AUTODESK. UNIVERSITY

Visualization of Intralogistics Solutions using Autodesk Products

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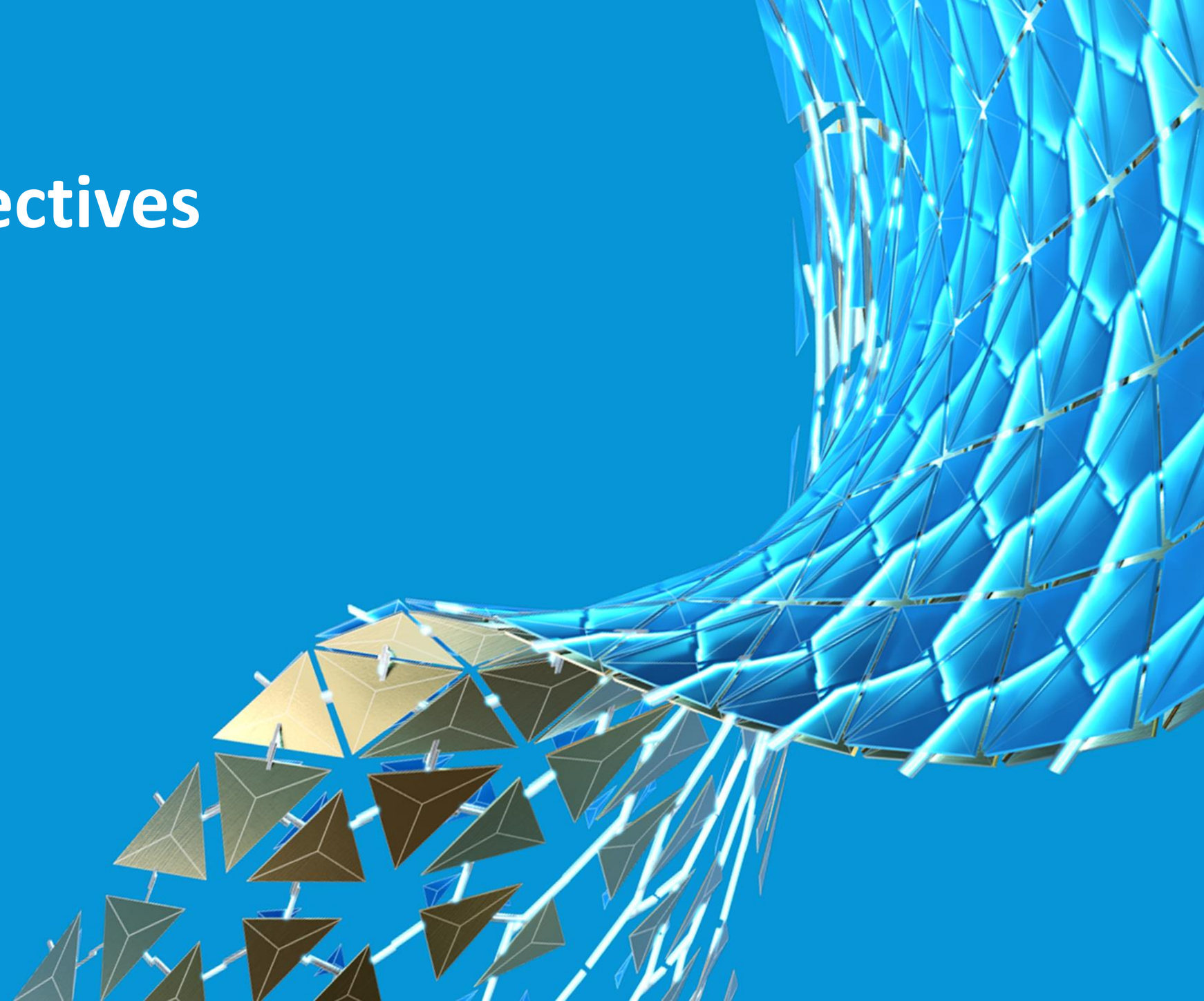
Learning Objectives



Learning Objectives

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

About the speaker

Unnikrishnan N N

- 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

About the Co-speaker

Saravanan K

- Mechanical Engineer with 12 years of experience in product design and development.
- Conversant with various design tools, modelling software tools and processes.
- Focusing on competency development function.

India's **LARGEST** Privately Held Group

Since **123** years

Delighting Customers across the **GLOBE**

Presence in **80** Countries

Diverse **PRODUCT** Portfolio

Consumer Products, Institutional Products, Industrial Products

Rated on Forbes

World's 100 Most Innovative Growth Companies

CONSUMER PRODUCTS

LOCKS

APPLIANCES

REAL ESTATE

PERSONAL CARE

FOOD PRODUCTS

INSTITUTIONAL PRODUCTS

A V SOLUTION

SECURITY SOLUTIONS

FURNITURE

VENDING MACHINES

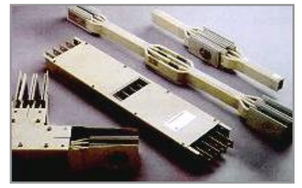
INFOTECH

ANIMAL FEED

INDUSTRIAL PRODUCTS

MOTORS

TOOLING



ELECTRICAL & ELECTRONICS

AERO SPACE

PROCESS EQUIPMENT

PRECISION ENGINEERING

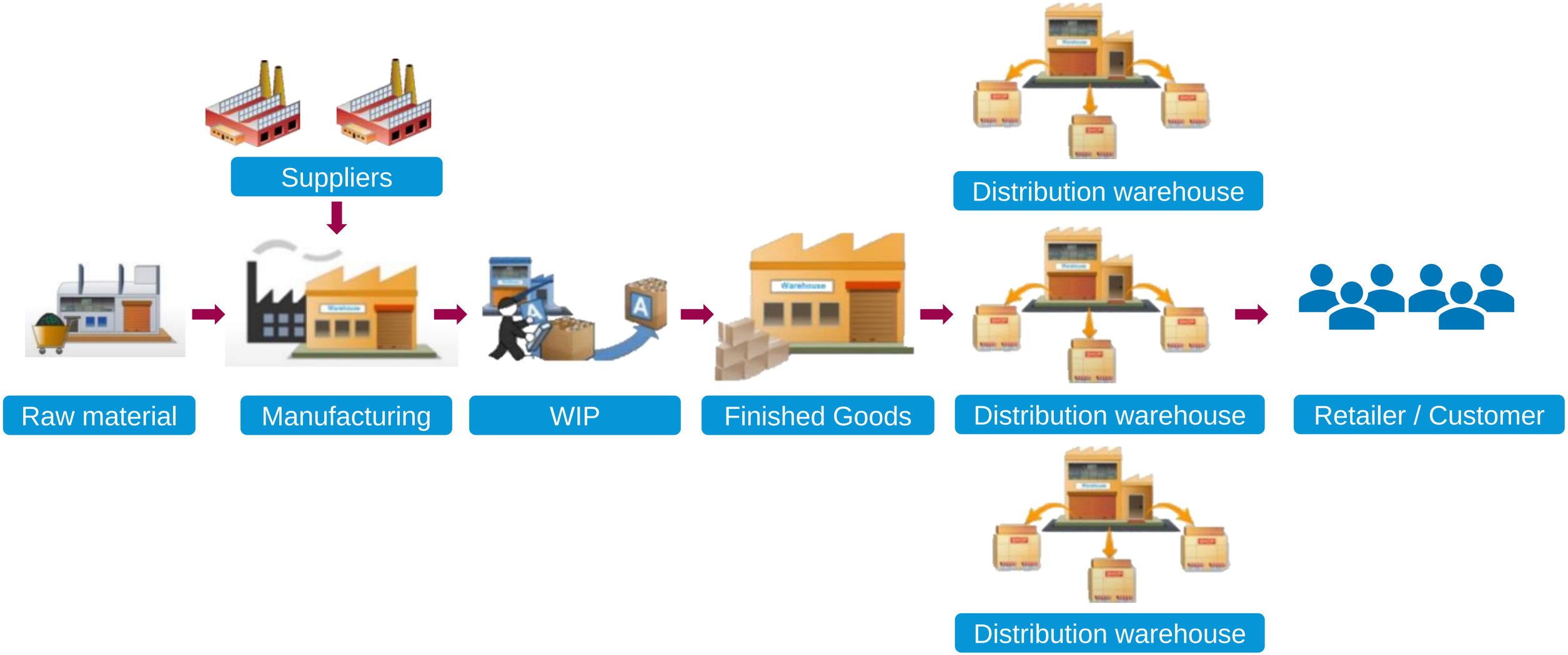
STORAGE SOLUTIONS

MATERIAL HANDLING

* First Large Industrial House in India to enter the field of Intralogistics

"**Intralogistics** is the art of optimizing, integrating, automating, and **managing the flow of material** & information **within the four walls of a warehouse** "

Organized warehouses are critical part of intralogistics



- Logistics as a segment is growing all over the world
- Hence the need for large and complex warehouses are increasing

1. Typical large & complex project for a retail customer
2. Ground+2 tier system installed on top of 1st floor civil mezzanine.
3. Fully integrated with air control system, fire prevention systems and aisle specific lightings.

Godrej | STORAGE SOLUTIONS

Large warehouse construction involves extensive communication between various stakeholders like Racking suppliers, MEP integrator, HVAC integrators etc

Challenges in a typical Warehousing Project

Challenges in warehousing projects: No one visualize the complete system till installation

Customer sends RFQ to sales team. Sales captures the needs & expectations of customer

1

Sales sends enquiry format to design – by sharing all the customer needs & expectations

2

Design prepares 2D drawing which goes multiple iterations between sales & customers

3

Able to visualize only after installation

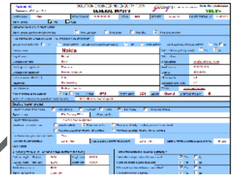
4

Installation

1. Customer

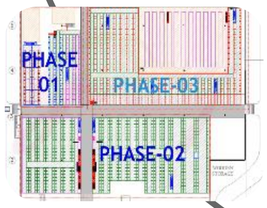
RFQ

2. Sales



Enquiry format

3. Designer

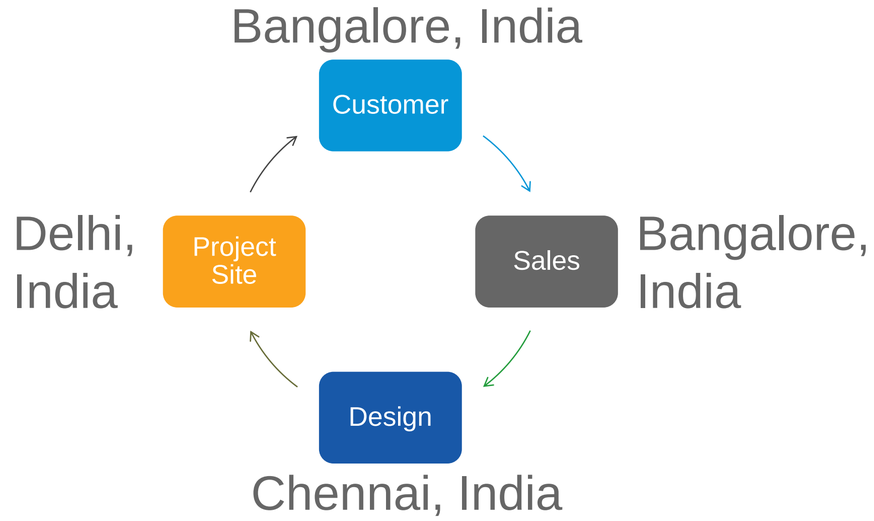


2D Drawing output

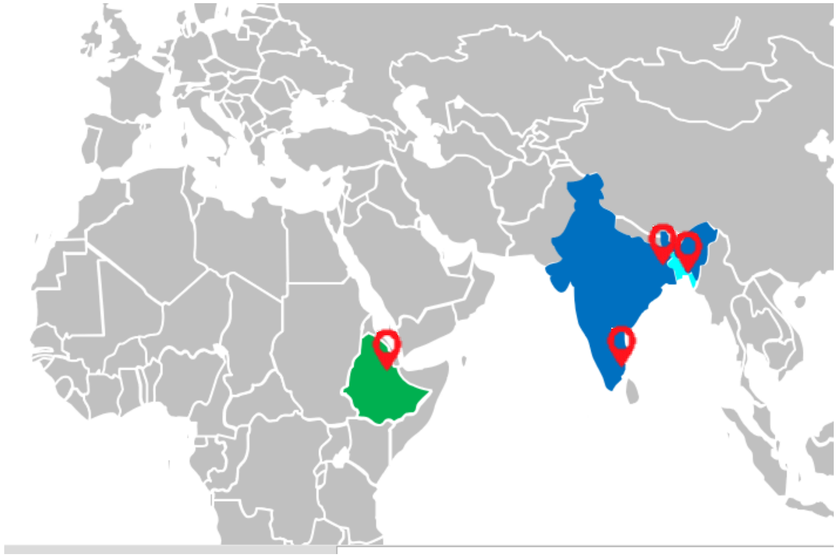
4. Projects

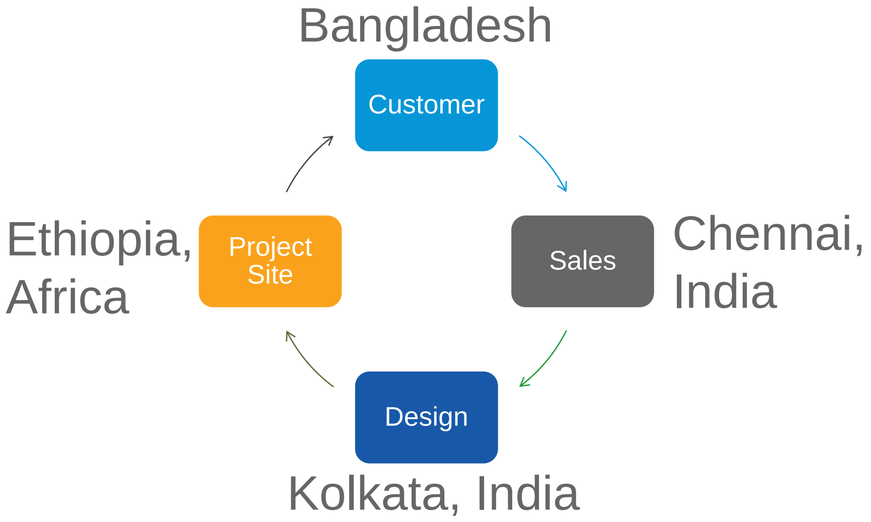
Challenges in warehousing projects: Communication among various functions

