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Visualization of Intralogistics solutions using Autodesk products

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Learning Objectives

- Make users to understand the process of using multiple Autodesk products to develop better visualization experience within short time.
- How 3D and walkthrough is helping in visualization and hence the decision-making process during design stage in intralogistics
- Learn about the opportunities for lateral deployment of Autodesk models to create immersive experience

Description

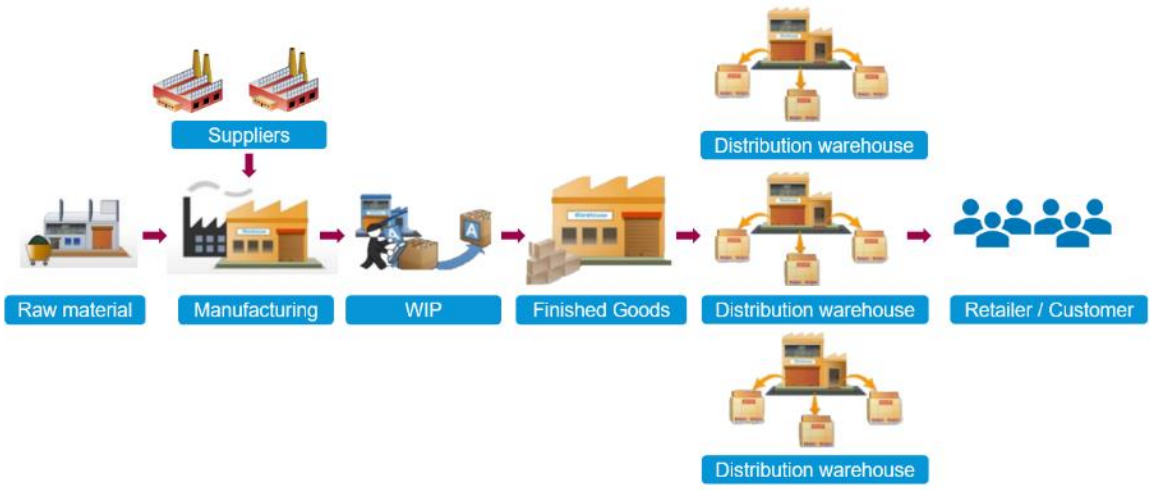
Godrej Storage Solutions is the largest intralogistics solutions provider in India and in Asia abroad.
It deals with projects that are unique & customized. The major output is a General Arrangement drawing of the warehouse layout. Due to its complex nature, the designs are prepared in 2D layouts and reviewed by customer. This process involves a lot of iterations before the customer gets a complete idea about the proposal. After many such iterations, technical sign-off happens but with the uncertainty of error-free solution.
To reduce this long cycle time and for better visibility to customer, Godrej design team makes 3D walkthrough videos of complete warehouse with all civil details. This helps the stakeholder to virtually visualize full warehouse facility at design stage itself and ensures NO conceptual errors.
Another aspect of the project business is that the project location & decision makers are not co-located. Hence visualization helps them making timely & accurate decisions.

Speaker(s)

UnniKrishnan N N is a Mechanical Engineer with 25 years of experience in Design in various manufacturing companies in India and UAE.
As head of Technology and Design of one of the largest Warehouse equipment manufacturers in Asia, was responsible for design of many large fulfillment centers for various MNCs.
The organization is a leader in its operating sphere in India with several IP assets with a lot of focus on Innovation.
Co-author of three international papers.

Saravanan K is a Mechanical Engineer with 12 years of experience in product design and development.
Conversant with various design tools, modelling software tools and processes.
Currently focusing on training & competency development function.

What is Intralogistics?



Material flow & Various Storage points

Whenever we need some electronic gadgets, home appliances or even provisions for home, either we go to store or we order online.
Have you ever thought, journey of those materials just before it reaches our hand?
Above picture explains the flow of material from Raw material till it reaches end users as final product.
There are many storage points needed at various levels like RM warehouse, WIP warehouse, FG warehouse and then material reaches large distribution centers and then it moves to regional warehouses then it reaches the stores and then customers.
"Intralogistics is the art of optimizing, integrating, automating, and **managing the flow of material** & information **within the four walls of a warehouse".**

Logistics as a segment is growing all over the world, the need for large and complex fulfillment centers are increasing.

Usually large & complex warehouses are integrated with air-controlled system, fire prevention and fire protection systems and lightings.
Lot of co-ordination happens between various stakeholders.

Typical large & complex warehouse

Challenges faced while executing Intralogistics projects

There are many challenges in executing the warehouse projects,

1. NO one visualizes the full project till it gets installed

2. Intralogistics projects requires lot of communication between customer and various stakeholders. But people are not co-located.
3. Millions of components are supplied to project location and then all are getting assembled at site.
4. Consideration of customer civil while detailing the project is very critical. As you see in the image, pillar hindrances and beam hindrances are likely to occur in large scale projects.
5. When warehouses are not designed considering the allied objects of customer, hindrances can occur. Which may require configuration level changes.

All these issues are due to poor visualization. Poor visualization leads delay in project execution & cost overrun.

Approach towards providing a better visual experience of Projects – Our Unique method

We recommend to present project drawings through 3D visuals. Either image or walkthrough video.

For better visualization between supplier, customer & other integrators, we make large projects in 3D, both imgaes and videos.

