NATIONAL UNIVERSITY OF HO CHI MINH CITY
UNIVERSITY OF SCIENCE

Faculty of Information Technology – Major in Computer Vision

FINAL PROJECT

WRITING AN ADD-IN FOR AUTOCAD

GROUP 3
04/07/2022

Table of Contents

I. Group Information

STUDENT ID	FULL NAME	MAIL	WORK ASSIGNMENT
19127644	**Chung Kim Khánh**	**ckkhanh19@clc.fitus.edu.vn**	• Planning project • Setting up project files/code • Finding references • Write mini report • Write main report • Code drawing sharp into AutoCAD • Fix slide
19127263	Nguyễn Hoàng Sơn	nhson19@clc.fitus.edu.vn	• Code read file .STL • Create Test sample • Create picture step by step • Fix slide
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II. Introduction

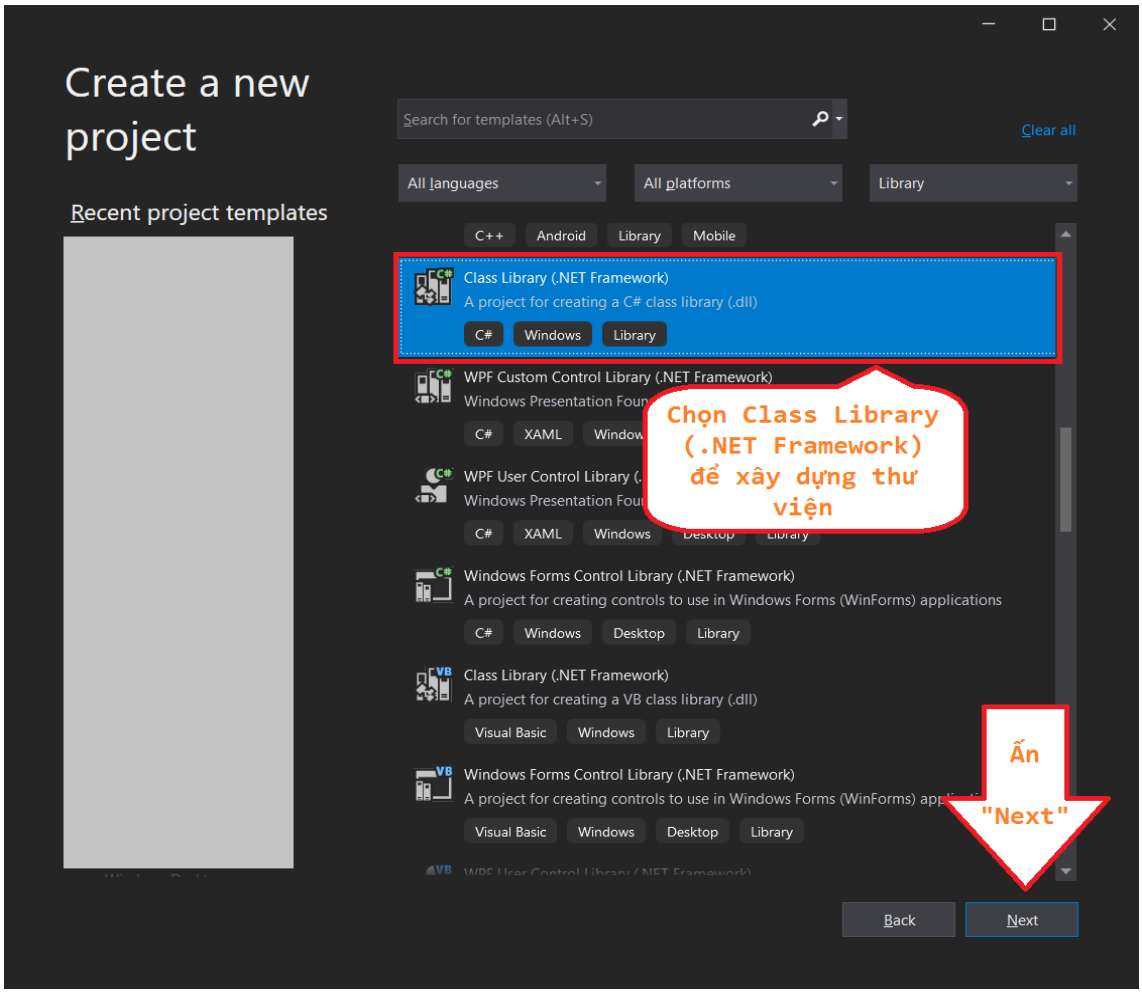
This is a plug-in of AutoCAD software that supports users to import .STL files (SketchUp software) into AutoCAD. This project we did while studying Applied Graphics course at VNUHCM-University of Science. The project is written in C# language on Visual Studio 2019 and AutoCAD 2020 software. We decode the .skp file from binary to the necessary information and program the command to ask AutoCad to perform the redraw. The project stops at the basic geometry level.