Typical India project



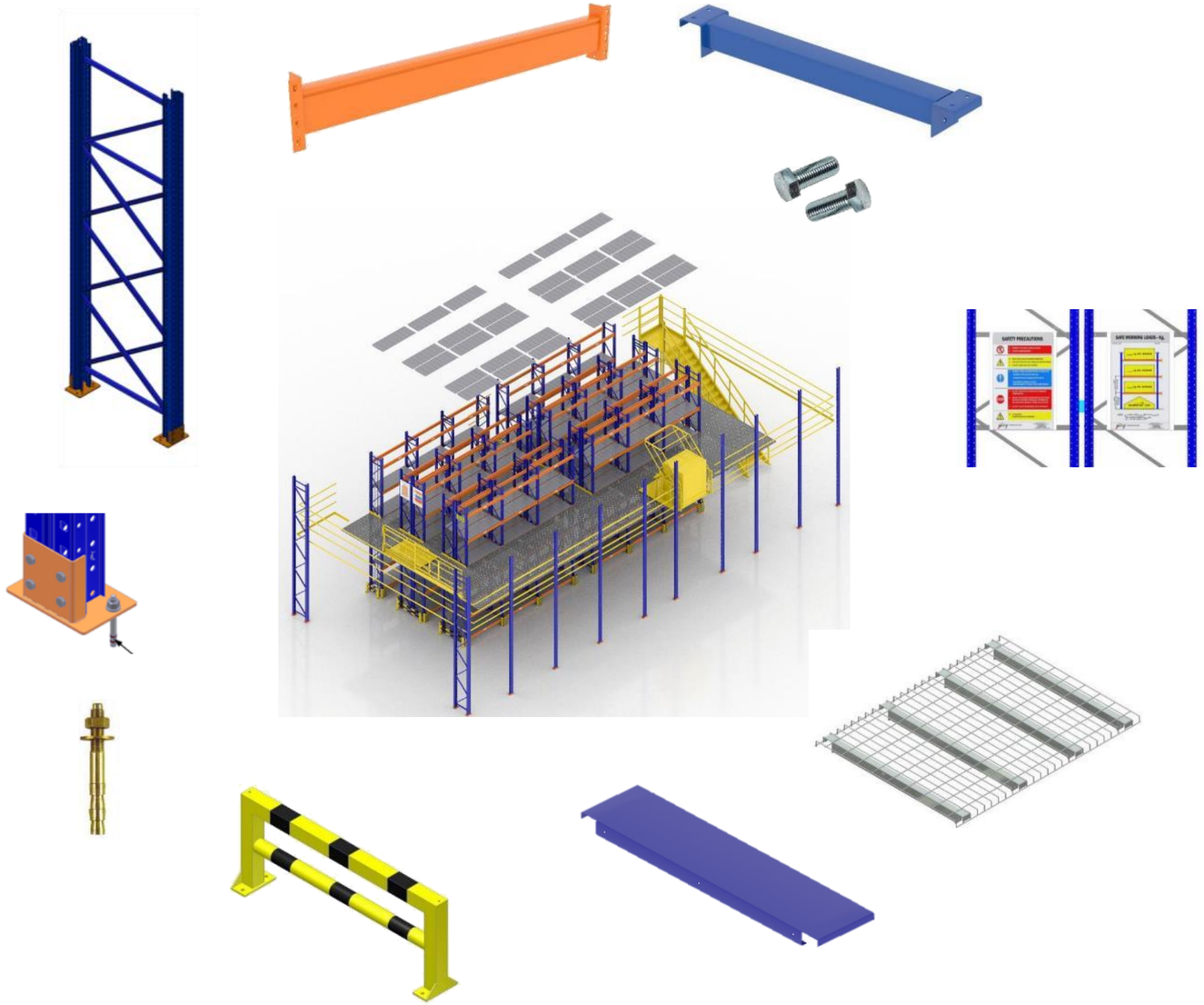
Typical International project

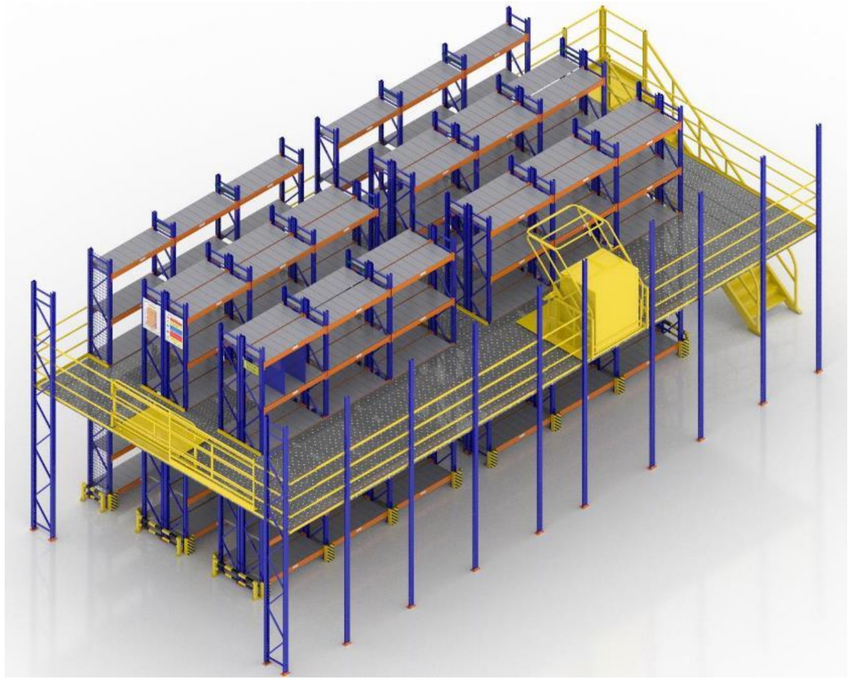




Intralogistics projects requires lot of communication, but People are not co-located

Challenges in warehousing projects: Millions of components assembled at site



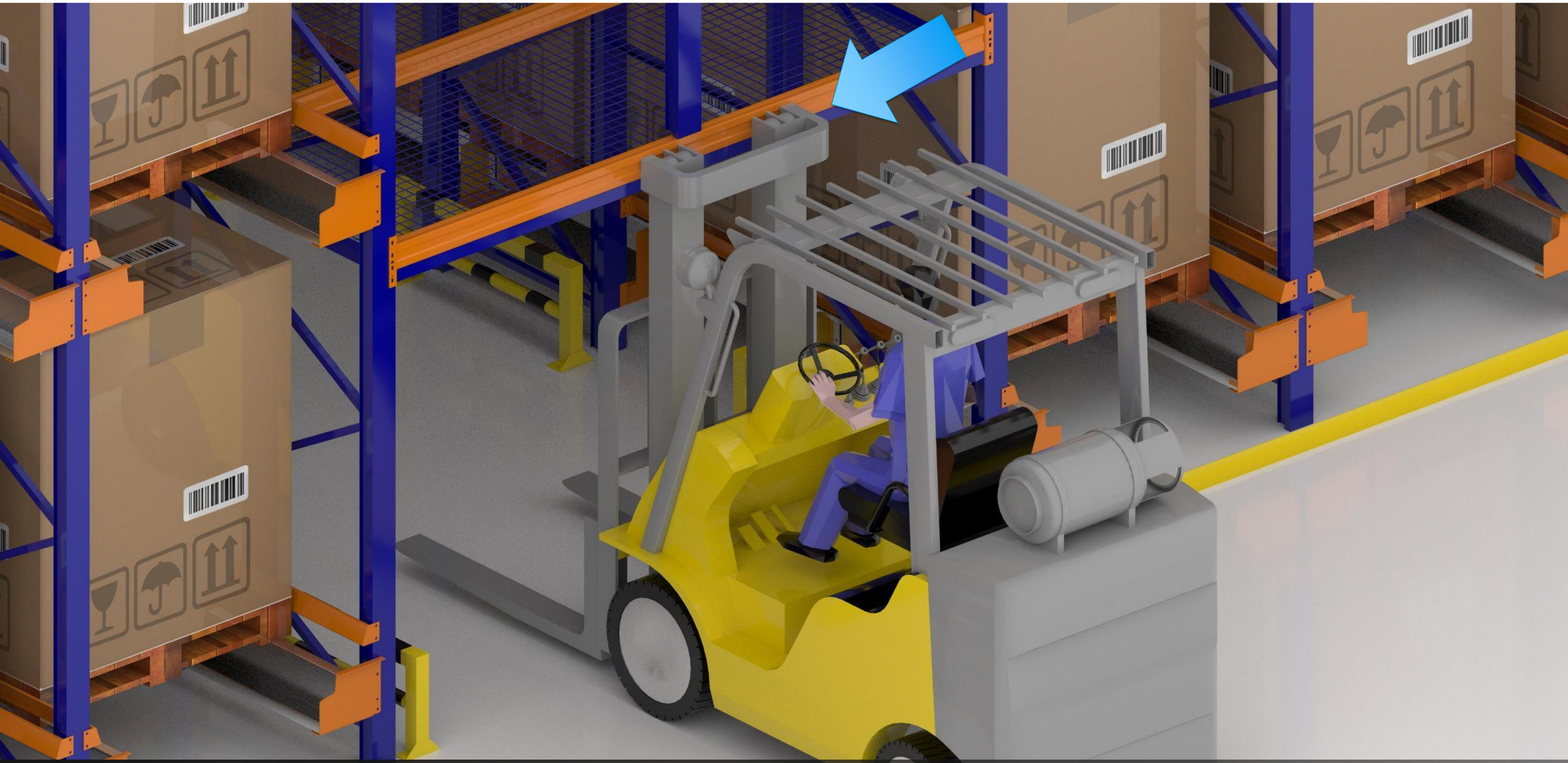


Components From factory → → → → Project Site

Challenges in warehousing projects: Improper visualization of Civil Structure

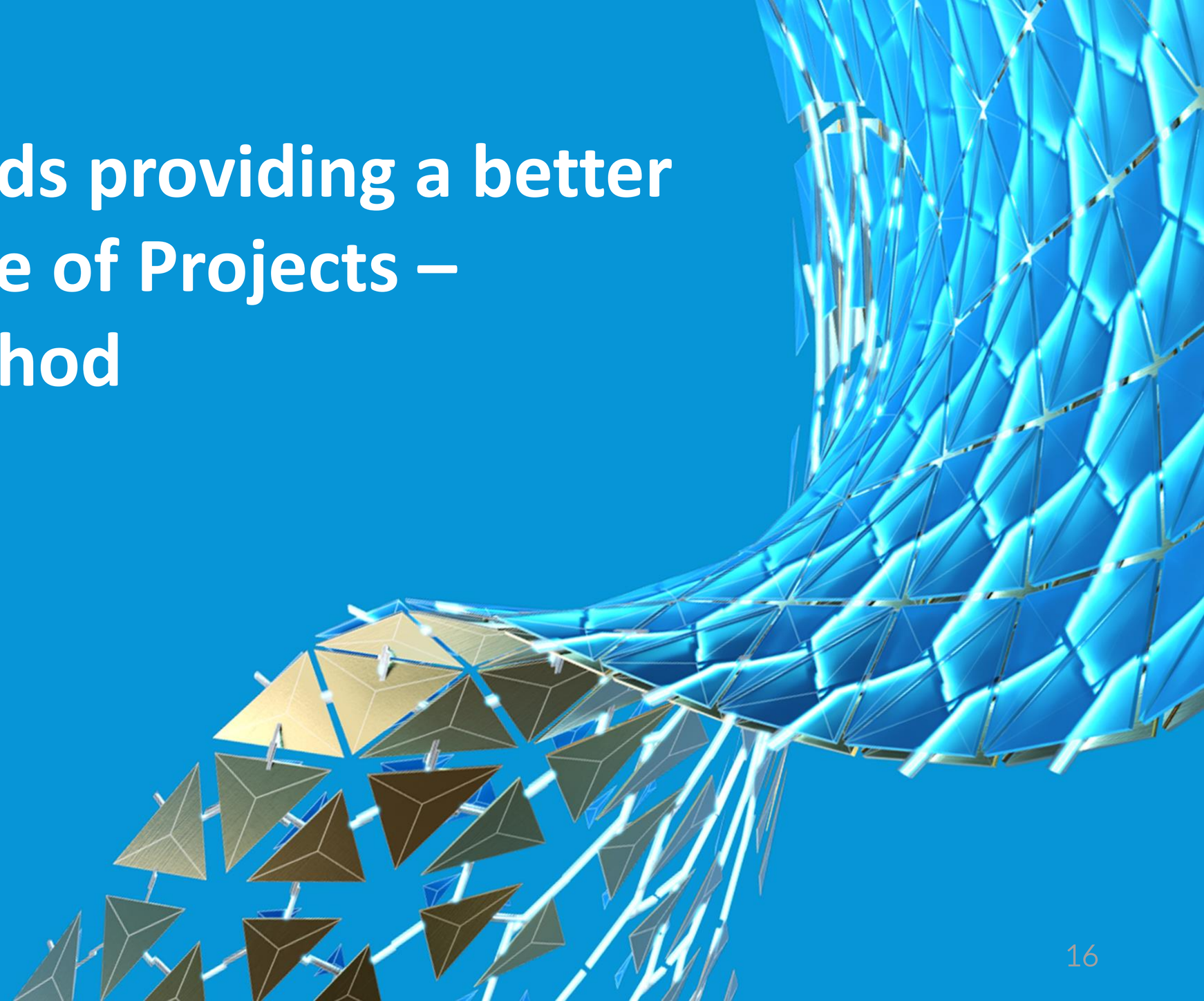
Poor visualization leads to delay in project execution & cost overrun

