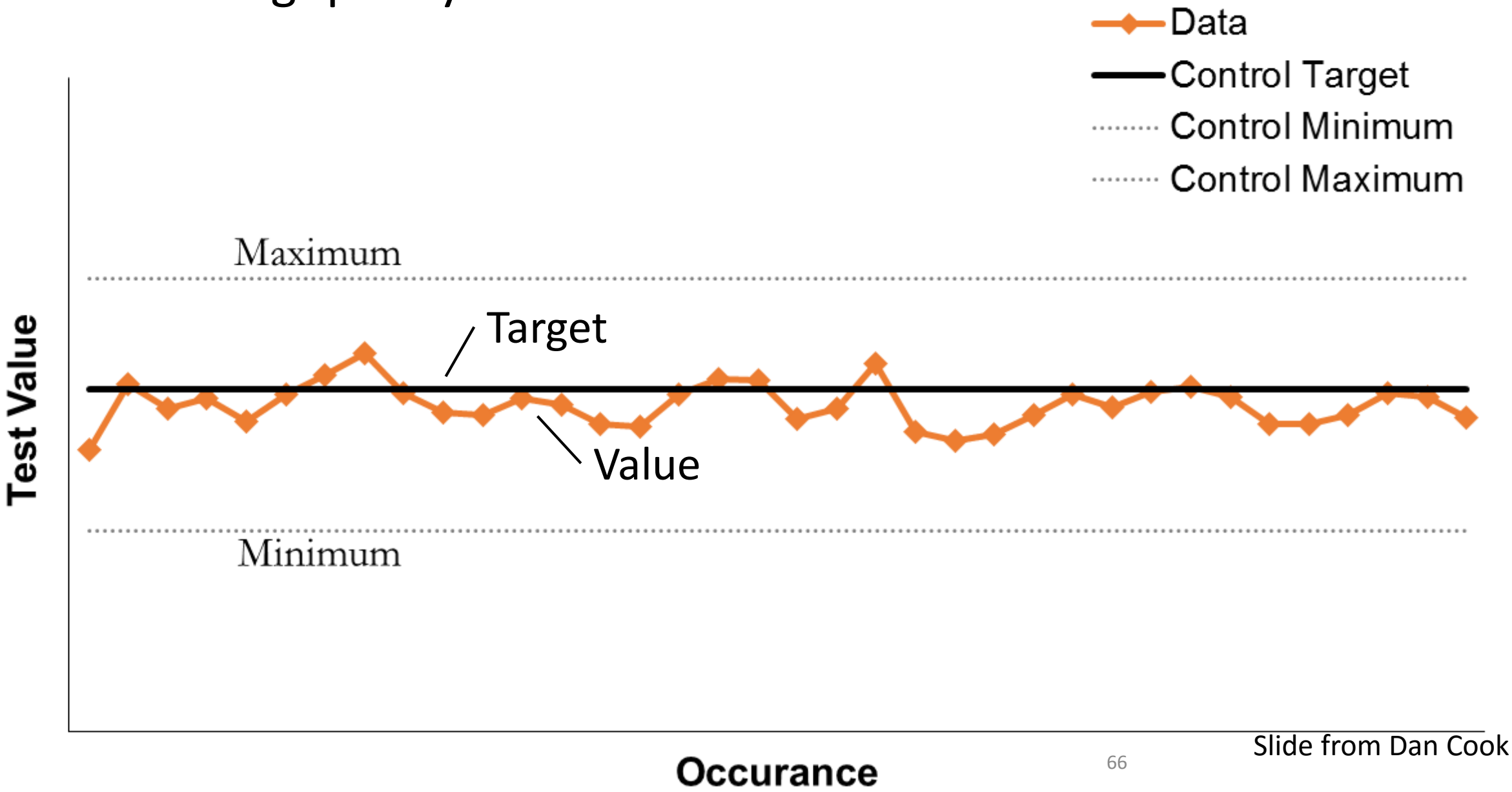
Email when results don’t meet specifications

Instant pay calculation

Automated report creation

Redundancy of data

Amazing quality control tool



Slide from Dan Cook

Other possible benefits

Can be used to track any material

Efforts like this inspires the new generation!

They will do things we have not even dreamed of!!!!

They will do things we have not even dreamed of!!!!

Does the Ctag impact strength?

Compared 4x8 cylinder strengths for 16 different mixtures with and without Ctags

< 2% difference in strength

All standard deviations within ASTM C39 tolerance

How long do they last on concrete?

Outside ~ 2 years

Fog room > 2 years

Survived ASTM C666 testing

170F the glue fails

What can the app measure?