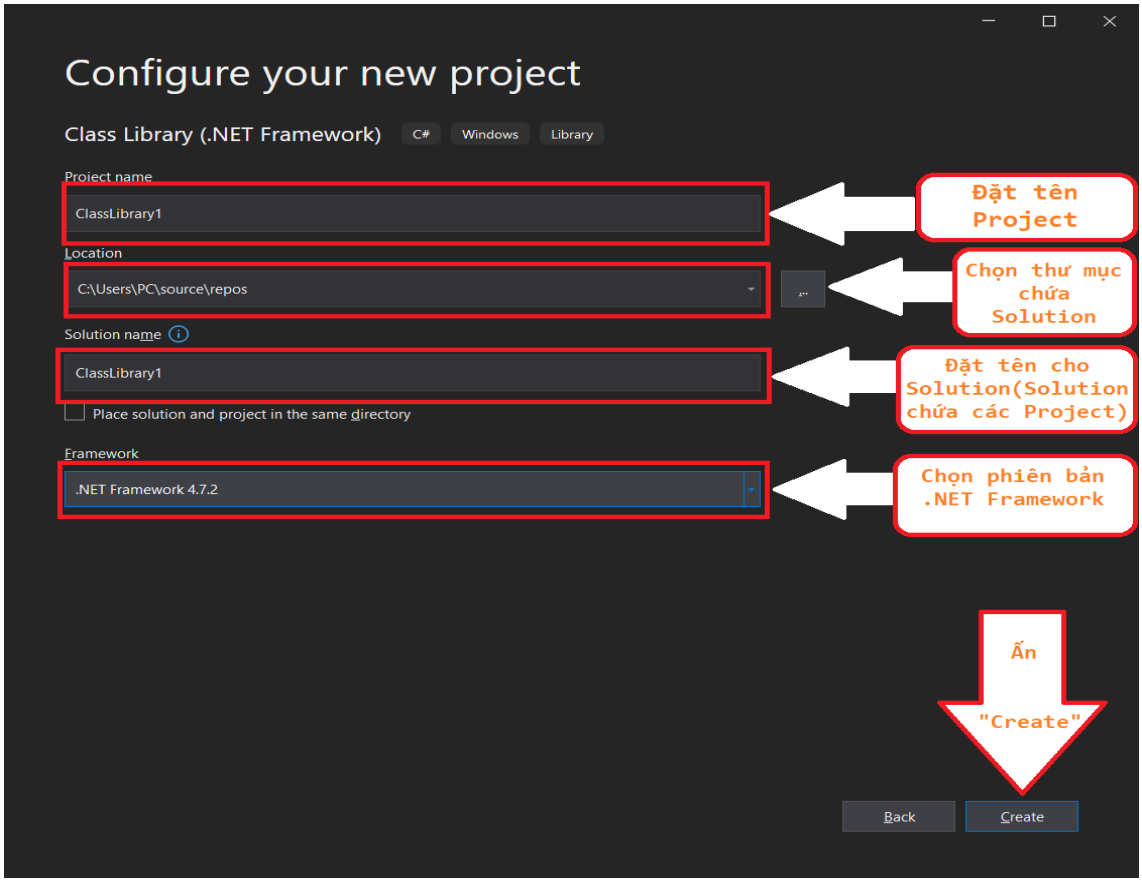
III. Instructions for Setting Up AutoCAD Projects on Visual Studio

There are 2 ways to create an Add-in programming project for AutoCAD. Method 1 we use directly to install AutoCAD programming support available on Visual Studio. Method 2 will be more complicated, but it is the foundation for plug-in programming for other software.

Step 1:

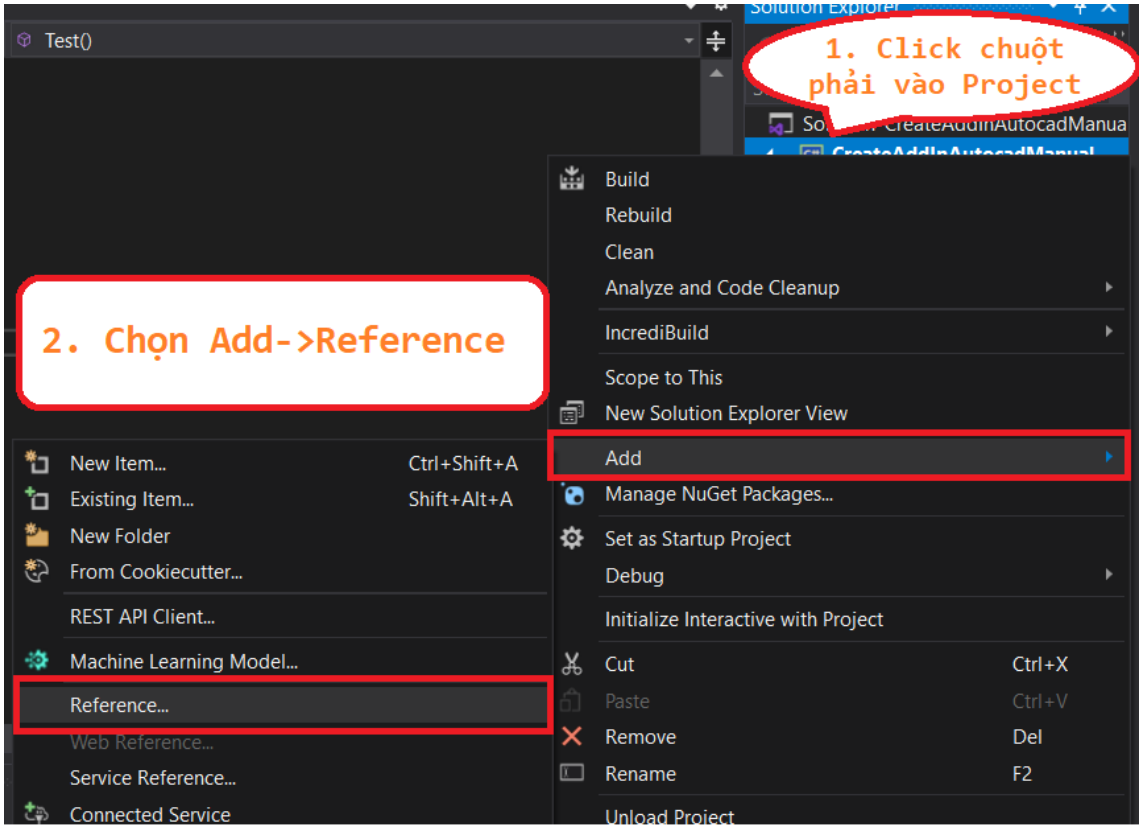
Create a “New Project” using “Class Library”. Choosing library .Net Framework (newest).