Challenges in warehousing projects: Issues related to compatibility checks across vendors

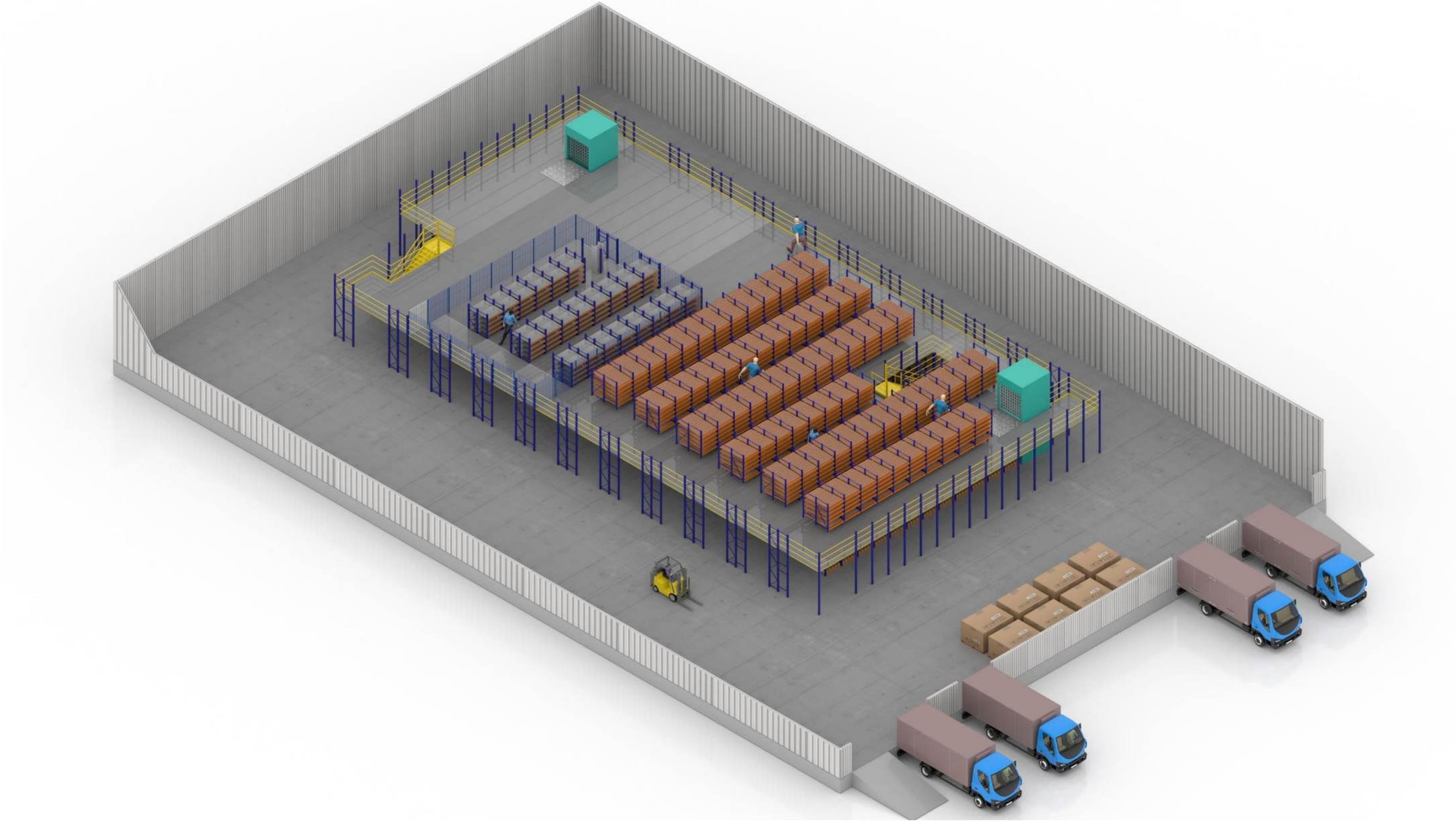


Poor visualization leads delay in project execution & cost overrun

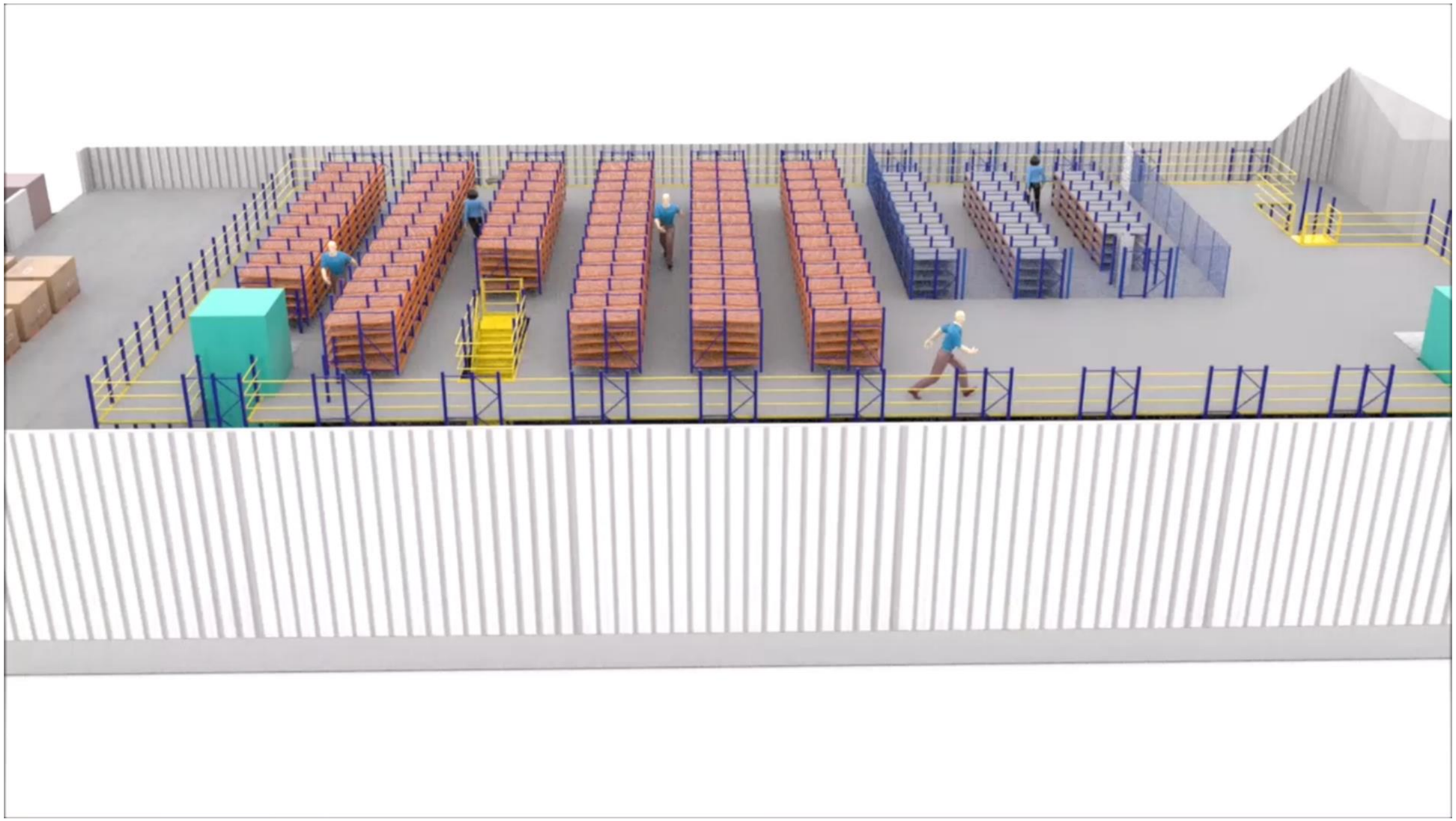
Approach towards providing a better visual experience of Projects – Our Unique method



Presenting projects using 3D views



Presenting projects using Walkthrough



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

Presenting projects using Walkthrough

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

Our unique way of preparing 3D & Walkthrough

Traditional Approach

AUTODESK® INVENTOR®

- Model sizes are very heavy *(Example: 380MB Inventor Vs 40MB AutoCAD).*
- Pictures & component level animations can be done.
- Complete walkthrough & immersive experience not possible.

Our Approach

AUTODESK® AUTOCAD®

File import

From other sources (universal formats like IGES / Step)

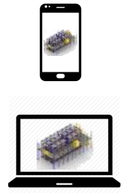
AUTODESK® 3DS MAX®

- Polygon optimization
- Scaling
- Material applying
- Color & textures
- Lighting
- Camera path

- Image export
- Video conversion
- Editing

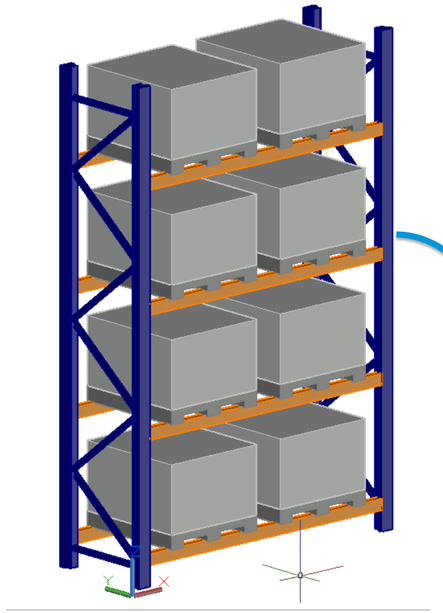
Google Drive

OneDrive

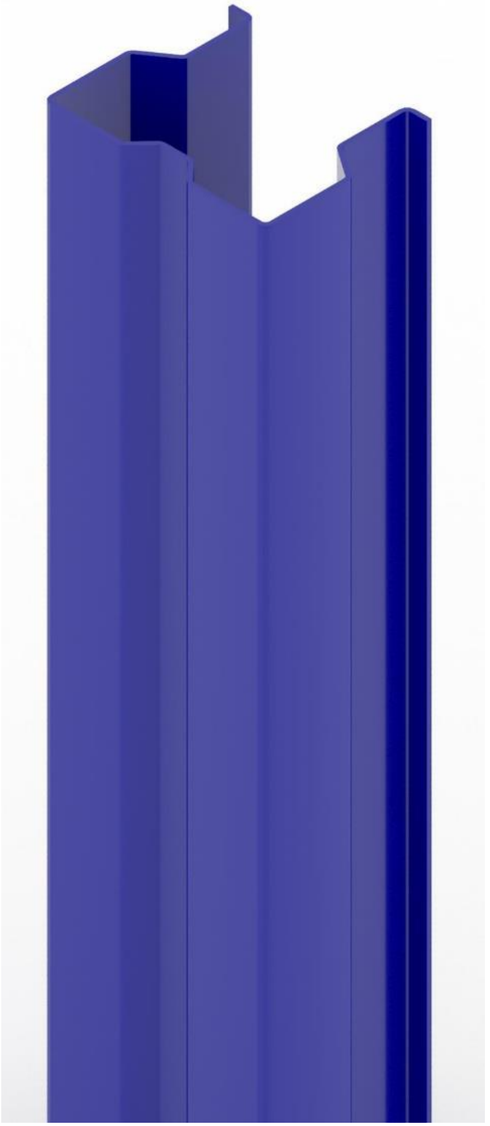


Step 1: Model optimization

- More polygons
- More features
- Difficult to handle – 3MB per component

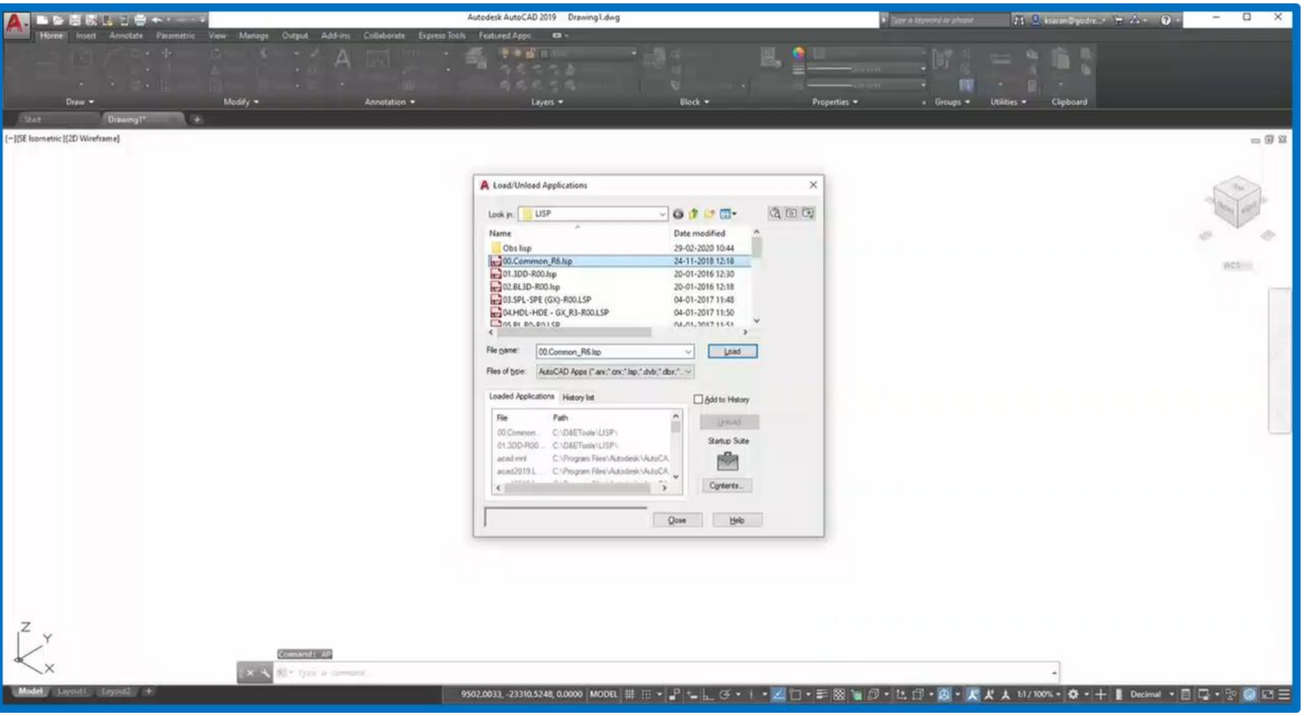


- Less polygons
- Depicts profiles with less features
- Easy to handle – 100KB per component