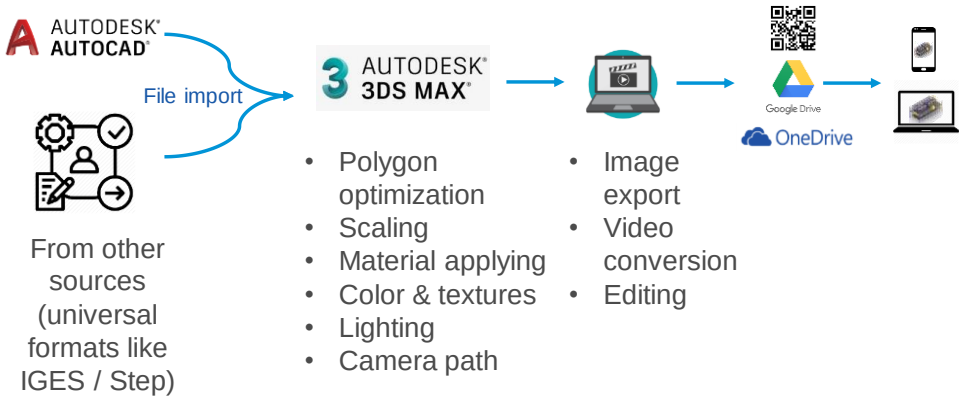
Link to flythrough video:

Video Link: https://youtu.be/mCP0Tstk7cQ

Link to walkthrough video:

Video Link: https://youtu.be/wFTAZkEvXGM

Presenting projects through 3D



Our approach: process flow

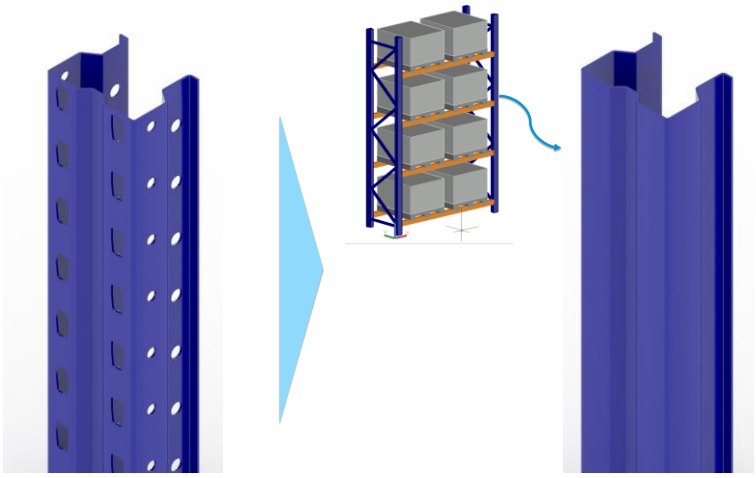
Step1 : 1st step begins with creating 3D models.

It is always suggested good practice to make 3D models in external software and then import to 3DS MAX instead of making models in 3DSMAX itself which might consume more time for custom profiles and assemblies.

Unique thing what we do here is, we create 3D models with most relevant features by removing unnecessary holes and other features which will increase the polygon count and make the model size difficult to handle.

As you see in the left side, component with more holes and slots with the file size of 3MB (remember, this component might be in thousands of quantities for a typical large warehouse, hence once component itself contributes to few GBs of data which is very difficult to handle).

Hence, the best practice we follow is shown in right side, by keeping the most relevant features which counts less polygons and less size to handle.

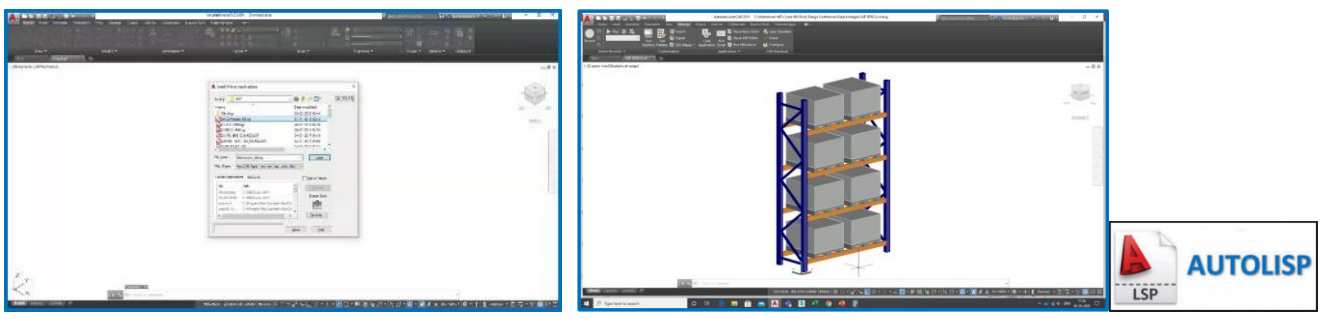


Because of keeping more relevant features, model size is small. Hence handling becomes smooth.

Step2 : Usage of automation tools for making quick 3D models.

Since we do this kind of projects repeatedly, we created a LISP program for making one storage module. But within that module, LISP was written in such a way that, profile sizes and pallet sizes can be varied for individual customer needs..

Once this is done, further modifications will be done. and then models will be joined so that it becomes single model which is easy to apply layer properties.



Bringing speed to the model creation using LISP

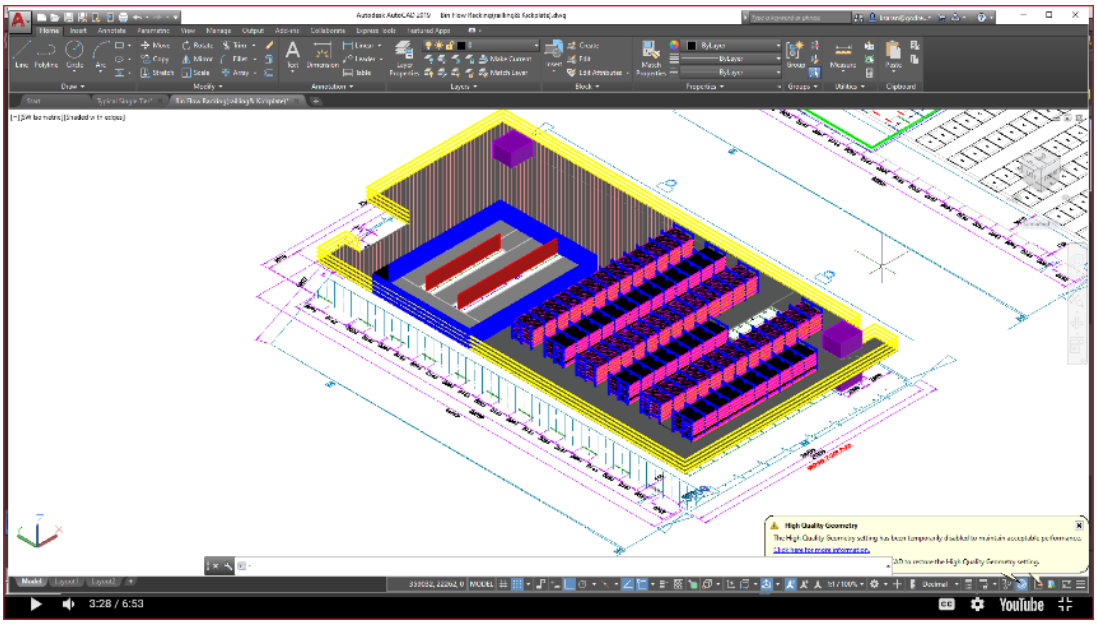
Step3: Creating entire project in AutoCAD using 3D.