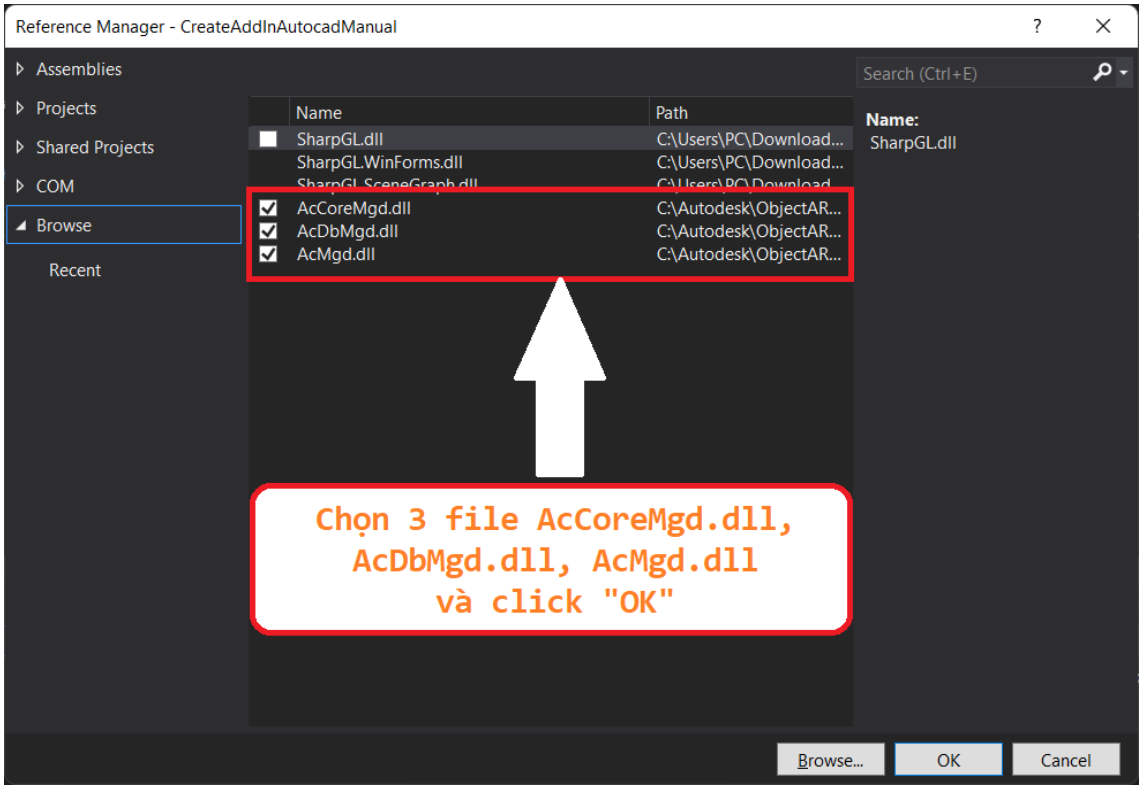

Create a new project
Recent project templates
Search for templates (Alt+S)
Clear all
All languages
All platforms
Library
C++
Android
Library
Mobile
Class Library (.NET Framework)
A project for creating a C# class library (.dll)
C#
Windows
Library
WPF Custom Control Library (.NET Framework)
C#
XAML
WPF User Control Library (.
C#
XAML
Windows
Windows Forms Control Library (.NET Framework)
A project for creating controls to use in Windows Forms (WinForms) applications
C#
Windows
Desktop
Library
Class Library (.NET Framework)
A project for creating a VB class library (.dll)
Visual Basic
Windows
Library
Windows Forms Control Library (.NET Framework)
Visual Basic
Windows
Desktop
Library
Chọn Class Library (.NET Framework) để xây dựng thư viện
Ấn "Next"
Back
Next