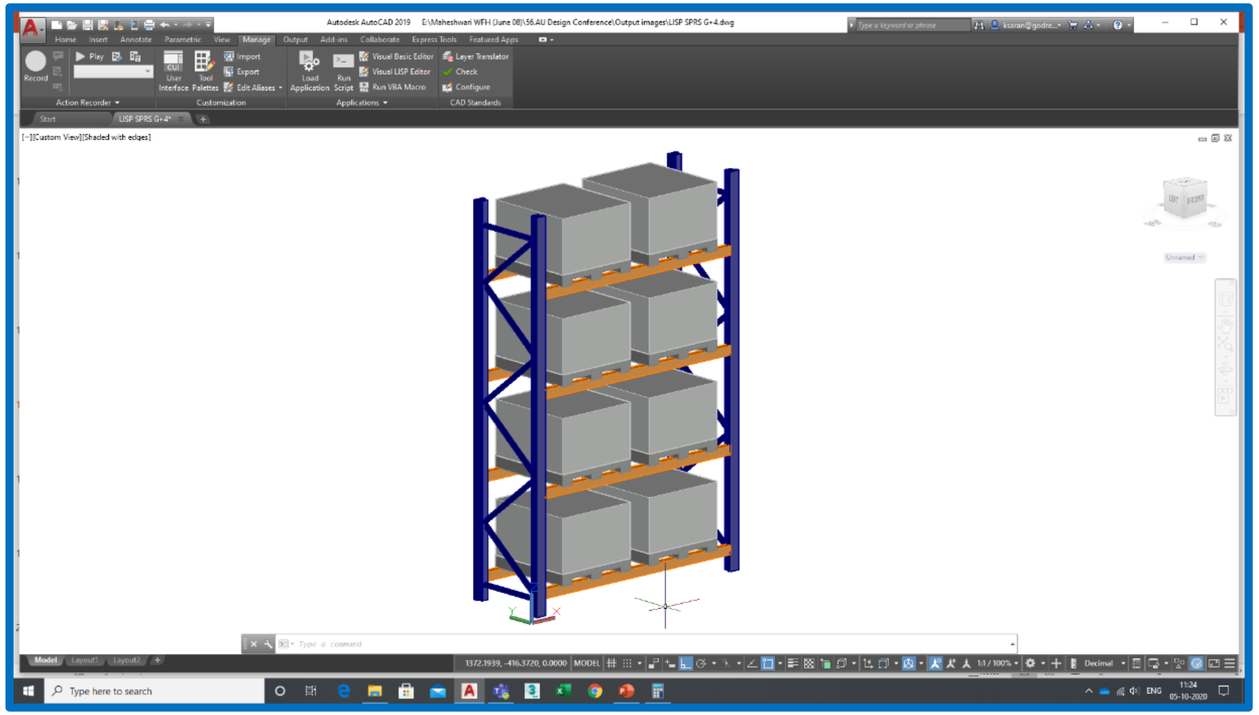


Model size is as small as it could be. Hence handling becomes smooth.

Step 2: Usage of automation tools for making quick 3D models



Importing LISP files & executing commands

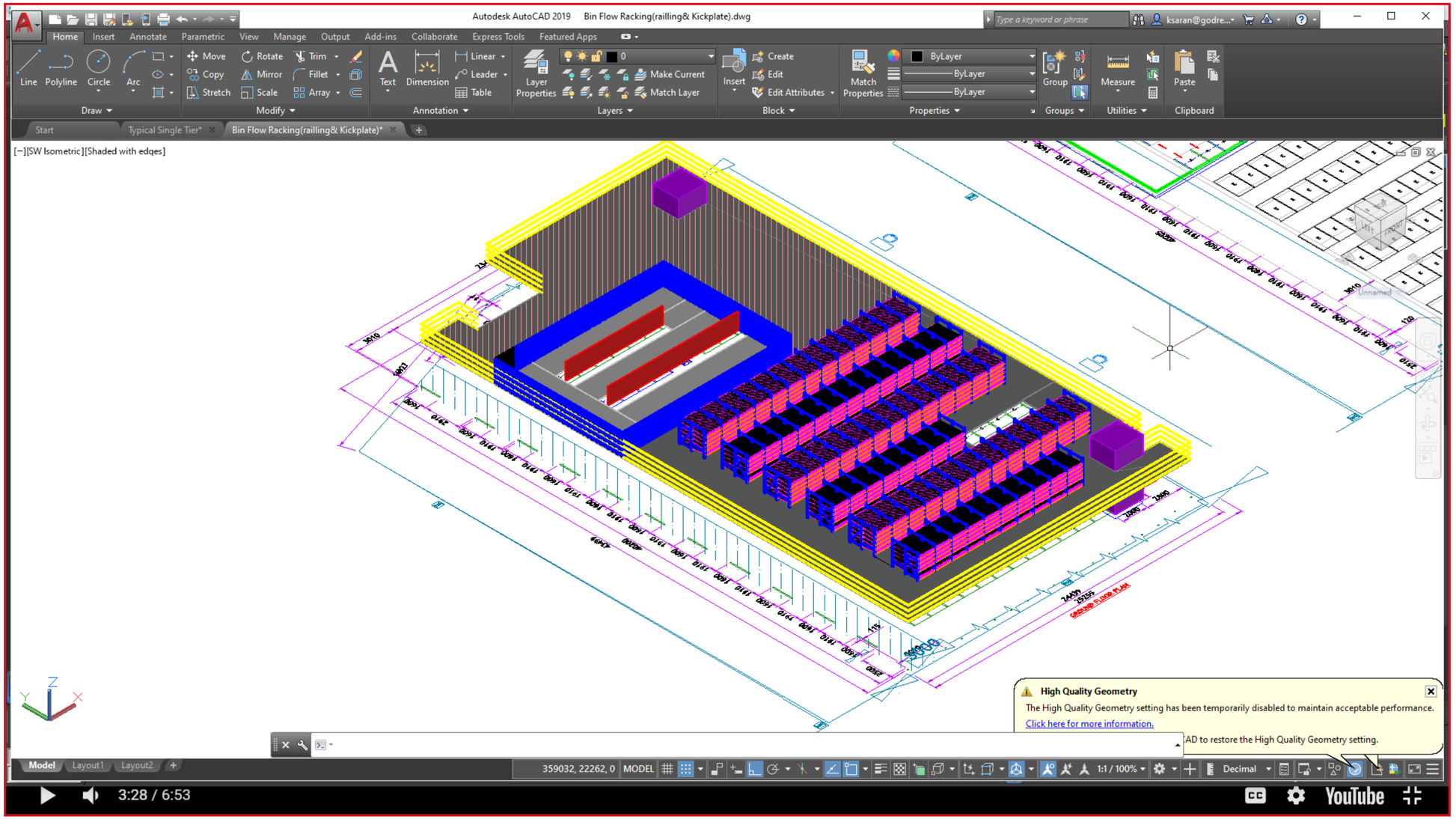


Creating a basic main unit

- If it is a standard product, existing models can be modified and used for a new project.
- For new requirements, model will be created partially using LISP & manual editing.

Bringing speed to the model creation using LISP

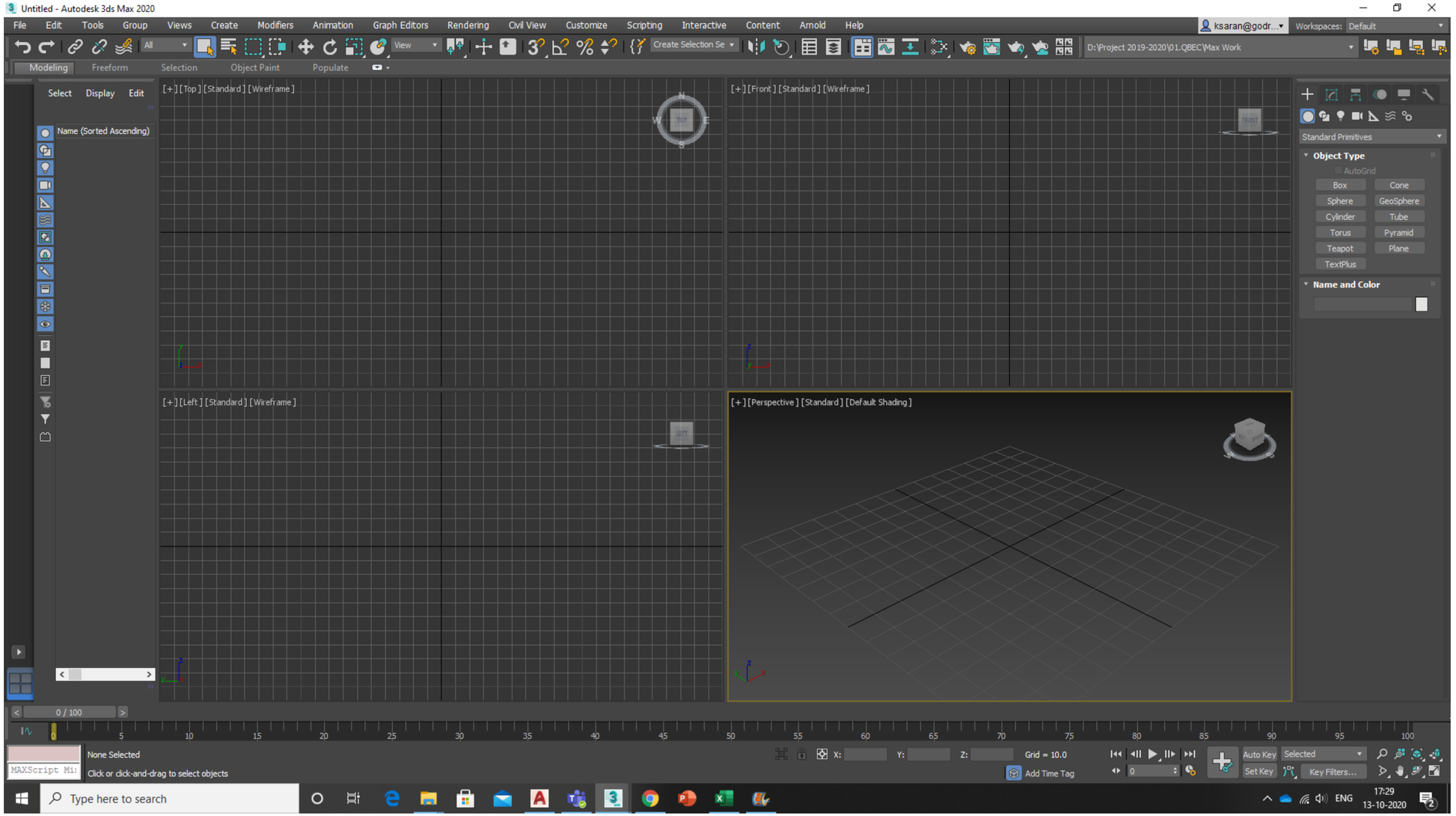
Step 3: Creating entire model in AutoCAD



Using the modules created in LISP, full project model is created.

