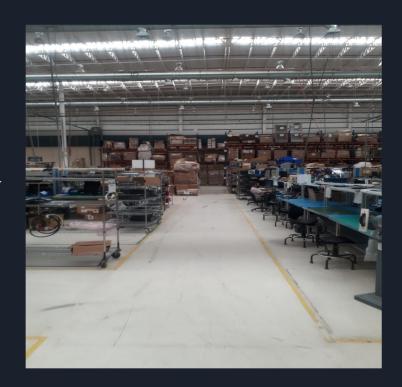
Redesign of C.T.D.I. Manufacturing Floor Layout

Team Members:

- Verónica Loya
- Oscar Chairez
- Ruben Solano
- Noel Ayala

Main technical problem

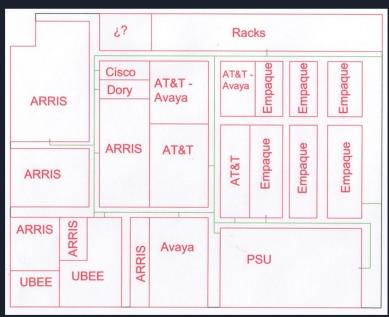
1,450,000 Defective Power Supply units were placed in different halfways, stations and rack locations.



Project Objectives

Our main goal as team, it was the implementation of a new layout that was able to reorganize, distribute and improve the flow of received and refurbished units generated from each project active on the plant. However, this goal could be possible adding a storage implementation to mitigate the overflow.





Storage solution constraints

- Danger Spaces
- Forklift path
- Limited Budget
- Building structure
- Adaptable to layout



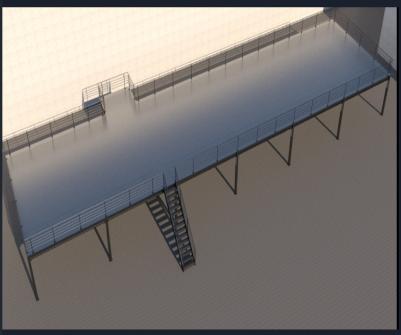
Main Design Solution: Stainless Steel Mezzanine Floor

- Building Structure
- Safety Environment
- Layout Adaptation



Main Design Solution Mezzanine





Results from Implementation:

- Additional space gained by 78%
- Increasing floorspace
- Big impact on retail performance by 49.3% save
- Storage abilities
- Can be expanded as needed
- Extra workroom
- Of course prevent traffic jams and accidents



Safety: Capacity Observations

- Capacity: 90 pallets Total Weight of 68,400 Lbs on Platform.
- According to "Industry in Motion" supplier the weight should be distributed uniformly.
- The weight is under the 125 PSF Capacity of Stainless Steel (27.80 PSF).



Why a Mezzanine as the best option?

During our first visits we notice that:

- Some of the main hallways were being obstructed by unnecessary objects.
- One of the emergency exists was being blocked with pallets.
- Some boxes were damaged due to the heavy material and because they were over stacked.

....and all this was due to lack of storage...