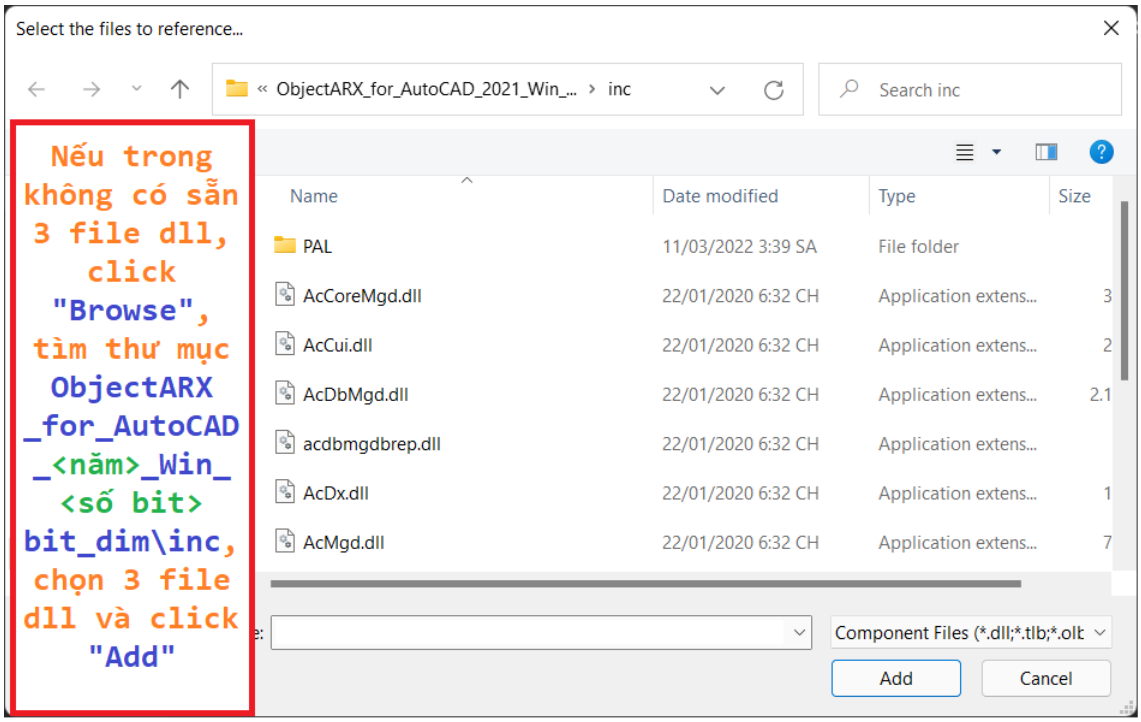

Configure your new project
Class Library (.NET Framework)
C#
Windows
Library
Project name
ClassLibrary1
Location
C:\Users\PC\source\repos
...
Solution name
ClassLibrary1
Place solution and project in the same directory
Framework
.NET Framework 4.7.2
Đặt tên Project
Chọn thư mục chứa Solution
Đặt tên cho Solution(Solution chứa các Project)
Chọn phiên bản .NET Framework
Ấn "Create"
Back
Create

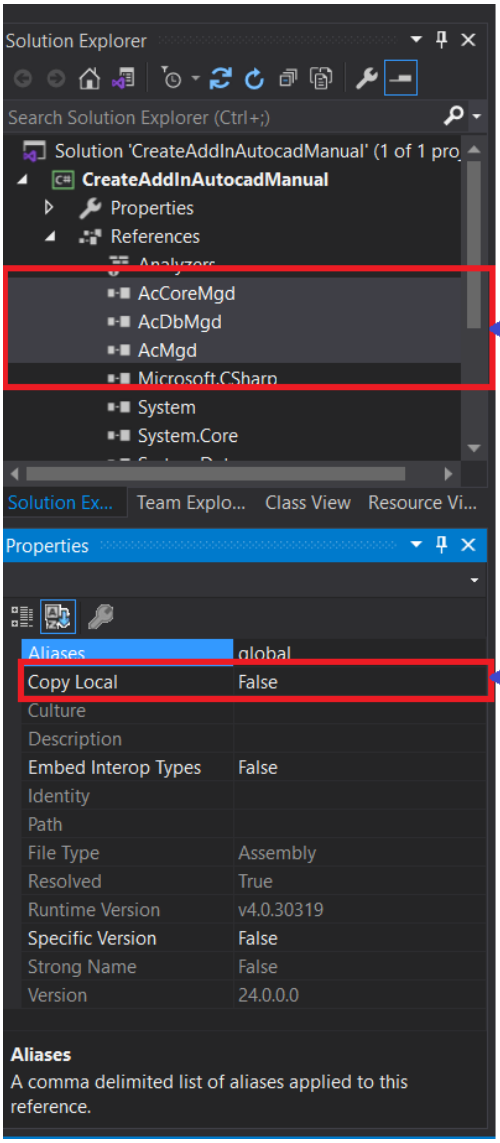
Step 2:

Insert API library of AutoCAD into Visual Studio. Change “Copy local” into “False”.









Trong Solution Explorer, chọn mục Project->References và chọn 3 file là AcCoreMgd, AcDbMgd và AcMgd

Trong Properties của 3 file trên, đổi Copy Local thành False

Step 3:

Change name of Visual's default class (Pressing "Yes" if asked)

Add the initial code as following:

- Insert reference library (using keyword)

```
using Autodesk.AutoCAD.ApplicationServices;
using Autodesk.AutoCAD.DatabaseServices;
using Autodesk.AutoCAD.EditorInput;
using Autodesk.AutoCAD.Geometry;
using Autodesk.AutoCAD.Runtime;
using AcAp = Autodesk.AutoCAD.ApplicationServices.Application;
```