Once basic main module is generated, entire project is created using those modules.

Once the rack units are made, other integrated components and accessories also created.

When project is large in size, each blocks can be made as separate files.

Layer properties shall be applied in this step for different components, so that it will be easy to handle in 3dsMAX.



Light weight files enables processing through standard workstations

Step4 & Step5: Getting into 3DS MAX, basic settings & Importing project layout in 2D.

Once preparation work done, let us move to 3DS MAX application.

After opening 3dsMAX, workspace to be selected. By default, it opens with “Default workspace” which has views called as view ports.

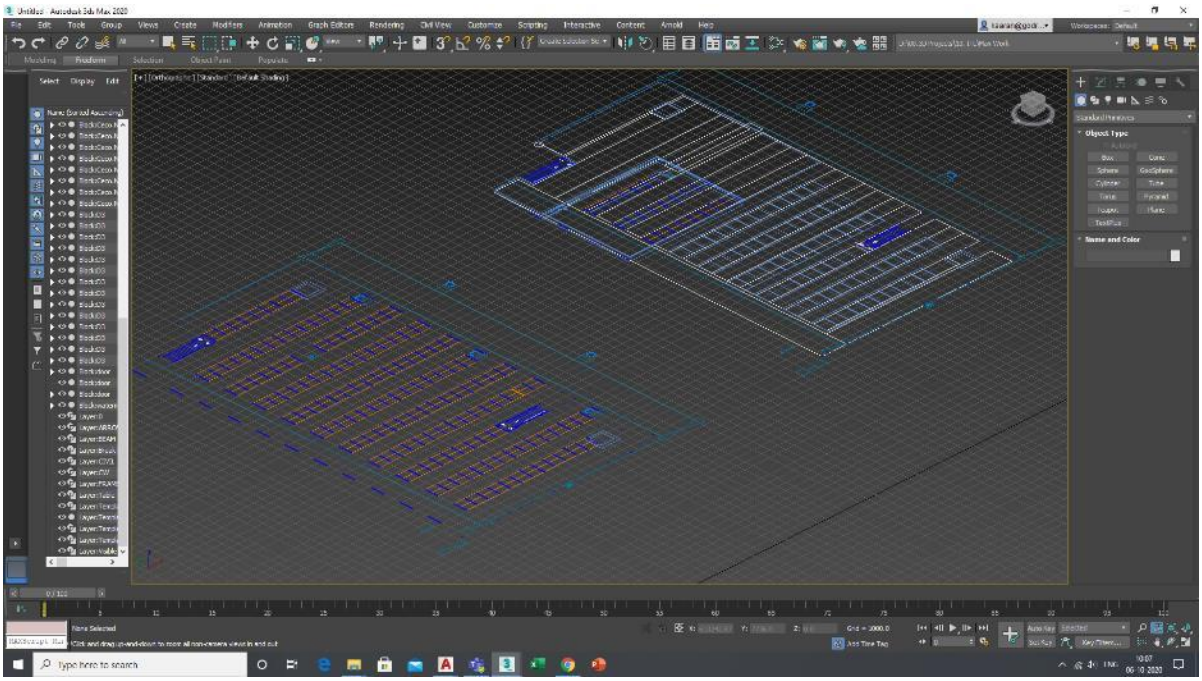
Top, Front, Left & Perspective.

View is controlled by Gizmo system at bottom left (x, y & z co-ordinate space arrows).

X & Y plane denotes the ground pane of object.As a next step, we are importing the 2D project layout for which the 3D Render or Walkthrough to be created.

This 2D will help us to set boundaries and to maintain 1:1 scale of objects which are imported.

So, this is only for reference. Later, this can be removed.