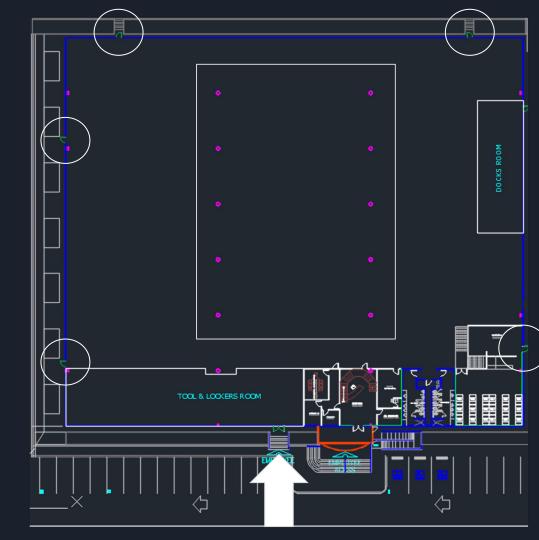




Actual Layout

Physical Constraints

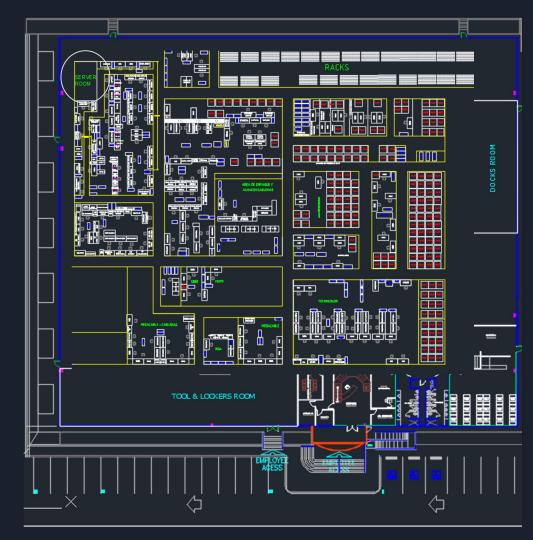
- Area of 55,00 square feet
- Main entrance
- Emergency exits
- Structural Pillars



Actual Layout

Physical Constraints

Server Room

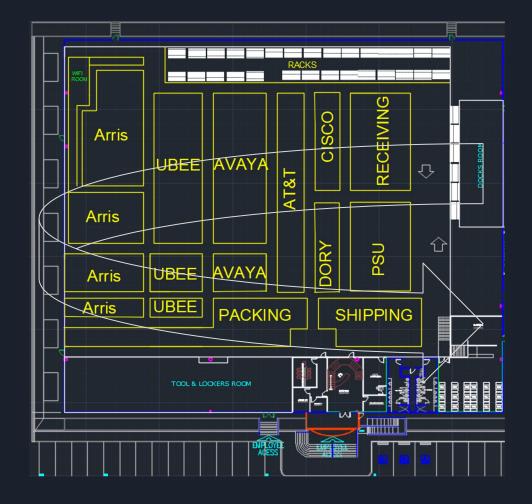


Contrasting between layouts

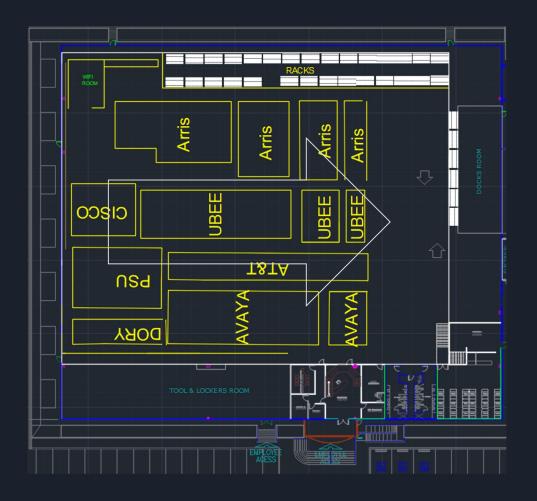




U-shape Layout as solution 1

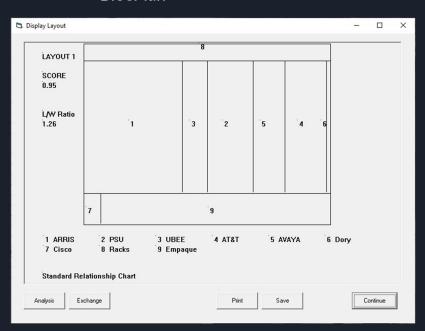


Linear Layout as solution 2 by CTDI

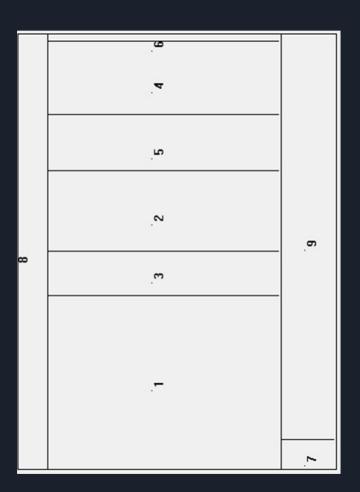


Layout Elaboration

BlocPlan

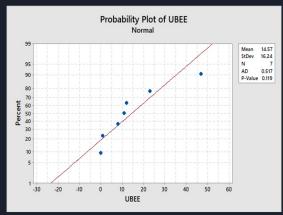


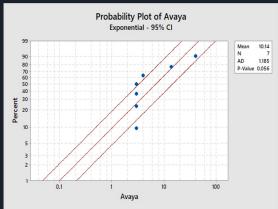


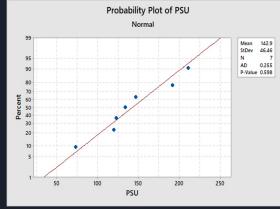


Data Distributions at 5% Confidence Level

- PSU Normal Dist.
- UBEE Normal Dist.
- Dory No Dist.
- Avaya- Exponential Dist.
- Arris No Dist.
- AT&T No Dist.