GPS coordinates

Weather

Time

Technician

Any property….

What do you want?

Will it interface with my other software?

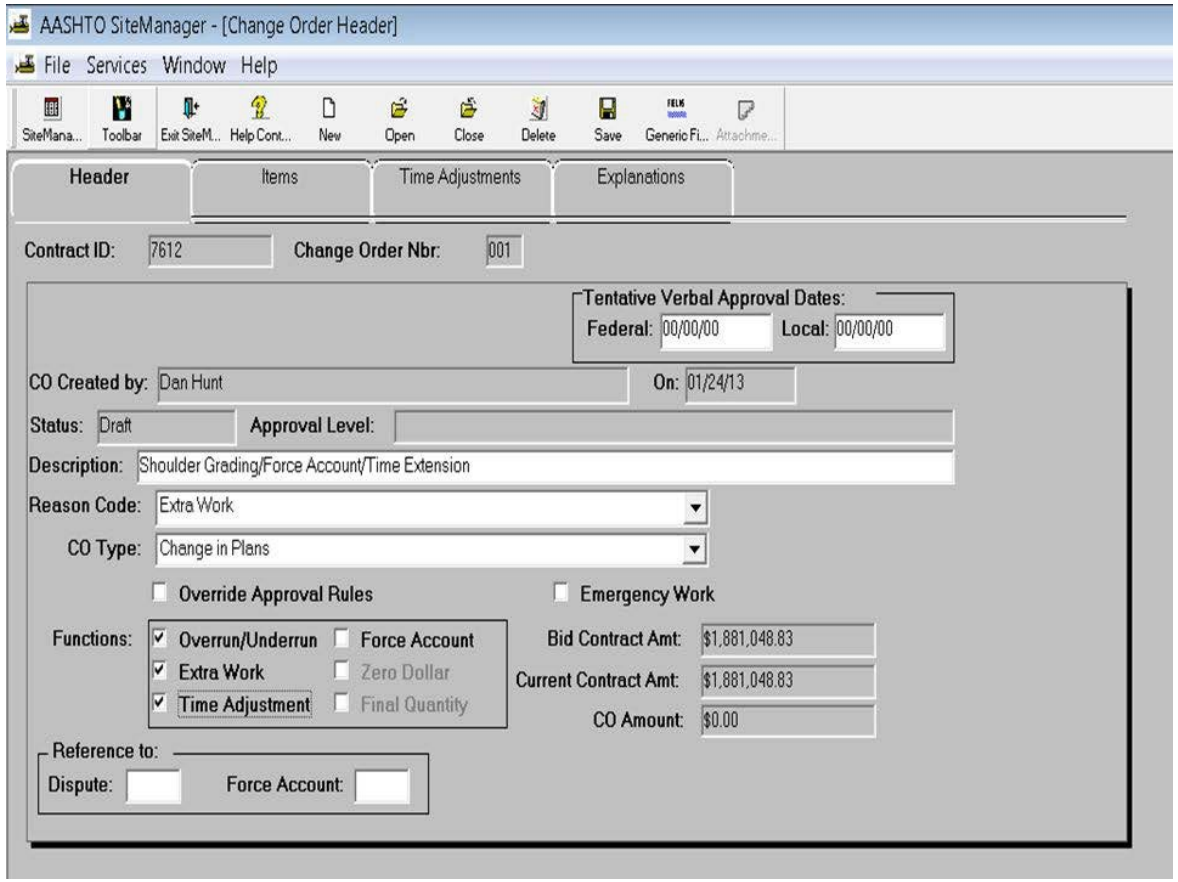
Google Docs or Excel

Comma separated or any other formatted file format

Python code that automatically transfers data between a file and your software

Automated data transfer to SiteManager

	A	B	C	D
1	Tag #	location	Slump	placement
2	10027875	36.1240912,-97.0	3	
3	10017818	36.1240912,-97.0	3	
4	Template	36.1240912,-97.0681319		
5	10027886	36.1240912,-97.0681319		



What does it cost?

App – FREE!

Ctag roll – PEM Pooled Fund – Free!

Non PEM - $100

What does it cost?

App – FREE!

Ctag roll – PEM Pooled Fund – Free!

Non PEM - $100

PCA Members - $500

Conclusion

The Ctag is a new way to label concrete cylinders.

The Ctag app can catalog information from the field and send it to the cloud.

Conclusion

It was created by the next generation of the concrete industry to make their lives better.

Do you want to try it?

My contact

www.tylerley.com

www.youtube.com/tylerley

Questions?