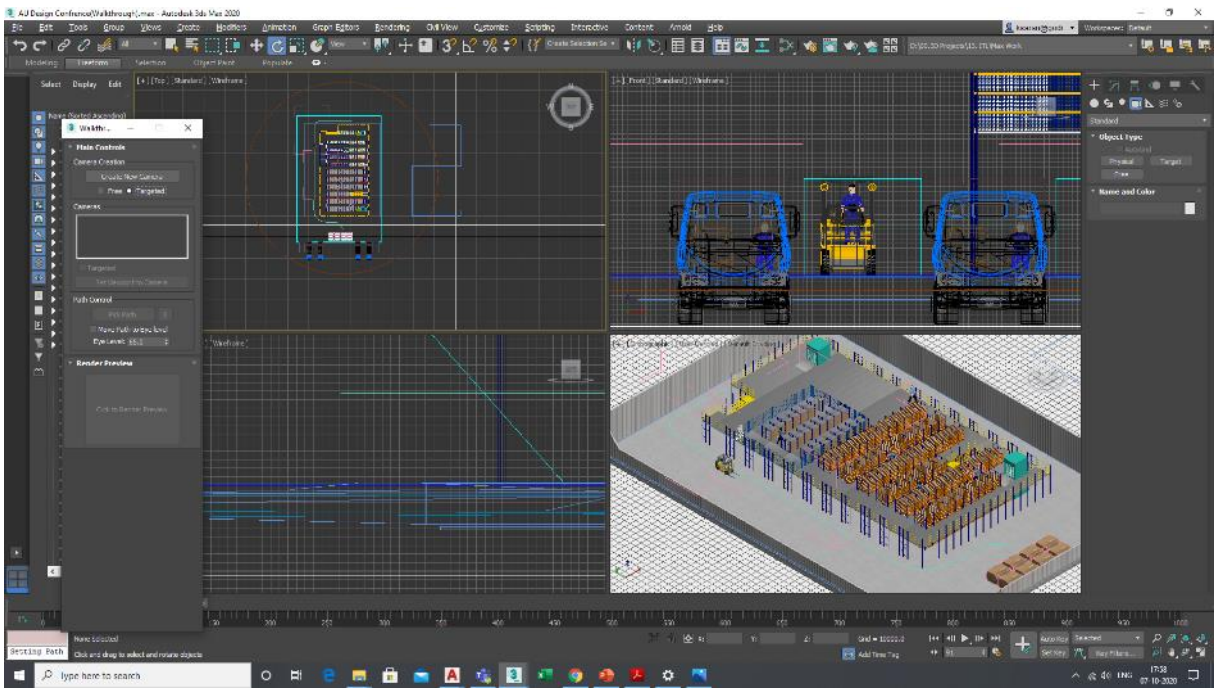


Ensuring the model dimensions are as per the requirements

Step6: Importing 3D models & aligning with 2D layout.

Now, import AutoCAD files into 3dsMAX.

For importing AutoCAD file, go to File > Import > Locate the CAD file > Check the incoming units (mm / cm / m etc). Another important step here is, aligning all the models in the project layout. We ensure, models are in 1:1 scale.



Large projects can be divided into multiple small files & use 2D layout to align them.

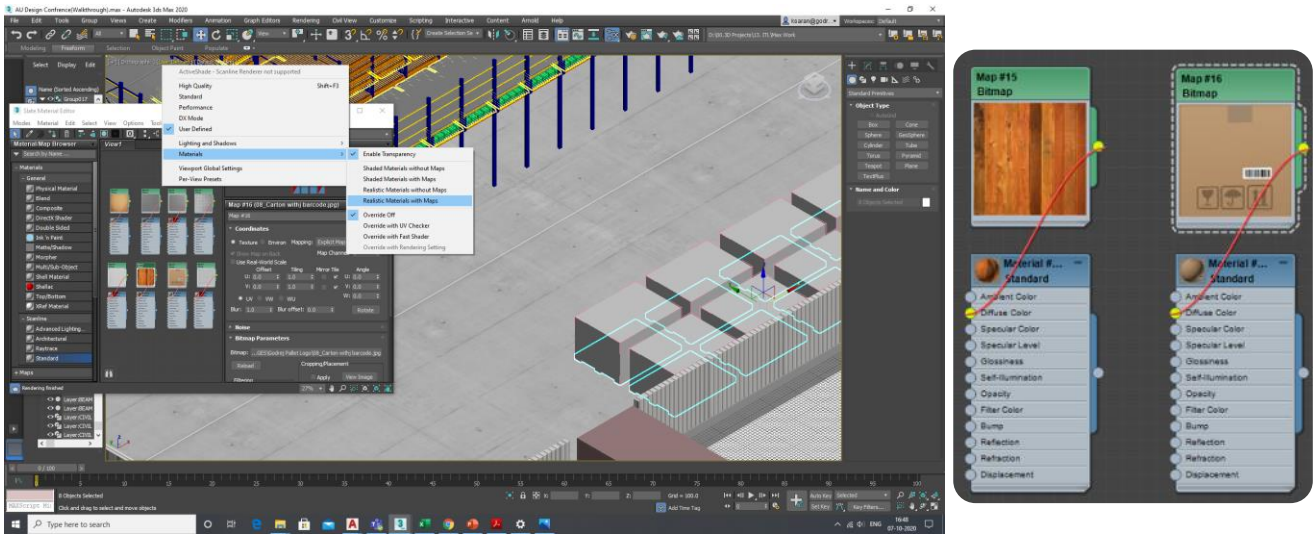
Step7: Applying material, color and textures.

Now another important step is that, applying materials to the objects.

TWO things we can do,

1. Objects with standard colors: we can choose directly.

2. Objects with non-standard textures (say wooden pallets): go to bitmap > and choose the pallet texture image > apply.



Creating models with layer groups & maintaining a library of material for frequent use.

Step8: Lighting & Rendering setup.

Once material & textures are applied, another important step is to setup lighting & camera.

Go to create > Lighting,

Lighting we have many options, 1. photometric 2. standard 3. Arnold .

In standard > target spot is most commonly used. Then go to modifiers to adjust the hot spot parameters like hotspot beam, intensity & decay to reflect more realistic lighting.