Calculations

Projects' Areas

	Area De	Proyecto		Area tota	locupada	por proye	ctos y rac	cks				
	Proyecto	Area (PC)		28472								
	ARRIS	8250.75										
	UBEE	2102		Porcenta	je otorgad	o a proye	ctos					
	Cisco	319		0.7826	78.26%							
	Dory	319										
	AT&T 3508			Porcenta	je otorgad	o a pasillo	s	Porcenta	je otorgad	do en relac	cion a proy	ectos
	AVAYA	2708		0.2174	21.74%			0.2778	27.78%			
	PSU	3772										
	Packing	4634										
	Racks	2859.5										
En AT&T y	AVAYA el	h dicipado la	as bodega	as compar	tidas y dist	ribuido su	s areas to	tales entre	AT&TyA	VAYA po	r la mitad	
Area Total	de la plant	ta										
36,382												
		proyectos co	on design	acion de p	asillos							
	Proyecto	Area (PC)										
	ARRIS	10543										
	UBEE	2686										
	Cisco	408										
	Dory	408										
	AT&T	4483										
	AVAYA	3460										
	PSU	4820										
	Packing	5921										
	Racks	2860										

More Calculations

Pallet Flow

Generic:

- Transportation Speed 249.06 ft/min
- Cost of Transportation \$0.39/min

	Frecuencia de traslado (Valores Designados)										
De\Para	ARRIS	PSU	UBEE	AT&T	AVAYA	Doris	Cisco	Racks	Empaque	Shipping	Receiving
ARRIS	-	-	-	-	-	-	-	-	7	-	-
PSU	-	-	-	-	-	-	-	-	8	-	-
UBEE	-	-	-	-	-	-	-	-	6	-	-
AT&T	-	-	-	-	-	-	-	-	3	-	-
AVAYA	-	-	-	-	-	-	-	-	4	-	-
Dory	-	-	-	-	-	-	-	-	5	-	-
Cisco	-	-	-	-	-	-	-	-	1	-	-
Racks	7	8	6	3	4	5	1	-	-	-	-
Empaque	-	-	-	-	-	-	-	-	-	10	-
Shipping	-	-	-	-	-	-	-	-	-	-	-
Receiving	-	-	-	-	-	-	-	10	-	-	-
				_							

Generic Cost pe	er minute	Tra	nsportat	ion speed (walking)	
			110 0 1 1011	. с. сросс. (
Minimum wage/	day (pesos)	Distance	(Ft.)	Seconds	Ft./sec.	
\$ 186	5.00	34		7.61	4.4678055	519
Hours / [Day	34		9.03	3.7652270)21
8		34		8.93	3.8073908	317
Pesos / H	our	34		7.45	4.5637583	389
\$ 23	3.25			Average	4.1510454	137
			9	Seconds/		
Pesos / Mi	nute			minute	$\downarrow\downarrow\downarrow\downarrow\downarrow$	\downarrow
\$ (0.39			Ft./Min.	249.06272	262

More Calculations . . . Again

De\Para

ARRIS

PSU

UBEE

AT&T

AVAYA

Racks

Packing

Shipping

De\Para

ARRIS

PSU

UBEE

AT&T

AVAYA

Dory

Cisco

Racks

Packing

Shipping

Receiving

ARRIS

1.77 \$

PSU

UBEE

1.94 \$

1.16 \$

ARRIS

0.47

AT&T

0.92

Costo total de traslados

1.40 \$

Doris

AVAYA

0.97

3.04 \$

0.62

1.12

Cisco

Racks

PSU

		Costo total	de traslados										
UBEE	AT&T	AVAYA	Doris	Cisco	Racks	Pa	cking	Shipping	Receiv	D-10	ADDIC	DCII	T
										De\Para	ARRIS	PSU	ľ
-	-	-	-	-	-	\$	1.91	-	-	ADDIC			Т