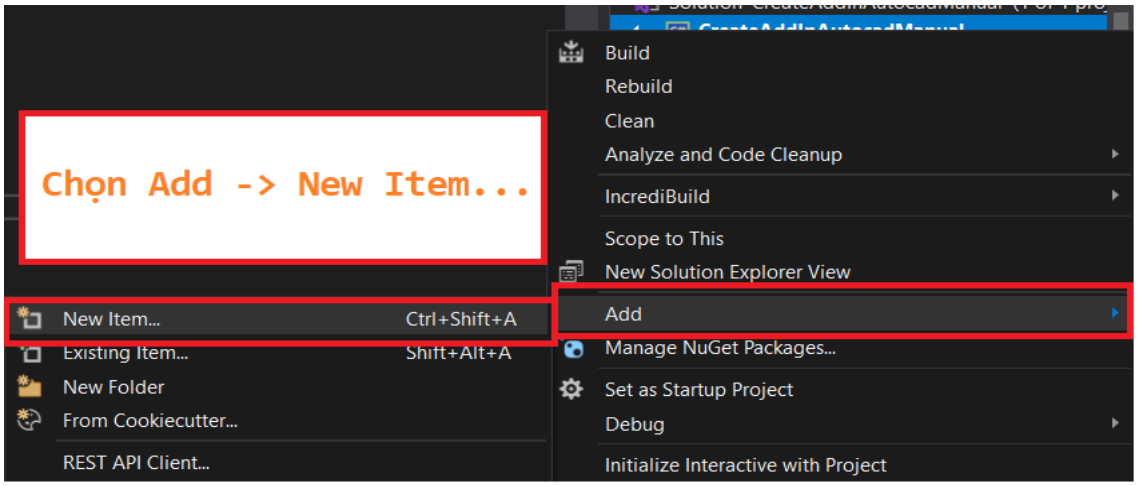
- Create Test method

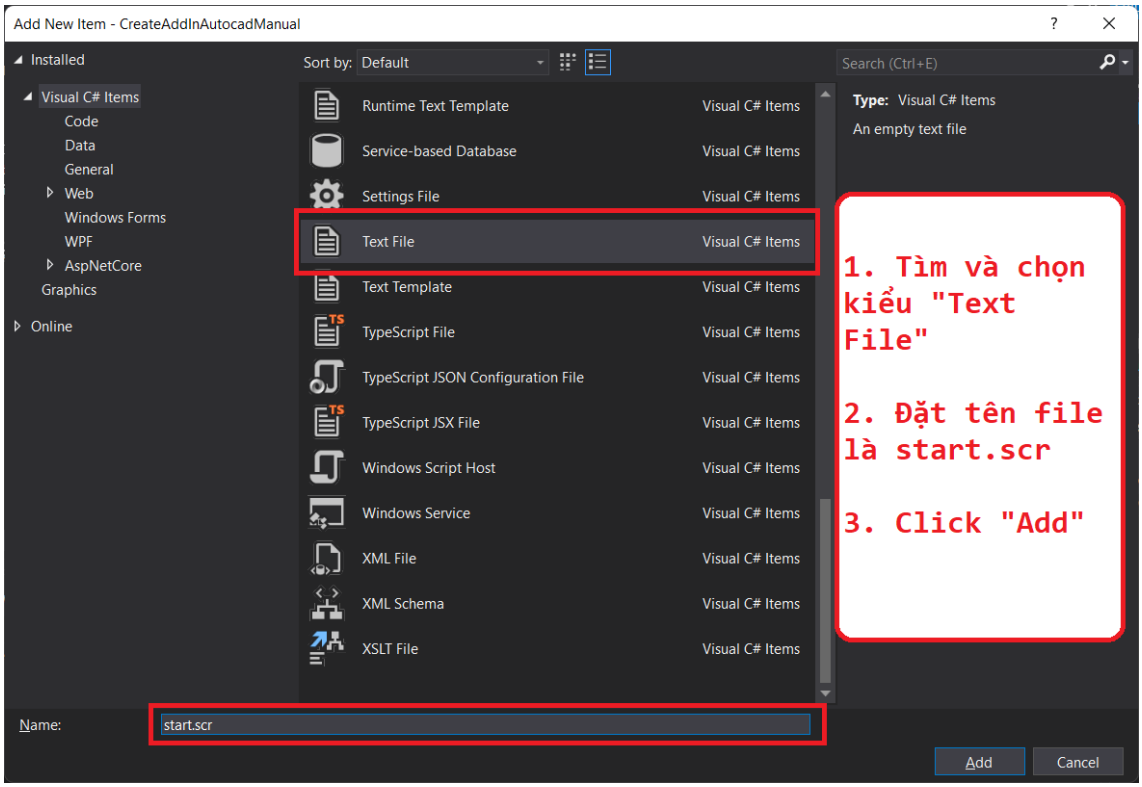
```
public class Commands
    {
        [CommandMethod("TEST")]

        public void Test()
        {
            var doc = AcAp.DocumentManager.MdiActiveDocument;
            var db = doc.Database;
            var ed = doc.Editor;
            using (var tr = db.TransactionManager.StartTransaction())
            {
                tr.Commit();
            }
        }
    }
```

Step 4:

Create a script to load the application when starting AutoCAD

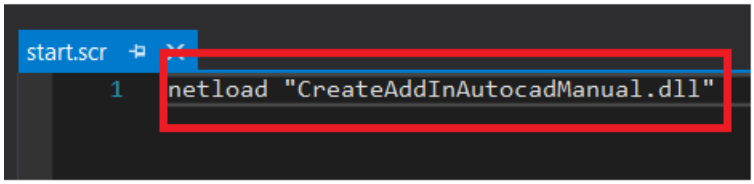
- Create a file of type Text File named "start.scr"



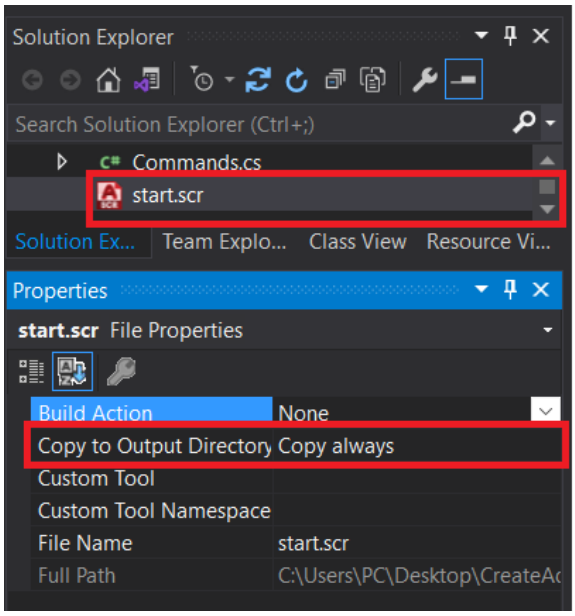


- Insert the following line of code into the file "start.scr" and save it:

netload “<name of project>.dll”