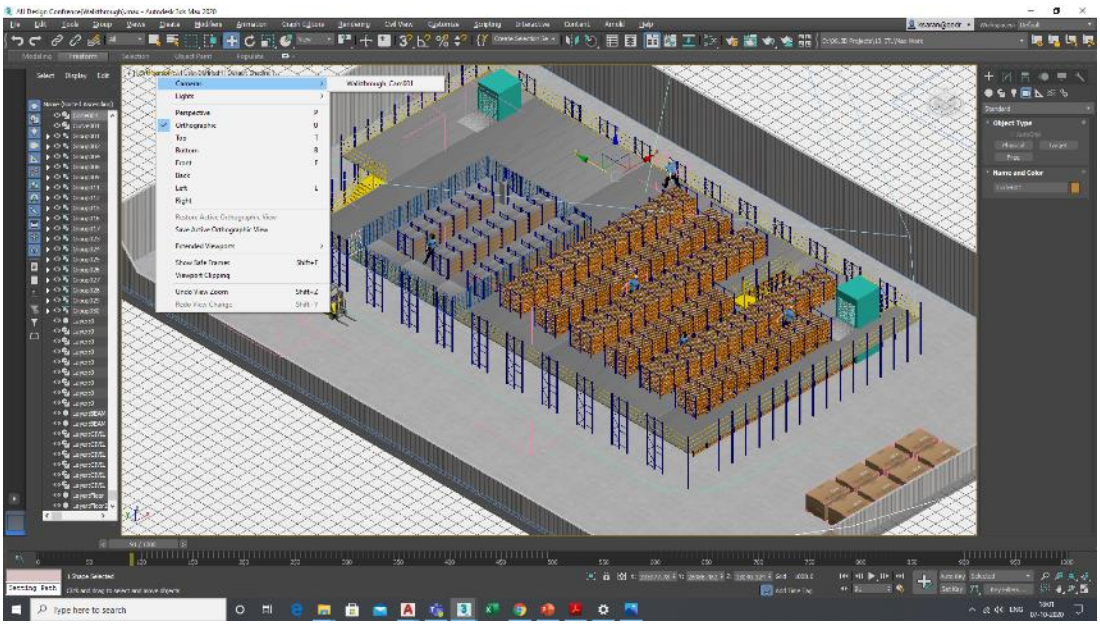
setup

Also we use Arnold lighting frequently because it has predefined settings which helps quick & good renders.

From lighting options > Choose Arnold > Arnold light > select modifiers for adjusting the parameters like intensity and exposure. Also by choosing Quad X & Quad Y, we can add shadows.

To setup render settings > go to rendering > rendering setup > Choose Arnold as renderer.

We can preview while applying the lightings.



Rendered using standard workstations (HD quality 1080pixel & ~25 fps)

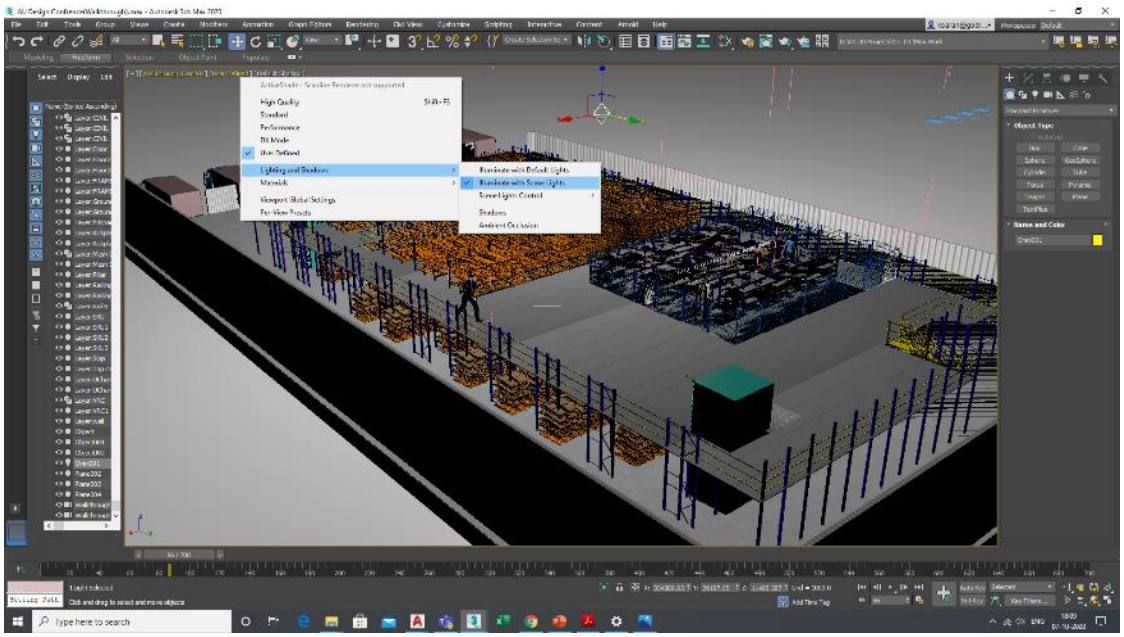
Step9: Camera path setup.

For walkthrough video creation, this step is critical.

Create > Camera > then two options a) target b) Free. Choose target for creating path.

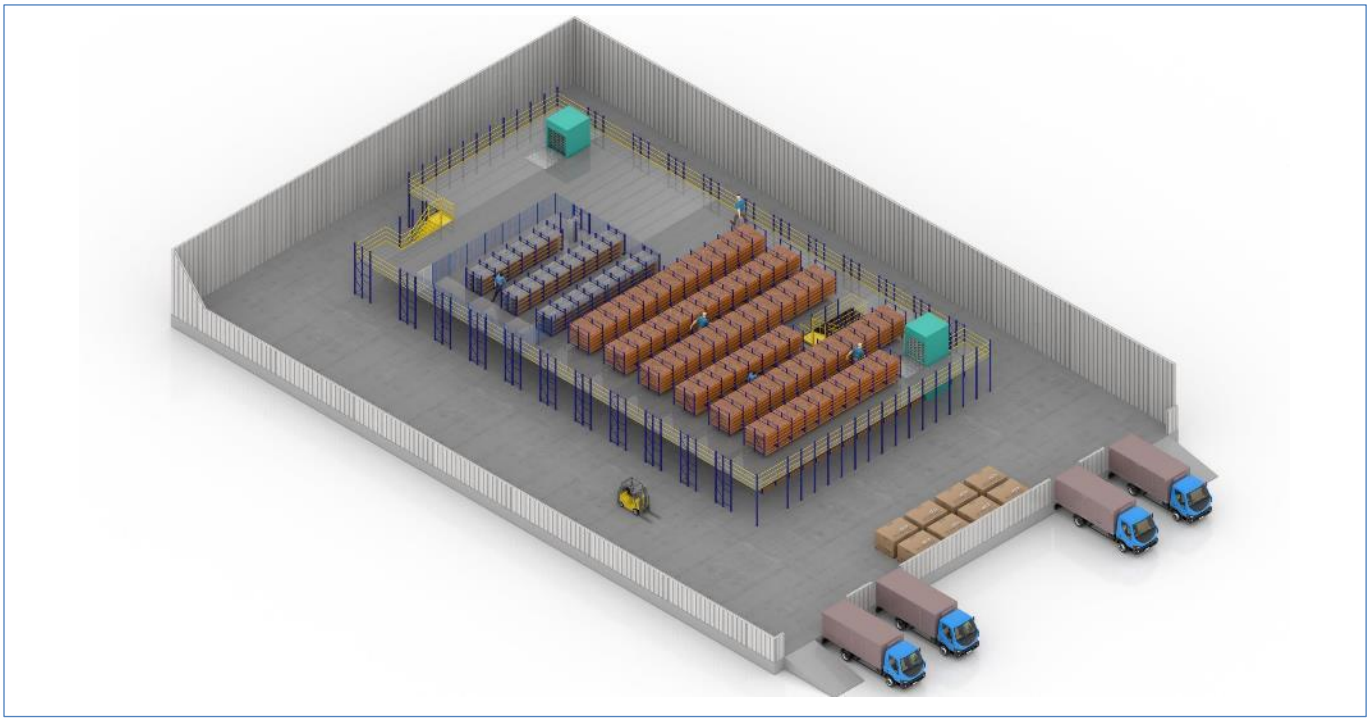
Go to shapes > draw required path lines. And then Go to Motion > Assign controller > position > Choose “Path constraint” > Then there will be an option of “add path”. Click on it and locate your line path.