0.98

0.39

1.42

0.30

Packing

0.11

0.09

0.05

0.06

0.02

Shipping

0.23

UBEE

AT&T

AVAYA

Dory

Cisco

Empaque

Shipping

Receiving

ARRIS

PSU

UBEE

AT&T

AVAYA

Dory

Cisco

Racks

Packing

Shipping

ARRIS

0.85 \$

0.56

0.67

0.06

0.29 \$

0.08

PSU

Receiv De\Para Costo total de traslados

1.84

UBEE

0.47 \$

AT&T

0.92

AVAYA

2.09

Doris

0.43

Cisco

1.09

Racks

Racks

Empaque

1.91

1.18

0.98

0.11

0.39

1.42

0.30

Packing

0.11

0.12

0.09

0.05

0.06

0.77

0.09

0.18

Shipping

1.01

Receiving

Receiving

Cisco

	Costo total	de traslados				

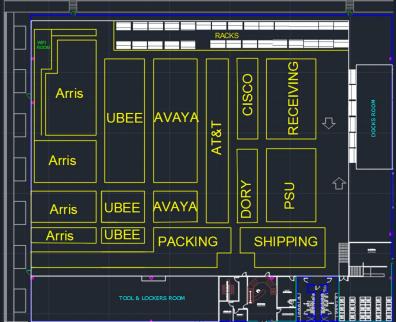
... and Again, but ...

Proposed Layout with Hallways Analysis

Distancia	Pies											Costo tota	al de traslad	los									
De\Para	ARRIS	PSU	UBEE	AT&T	AVAYA	Doris	Cisco	Racks	Empaque	Shipping	Receiving	De\Para	ARRIS	PSU	UBEE	AT&T	AVAYA	Doris	Cisco	Racks	Empaque	Shipping	Receiving
ARRIS									6.102362			ARRIS									\$ 0.07		
PSU									42.55249			PSU									\$ 0.53		
UBEE									6.102362			UBEE									\$ 0.06		
AT&T									6.102362			AT&T									\$ 0.03		
AVAYA									6.102362			AVAYA									\$ 0.04		
Dory									69.9147			Dory									\$ 0.54		
Cisco									14.76378			Cisco									\$ 0.02		
Racks	148.3301	6.5616	129.6588	54.19948	96.65354	36.97507	5.93832					Racks	\$ 1.62	\$ 0.08	\$ 1.21	\$ 0.25	\$ 0.60	\$ 0.29	\$ 0.01	•			
Empaque										15		Empaque	-									\$ 0.23	
Shipping	-	-	-						-	-	-	Shipping	-	-		•				-	-	-	
Receiving		-						71.75			-	Receiving		-				-		\$ 1.12	-	-	

Layout transportation monthly transportation Cost

Updated Proposed Layout



Layout transportation monthly transportation Cost

\$6.69!

Overall Results

Layout	Cost	Cost	Reduction	% of Reduction		
Existing's Potential	\$15.44	\$	-	0%		
Existing's Actual	\$17.61	\$	(2.17)	-14%		
CTDI's	\$14.26	\$	1.18	8%		
Proposed	\$ 5.95	\$	9.49	61%		
Proposed Updated	\$ 6.69	\$	8.75	57%		

References

- <u>https://www.3dstoragesystems.com/justification</u> Drive In Benefits
- http://www.industry-in-motion.com/mezzanines_and_storage_platforms.htm#WHAT_YOU_SHOULD_KNOW_BEFORE_BU_YING_A_STEEL_MEZZANINE Mezzanine
- https://www.osha.gov/laws-regs/regulations/standardnumber
- https://www.bluffmanufacturing.com/es/mezzanines-steel-structures/
- https://legalbeagle.com/7147737-osha-mezzanine-requirements.html
- https://www.bastiansolutions.com/blog/how-much-does-pallet-racking-cost/
- https://www.shelvingdirect.com/pallet-rack-beam-pairs-prices-per-pair
- https://www.cisco-eagle.com/catalog/category/3038/drive-in-rack-photos

Thank you Questions?