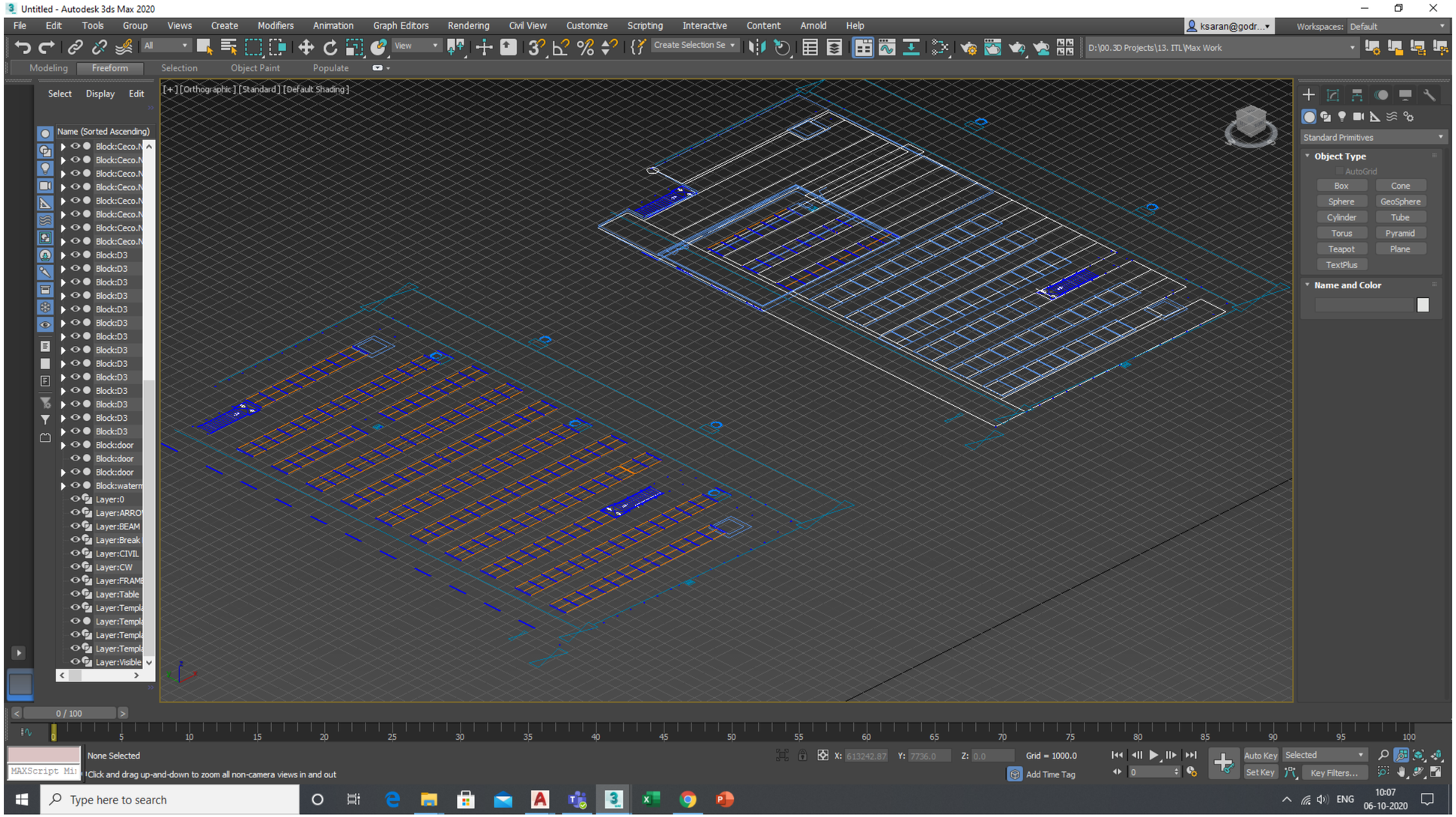
Light weight files enables processing through standard workstations

Step 4: Getting into 3DS MAX & basic settings



Moving to 3DS MAX from this step. Basic viewport & import unit setup done.

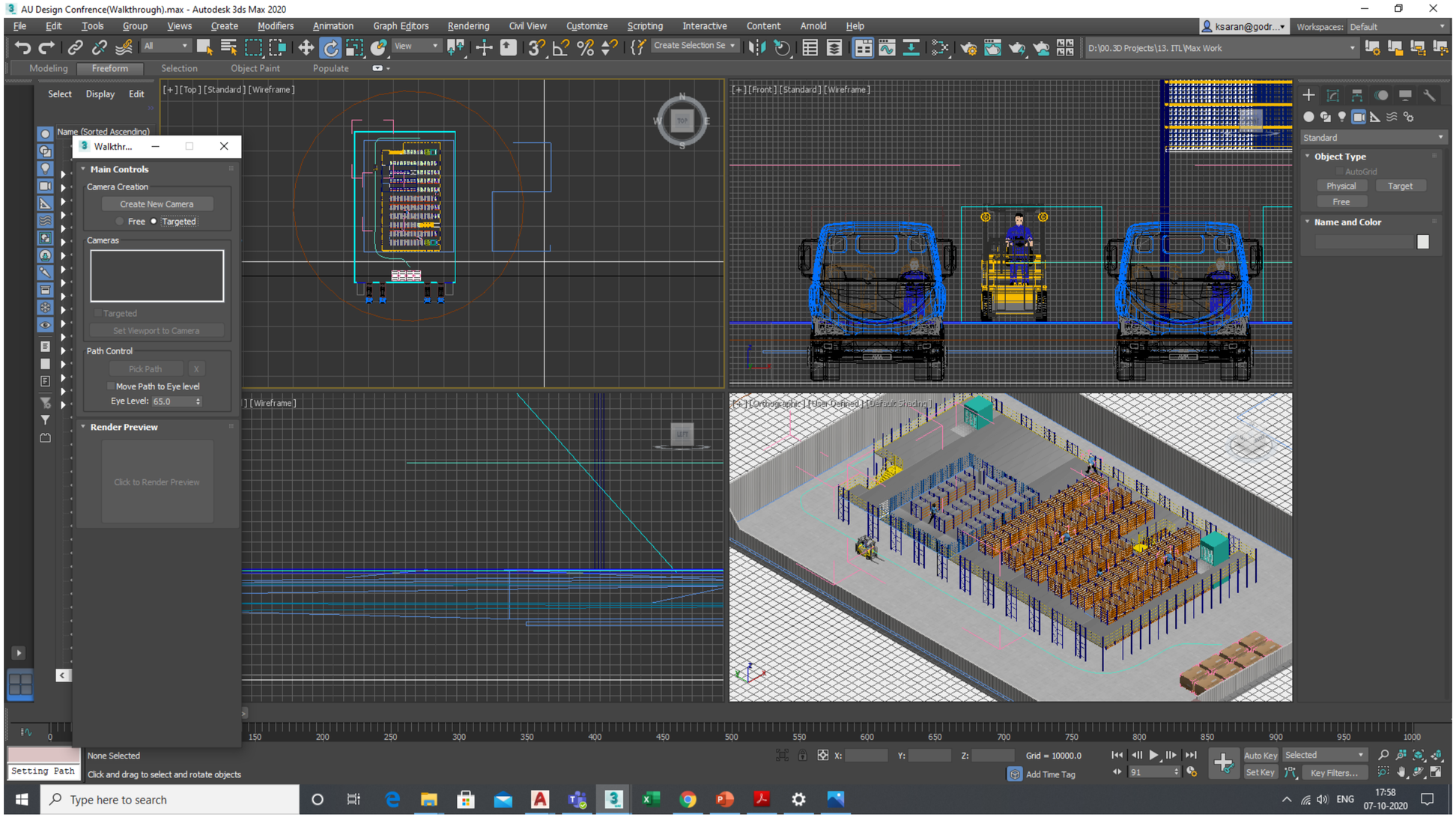
Step 5: Importing 2D layout in 3DS MAX



Now, Import the 2D layout into 3DS MAX for setting up boundary & make 1:1 models.

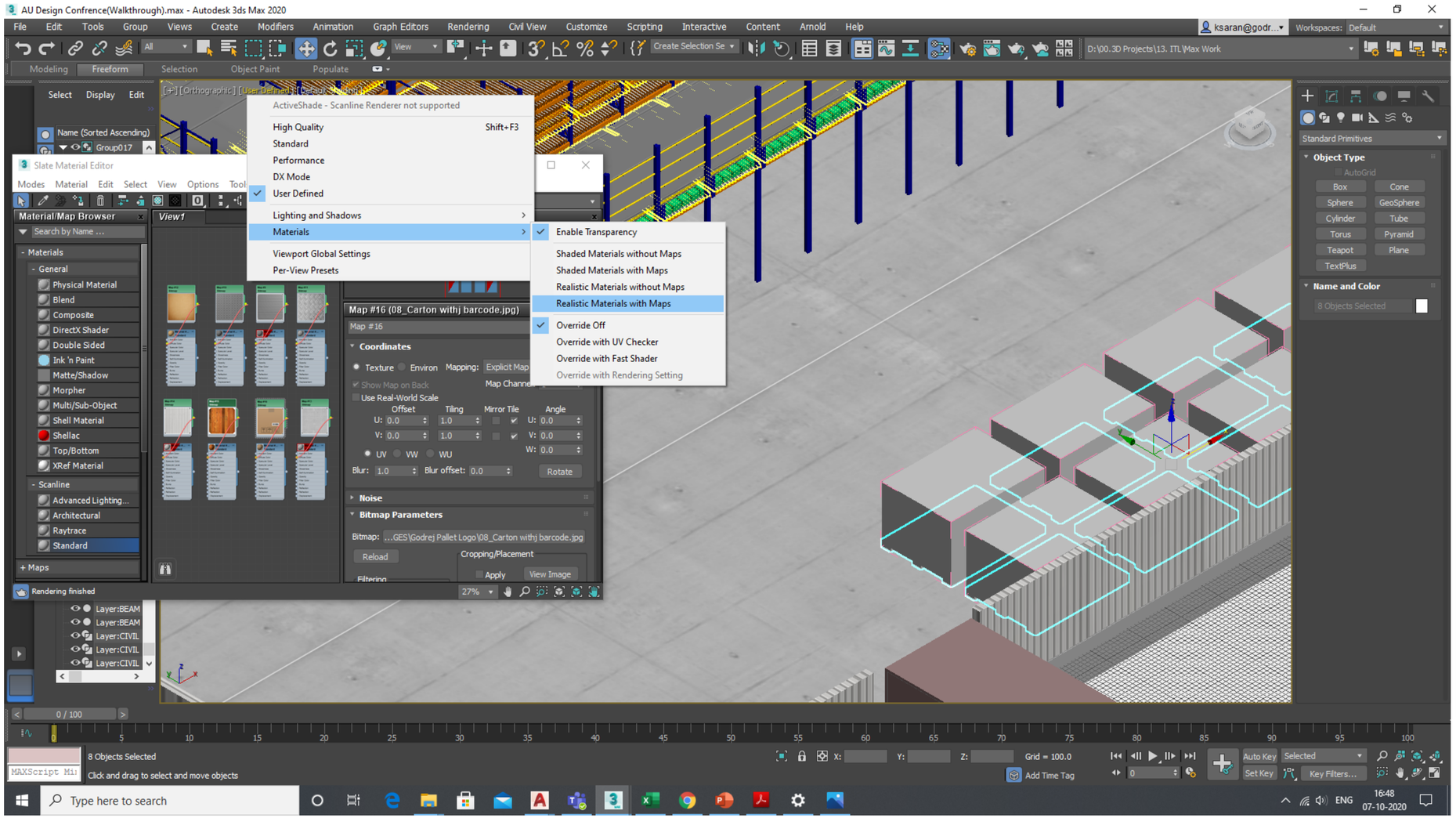
Ensuring the model dimensions are as per the requirements

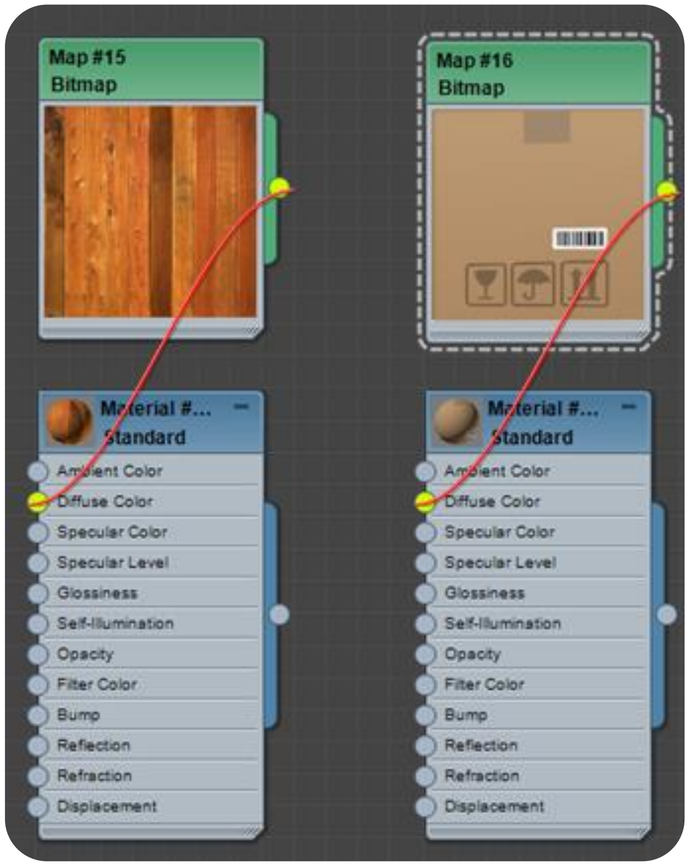
Step 6: Importing 3D models & aligning with 2D layout



Start importing 3D models from CAD drawings. Usually for large projects, models are created in multiple files. All will be imported and aligned as per layout.