Then click on Render



Capturing the needs of the customer & making the visuals without rework

Final output - Image

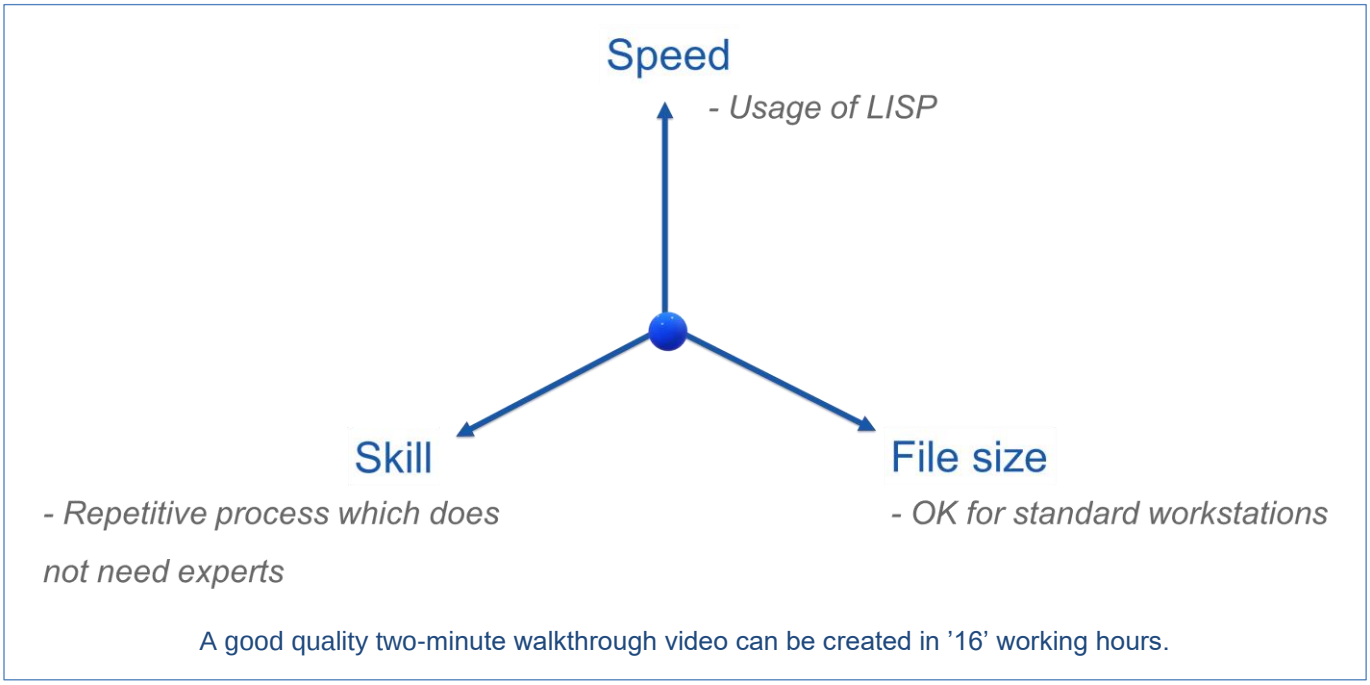


Taking the next step: creating immersive experiences,

As a horizontal deployment,

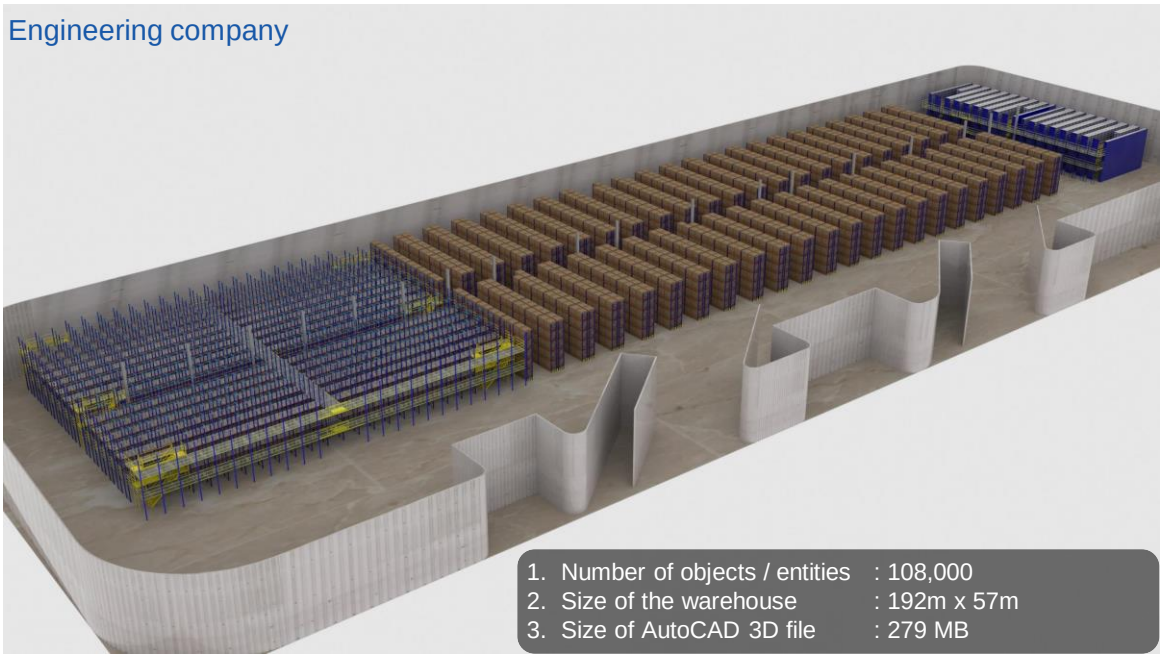
- Models created in this platform can be directly used for VR visualization hence reducing the effort of making model.
- Output formats from 3dsMax is highly compatible for VR content creation.
- All properties like color, textures, polygon reductions can be directly used for VR content.