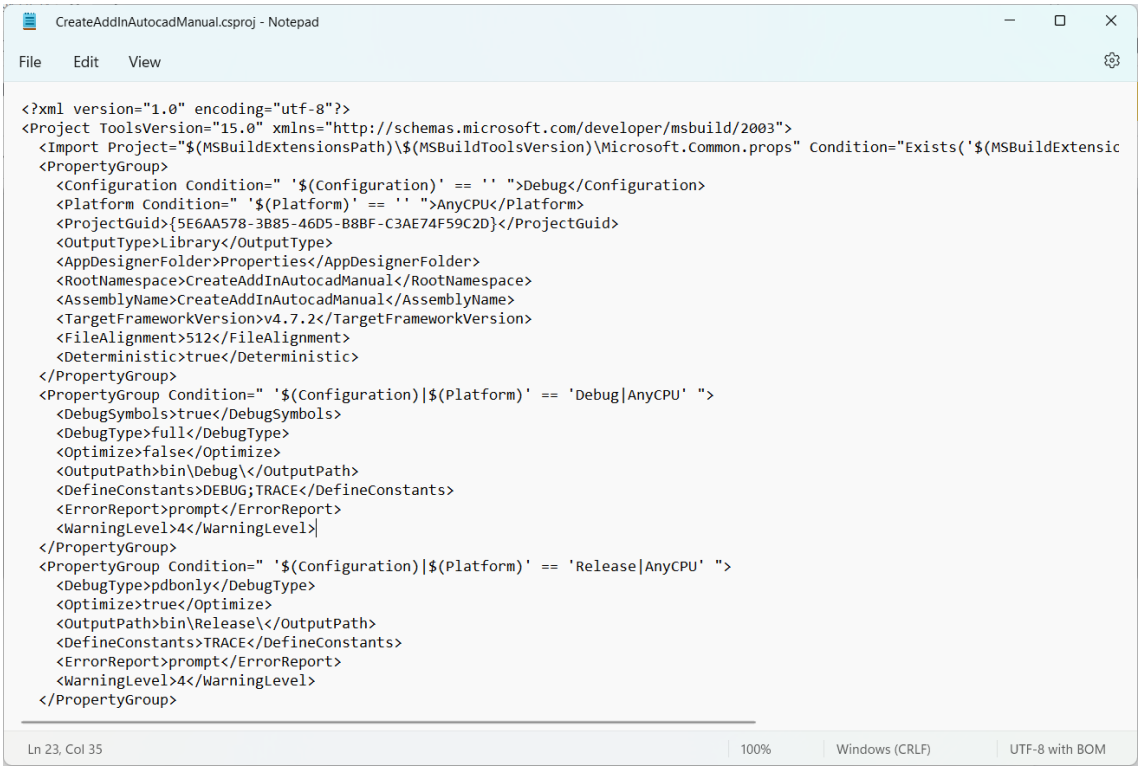
- In the Properties section of the "start.scr" file, change the "Copy in the Output Directory" property to "Always Copy"



Step 5:

Change the MSBuild file (.csproj) to run AutoCAd in Debug mode

- Find the .csproj file of the current project and open it with notepad



- Insert the following line of code in the PropertyGroup section (2nd - the Debug section). Change the AutoCAD path if necessary

```
<StartAction>Program</StartAction>
<StartProgram>C:\Program Files\Autodesk\AutoCAD 2021\acad.exe</StartProgram>
<StartArguments>/nlogo /b "start.scr"</StartArguments>
```

- The entire PropertyGroup node will look like this:

```
<PropertyGroup Condition=" '$(Configuration)|$(Platform)' == 'Debug|AnyCPU' ">
    <DebugSymbols>true</DebugSymbols>
    <DebugType>full</DebugType>
    <Optimize>false</Optimize>
    <OutputPath>bin\Debug\</OutputPath>
    <DefineConstants>DEBUG;TRACE</DefineConstants>
    <ErrorReport>prompt</ErrorReport>
    <WarningLevel>4</WarningLevel>
    <StartAction>Program</StartAction>
    <StartProgram>C:\Program Files\Autodesk\AutoCAD 2021\acad.exe</StartProgram>
    <StartArguments>/nlogo /b "start.scr"</StartArguments>
  </PropertyGroup>
```

- In the ItemGroup node you may need to change the path of the reference files (if necessary)

```
<Reference Include="accoremgd">
      <HintPath>..\..\..\..\..\..\..\..\Program Files\Autodesk\AutoCAD
2021\accoremgd.dll</HintPath>
      <Private>False</Private>
    </Reference>
    <Reference Include="acdbmgd">
      <HintPath>..\..\..\..\..\..\..\..\Program Files\Autodesk\AutoCAD
2021\acdbmgd.dll</HintPath>
      <Private>False</Private>
    </Reference>
    <Reference Include="acmgd">
      <HintPath>..\..\..\..\..\..\..\..\Program Files\Autodesk\AutoCAD 2021\acmgd.dll</HintPath>
      <Private>False</Private>
    </Reference>
```

- Save this file again. The above changes will appear in Visual Studio. The Debug tab of the Properties panel

Step 6:

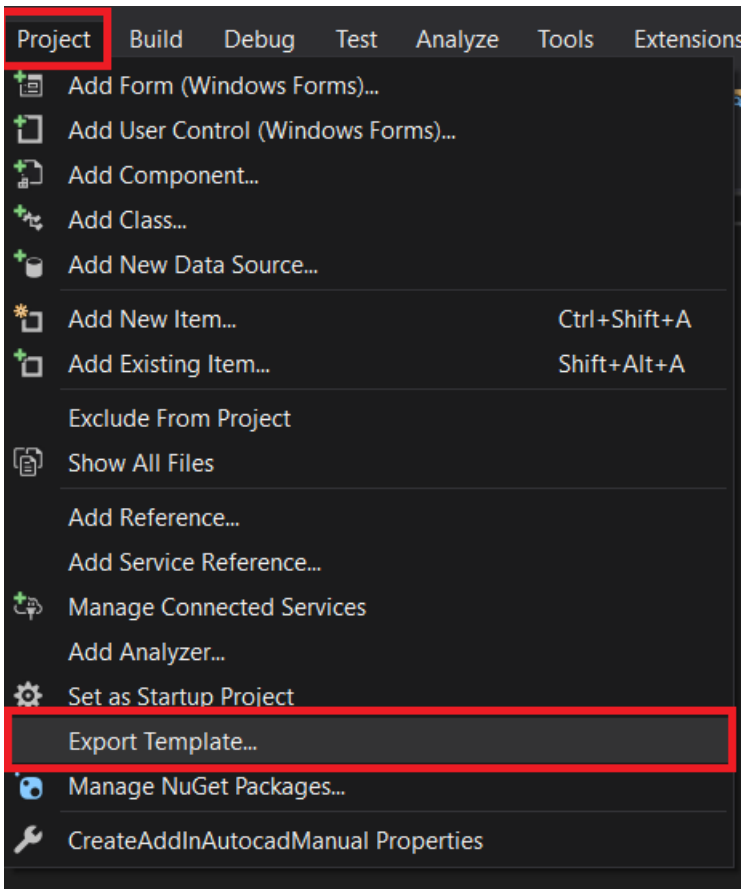
Export template

- With AutoCAD 2016 and later, the “LEGACYCODESEARCH” variable value must be changed to 1 (done in AutoCAD software)

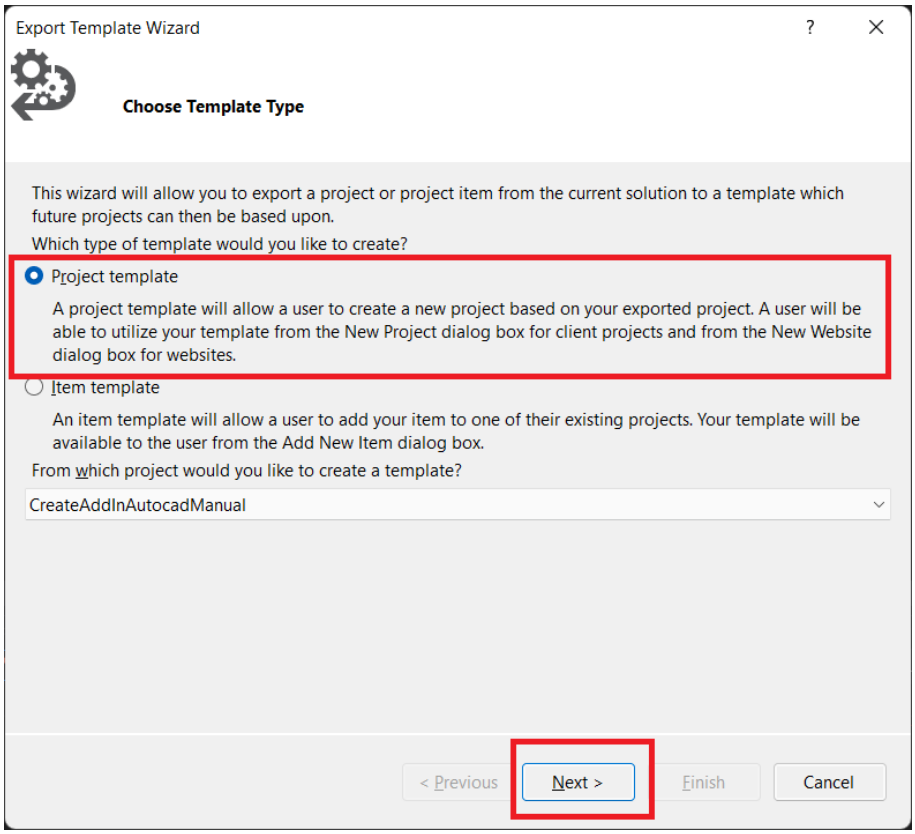
Figure 1. Press "LEGACYCODESEARCH" in Command Line of AutoCAD and press Enter

Figure 2. Press number "1" and press Enter

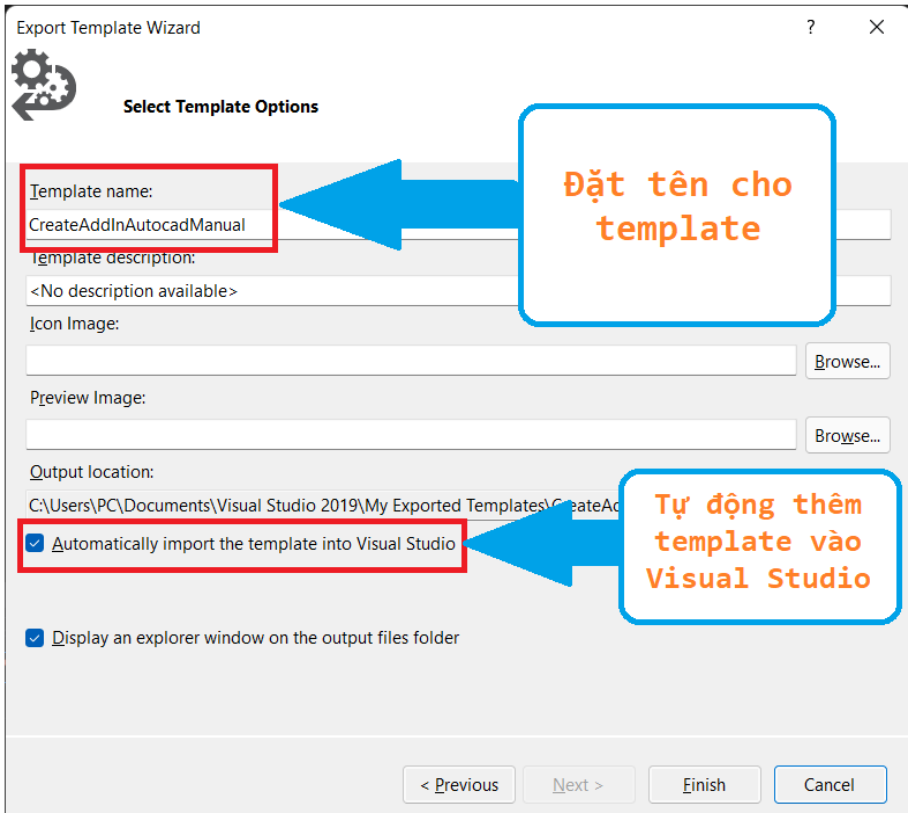
- Open the project in Visual Studio and try debugging (F5)
- Go to menu Project -> Export Template