Step 7: Applying material, color and textures

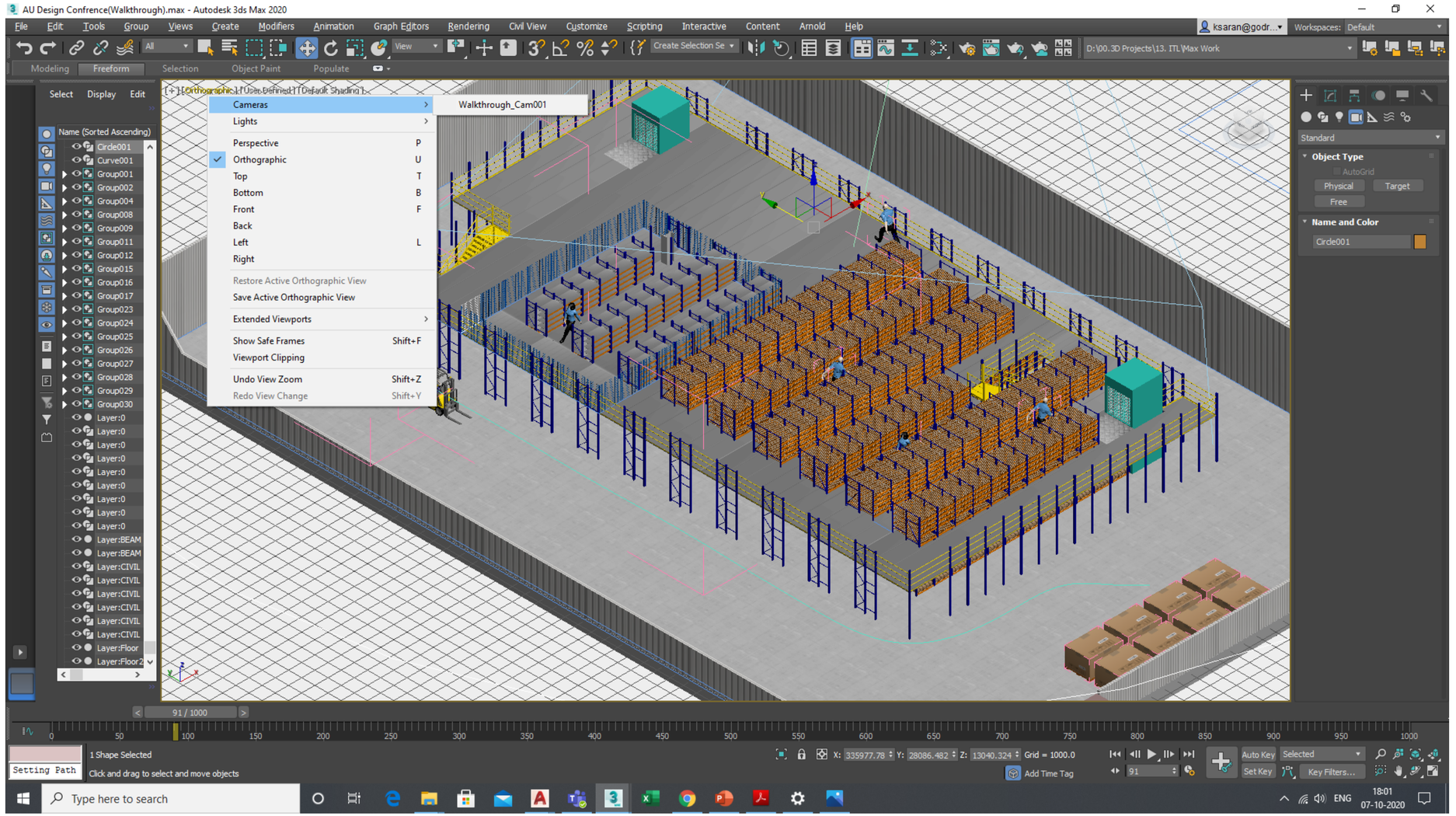




Once model imported, select the models using layer properties and apply materials through material editor.

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

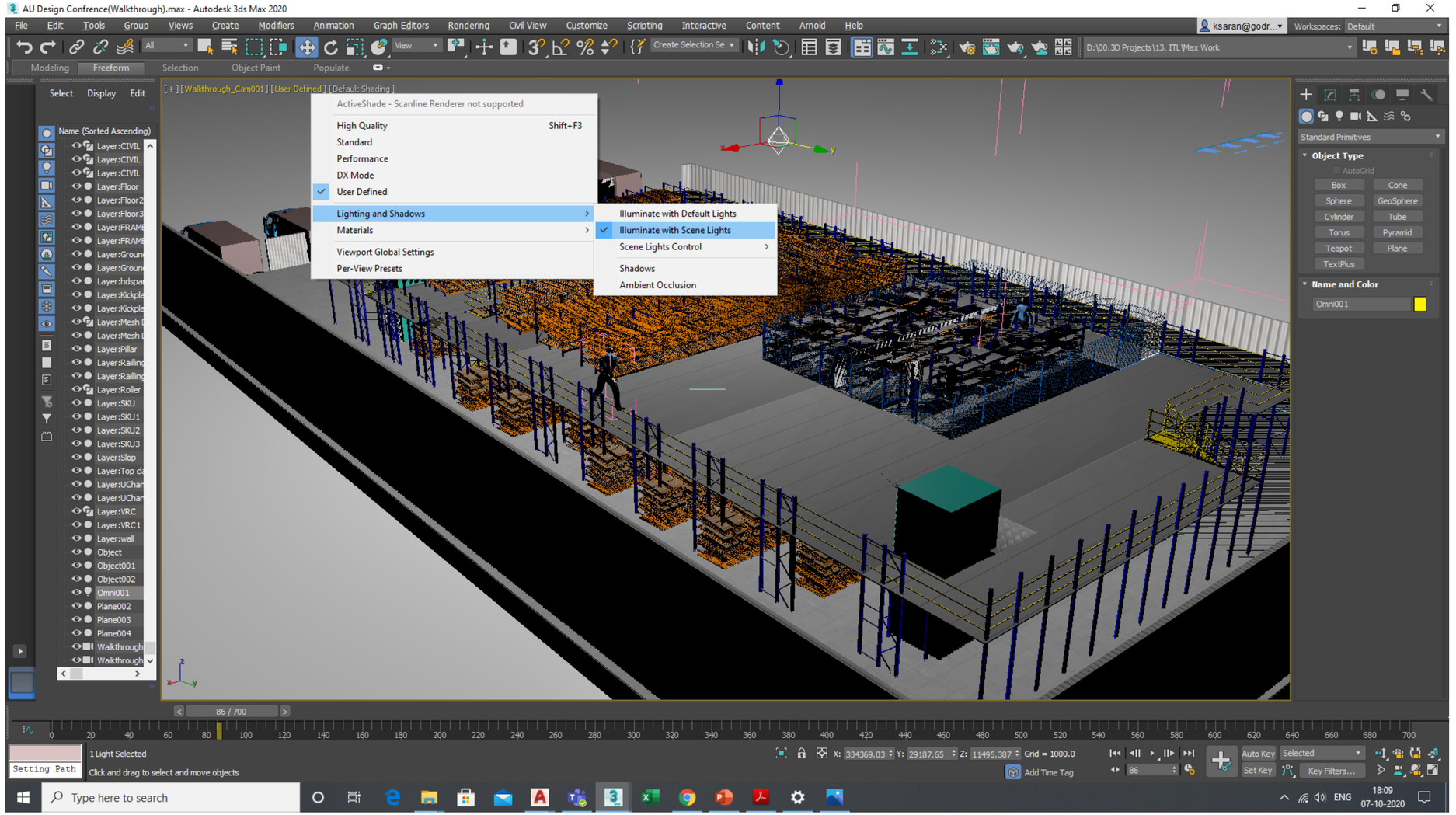
Step 8: Lighting & Rendering setup



Considering time, we use Arnold option for lighting with specific pre-defined modifiers.

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

Step 9: Camera path setup



For walkthrough video, required path is created. And then rendering will be started.

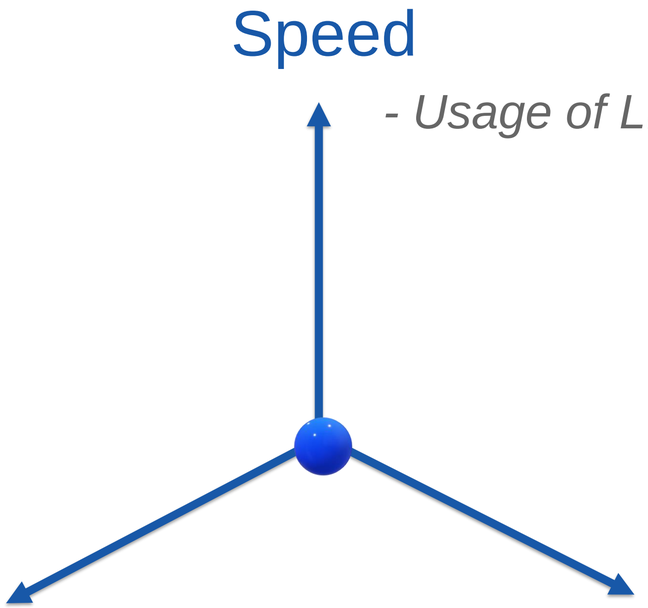
Final output - Image

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.

It is unique in three ways,



Speed

- Usage of LISP

Skill

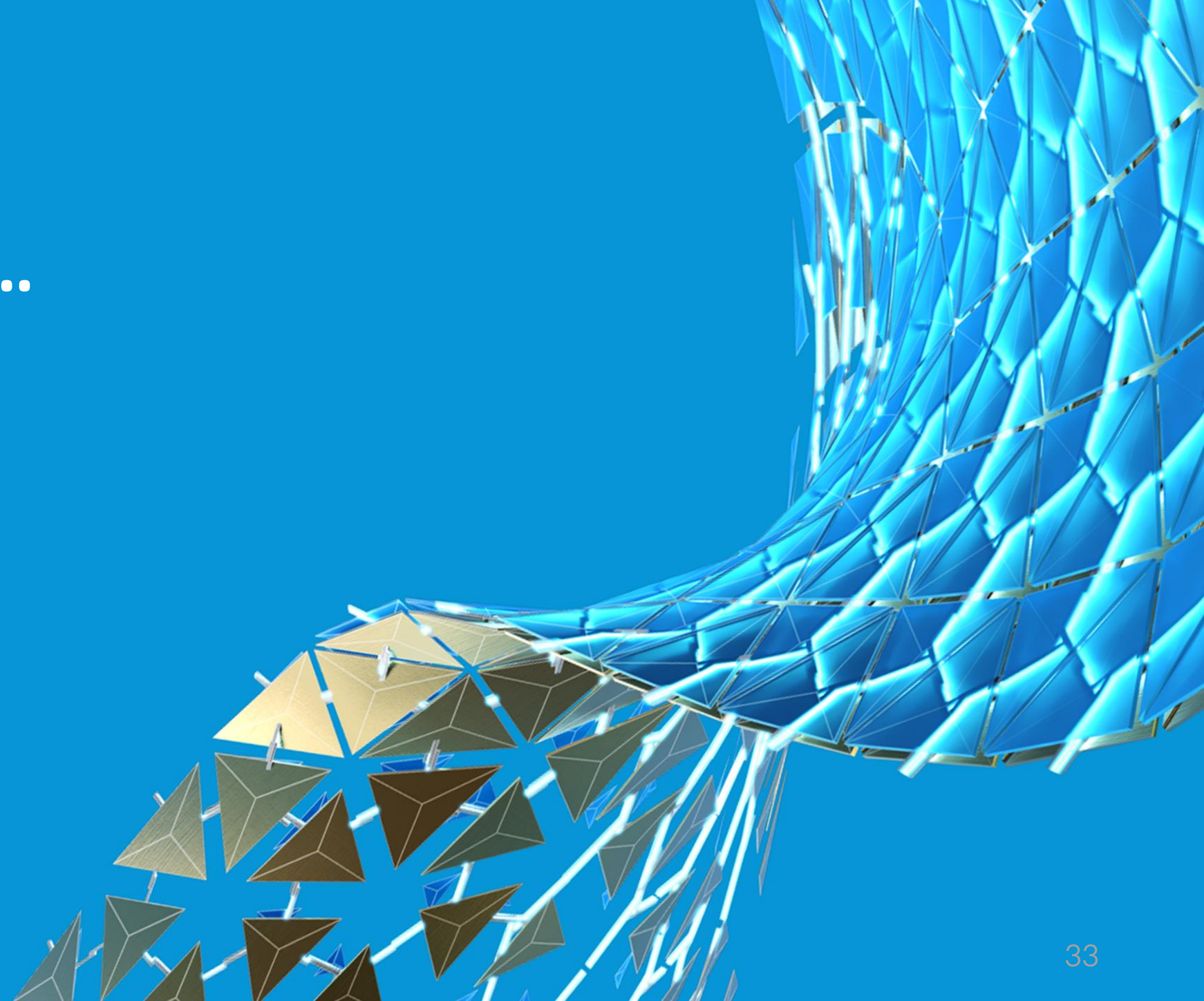
- Repetitive process which does not need experts