Our approach is unique in three ways,

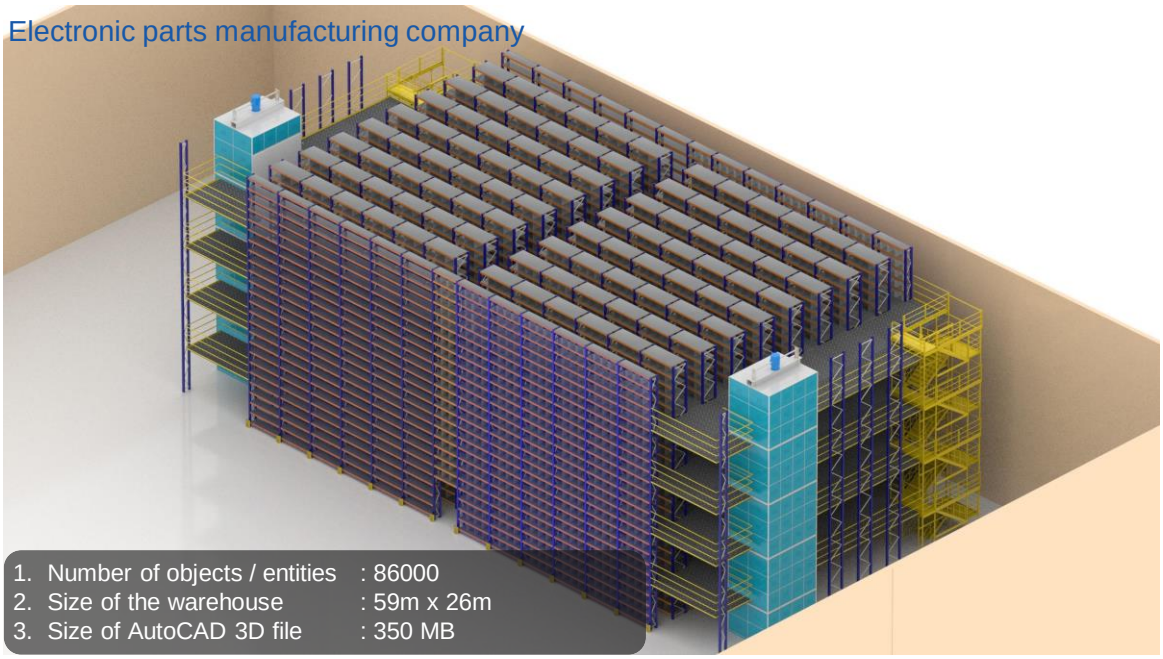


Some examples,

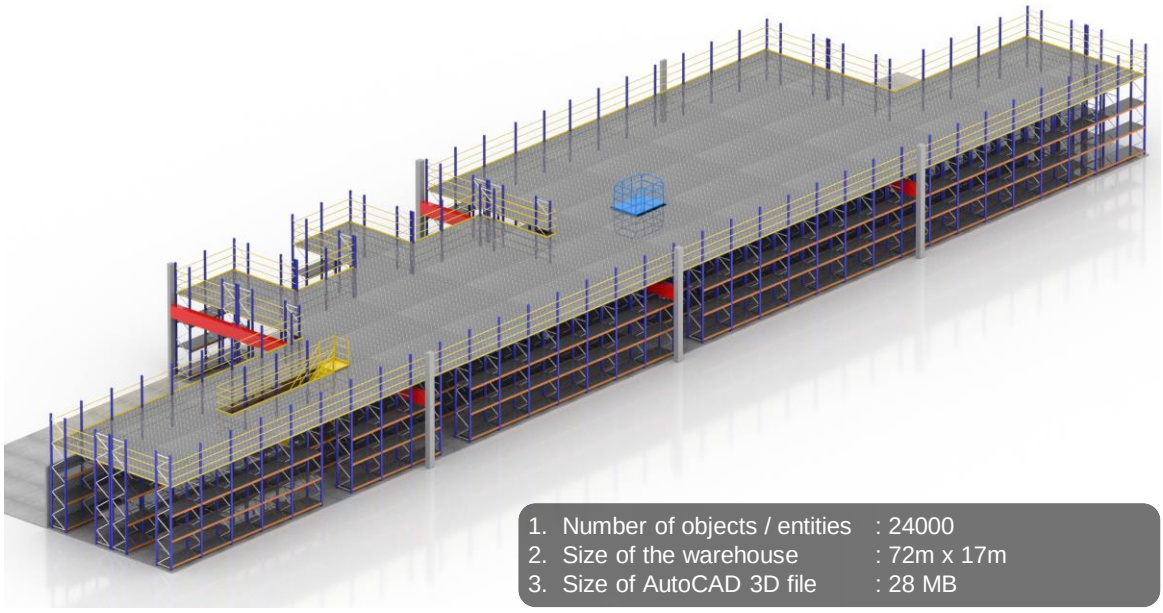
Engineering company



Electronic parts manufacturing company

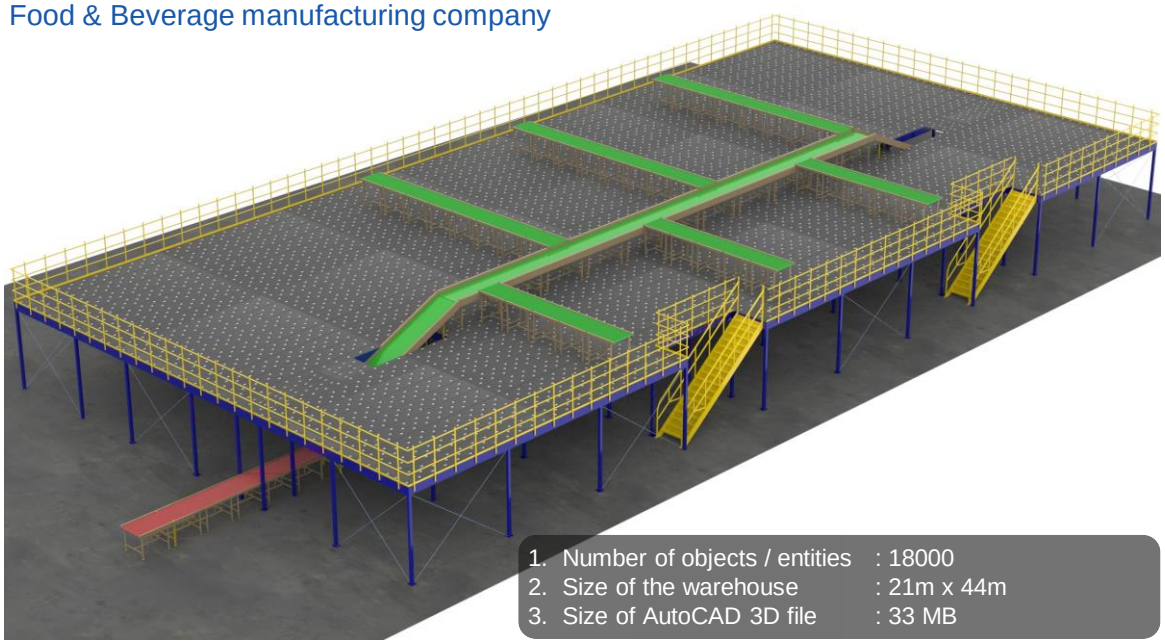


Pharma company

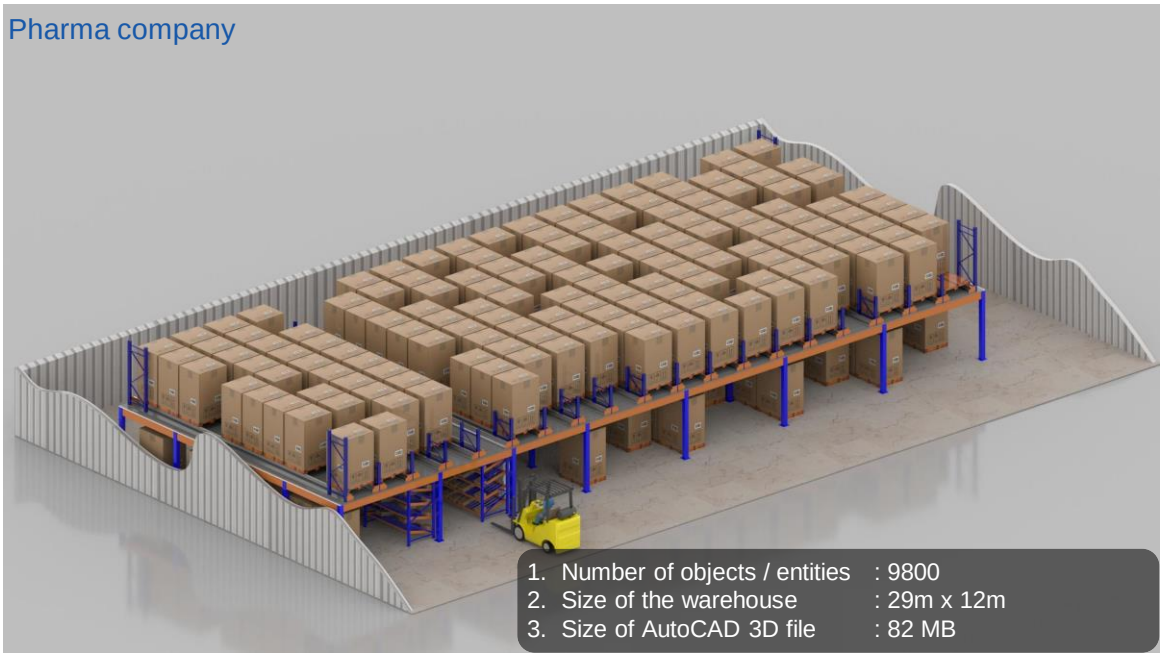


1. Number of objects / entities : 24000
2. Size of the warehouse : 72m x 17m
3. Size of AutoCAD 3D file : 28 MB

Food & Beverage manufacturing company



1. Number of objects / entities : 18000
2. Size of the warehouse : 21m x 44m
3. Size of AutoCAD 3D file : 33 MB



Learning & Benefits (User)

In this presentation we explained how to

- Create light weight 3D models that can be generated using normal design workstations
- Create walkthrough video using general AutoCAD products within short time.
- Possibilities of lateral deployment for creating immersive experiences.

All products that were used in the preparation are available within PDMC suite

Customer Benefits

- Reduced iterations in a project cycle
- Smooth communication between people who are not co-located
- Common understanding across customer, sales, design & projects people
- Less or NO error due to lack of conceptualization
- Enables quick decisions
- Collaborative approach on solution creation

All these benefits leads to "***Faster and Error Free Decision Making***".