File size

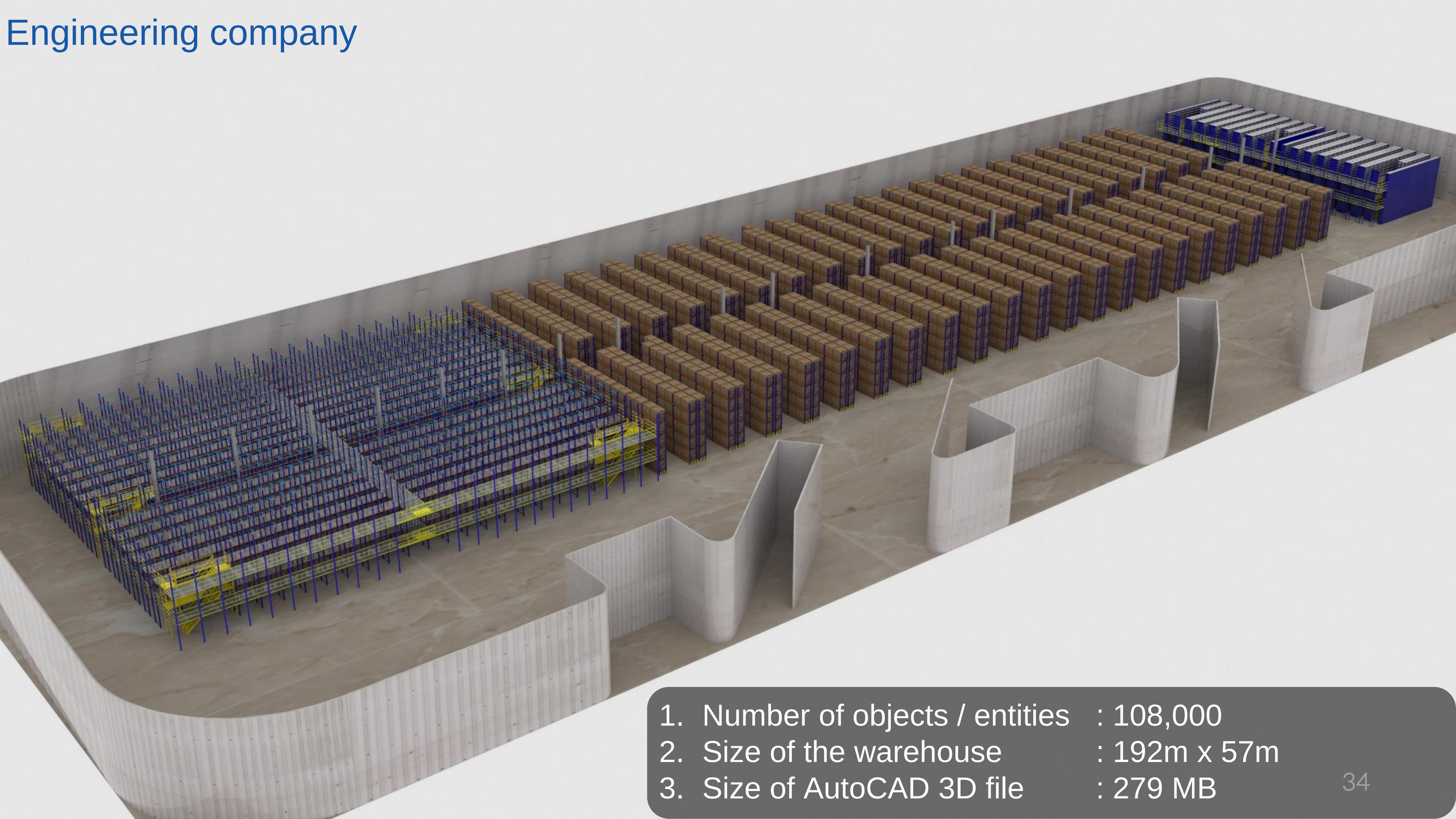
- OK for standard workstations

A good quality two-minute walkthrough video can be created in ’16’ working hours.

Some examples…

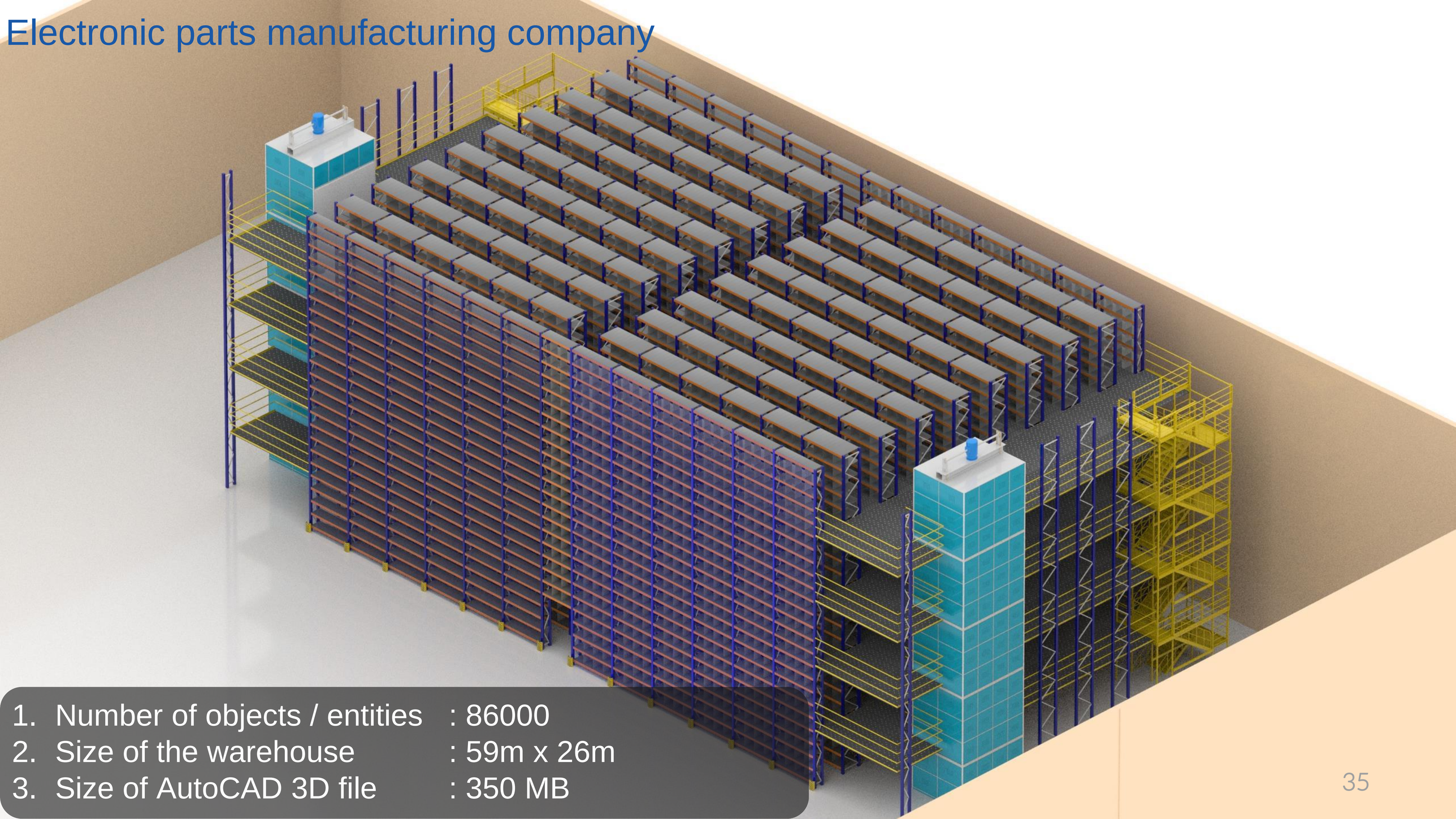


Engineering company



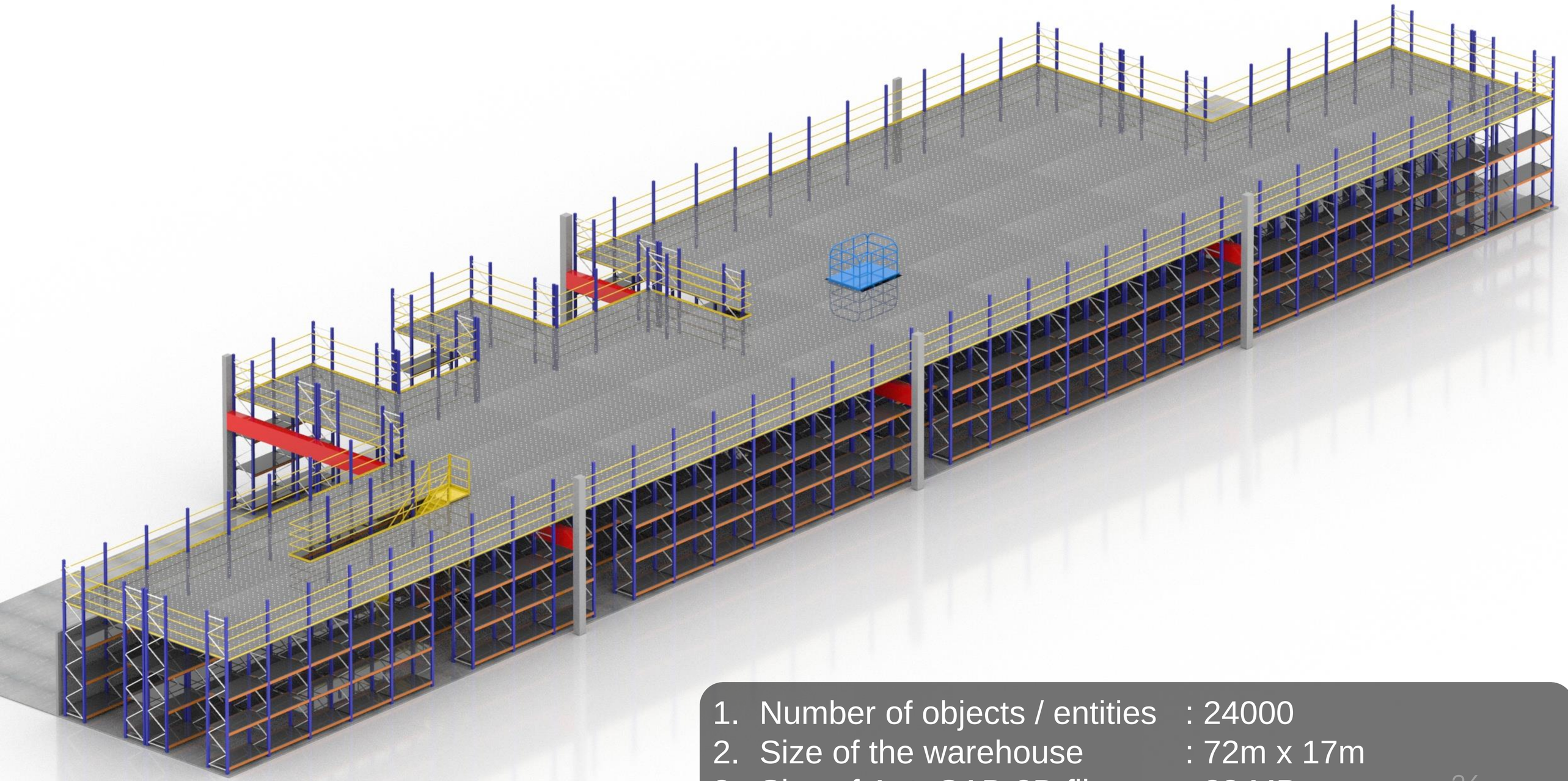
1. Number of objects / entities : 108,000
2. Size of the warehouse : 192m x 57m
3. Size of AutoCAD 3D file : 279 MB

Electronic parts manufacturing company



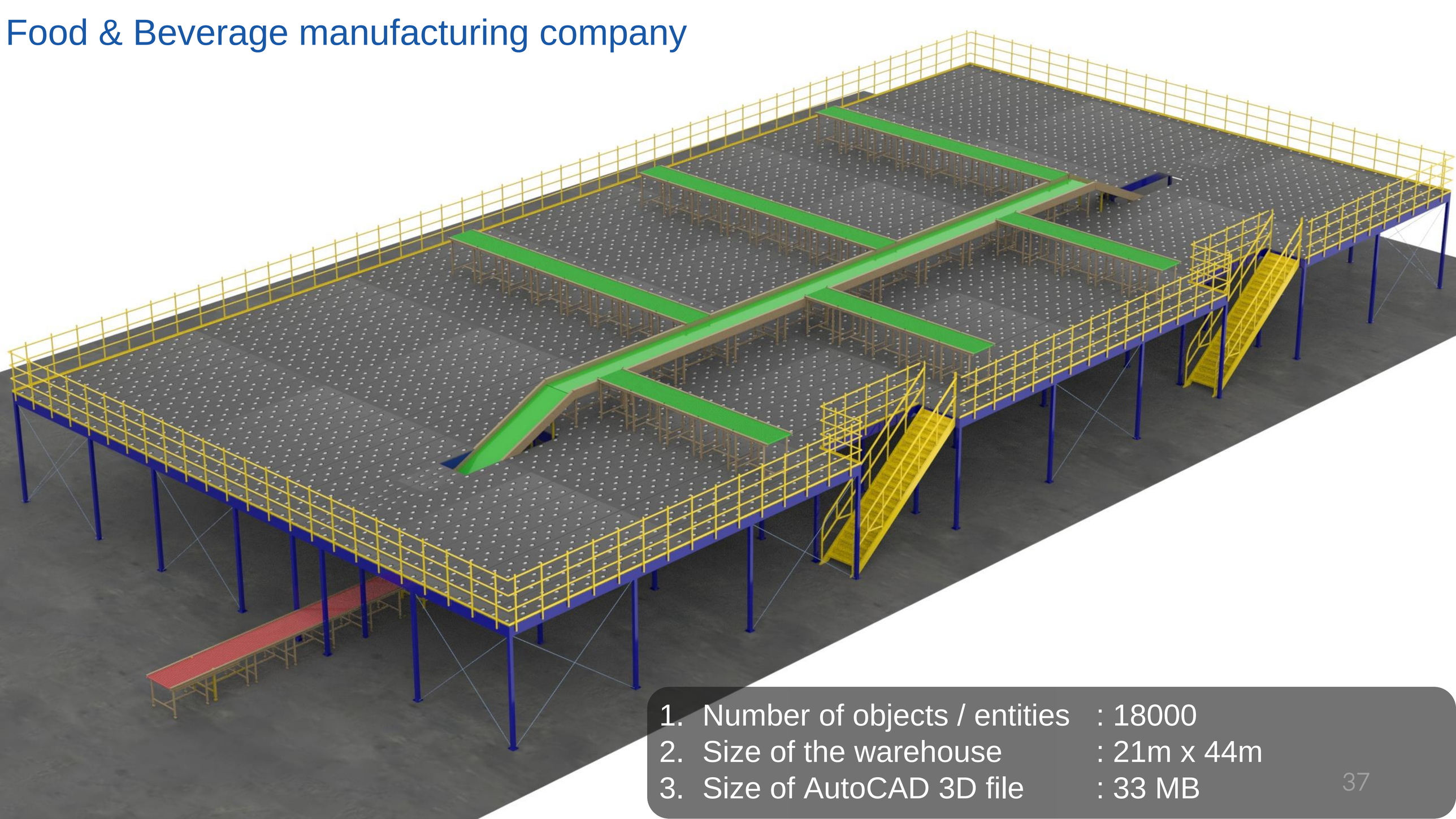
1. Number of objects / entities : 86000
2. Size of the warehouse : 59m x 26m
3. Size of AutoCAD 3D file : 350 MB

Pharma company



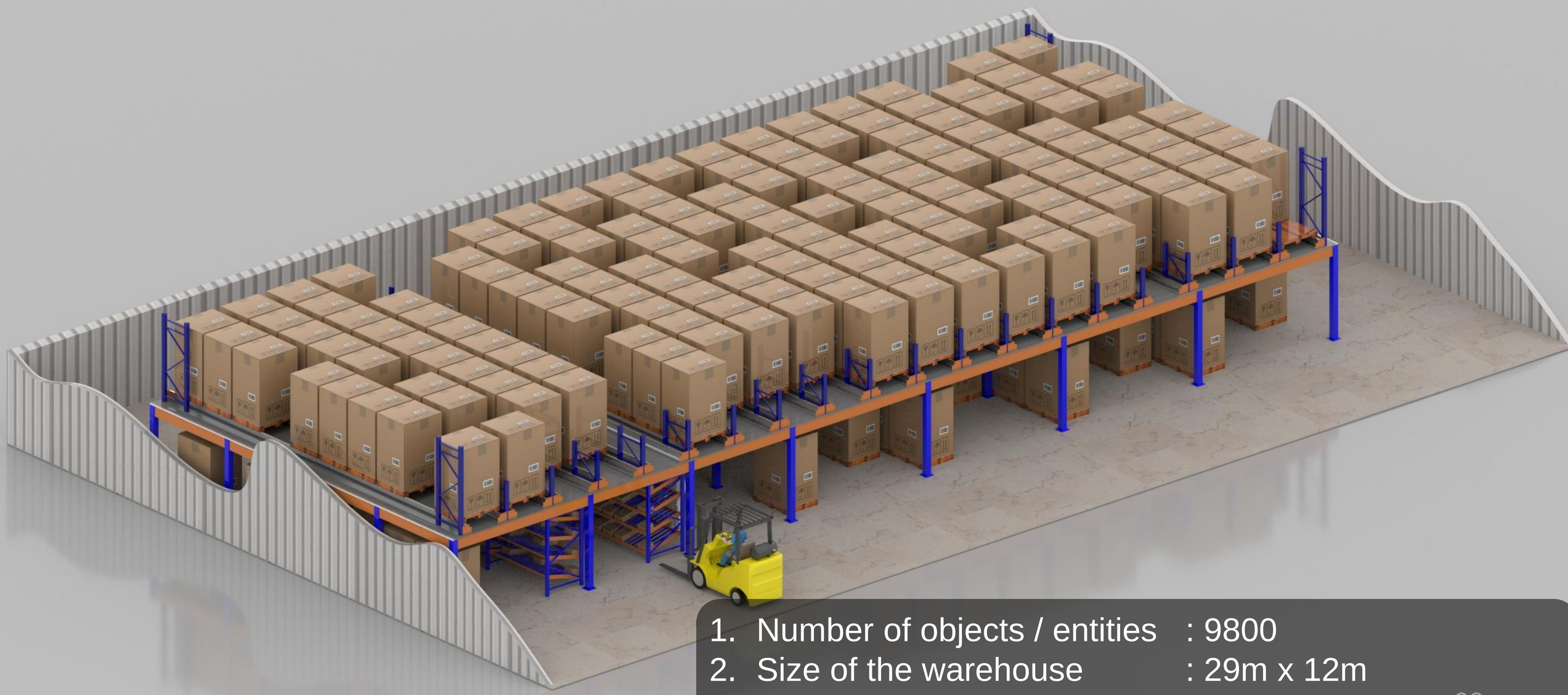
1. Number of objects / entities : 24000
2. Size of the warehouse : 72m x 17m
3. Size of AutoCAD 3D file : 28 MB

Food & Beverage manufacturing company



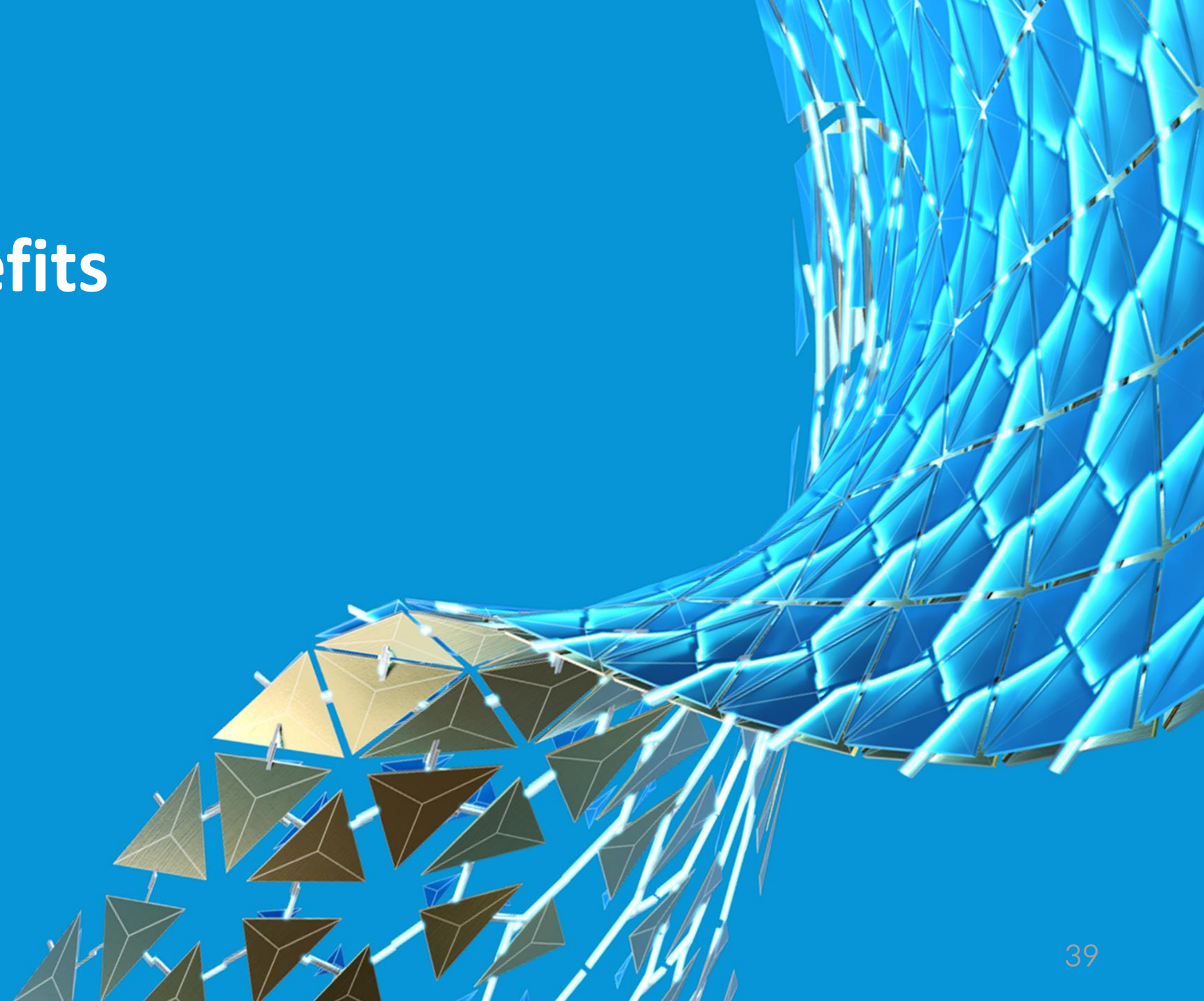
1. Number of objects / entities : 18000
2. Size of the warehouse : 21m x 44m
3. Size of AutoCAD 3D file : 33 MB

Pharma company



1. Number of objects / entities : 9800
2. Size of the warehouse : 29m x 12m
3. Size of AutoCAD 3D file : 82 MB

Learning & Benefits



Key Learning

In this presentation we explained how to

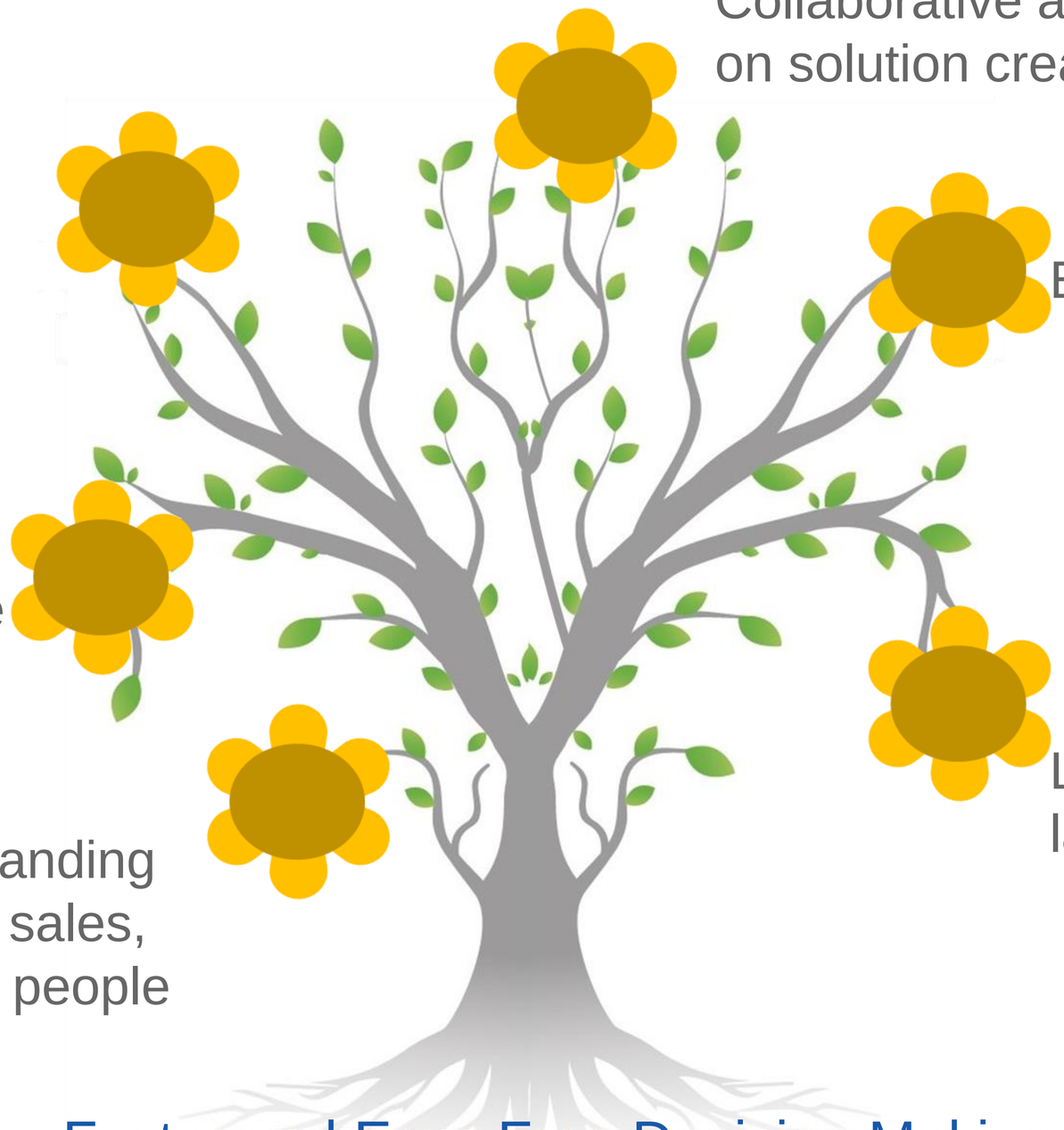
- Create light weight 3D models that can be generated using normal design workstations
- Create walkthrough video using general AutoCAD products within short time.
- Possibilities of lateral deployment for creating immersive experiences.

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

Customer Benefits

Collaborative approach on solution creation

Reduced iterations in a project cycle



Enables quick decisions

Smooth communication between people who are not co-located

Less or NO error due to lack of conceptualization

Common understanding across customer, sales, design & projects people

Faster and Error Free Decision Making

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