- Select Project Template -> Continue



- Enter the parameters then finish

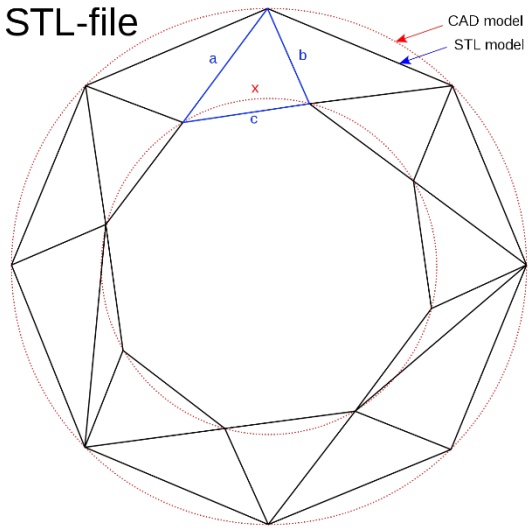


-

IV. About .STL file

STL is a file format native to the stereolithography CAD software created by 3D Systems. STL has several backronyms such as "Standard Triangle Language" and "Standard Tessellation Language". This file format is supported by many other software packages; it is widely used for rapid prototyping, 3D printing and computer-aided manufacturing. STL files describe only the surface geometry of a three-dimensional object without any representation of color, texture or other common CAD model attributes. The STL format specifies both ASCII and binary representations. Binary files are more common, since they are more compact. [2]

An STL file describes a raw, unstructured triangulated surface by the unit normal and vertices (ordered by the right-hand rule) of the triangles using a three-dimensional Cartesian coordinate system. In the original specification, all STL coordinates were required to be positive numbers, but this restriction is no longer enforced and negative coordinates are commonly encountered in STL files today. STL files contain no scale information, and the units are arbitrary. [2]



An ASCII STL file begins with the line

```
solid name
```

where *name* is an optional string (though if *name* is omitted there must still be a space after solid). The file continues with any number of triangles, each represented as follows:

```
facet normal ni nj nk
    outer loop
        vertex v1x v1y v1z
        vertex v2x v2y v2z
        vertex v3x v3y v3z
    endloop
endfacet
```

where each *n* or *v* is a floating-point number in sign-mantissa-"e"-sign-exponent format, e.g., "2.648000e-002". The file concludes with

```
endsolid name
```

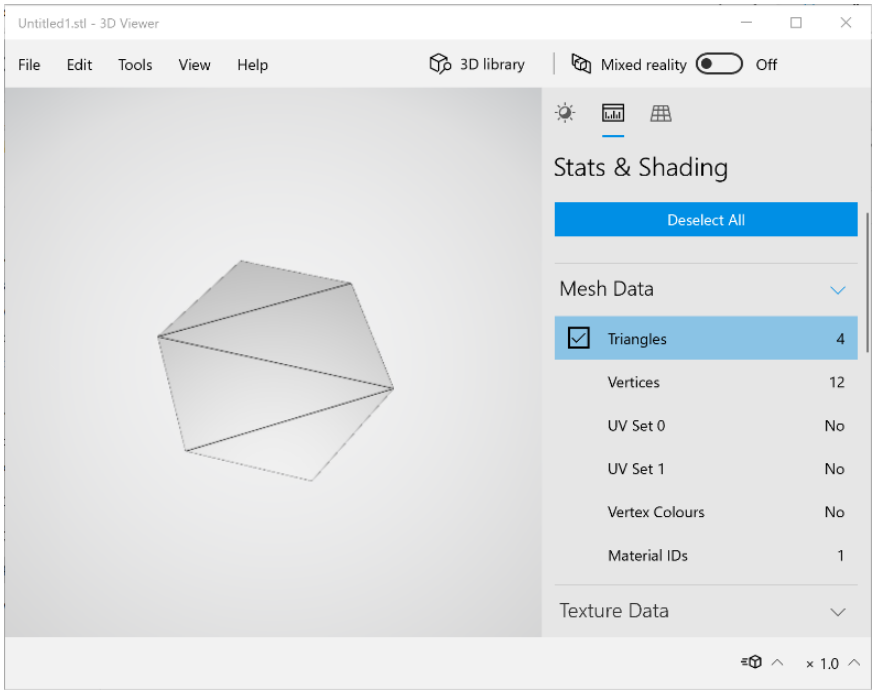
The structure of the format suggests that other possibilities exist (e.g., facets with more than one "loop", or loops with more than three vertices). In practice, however, all facets are simple triangles. [2]

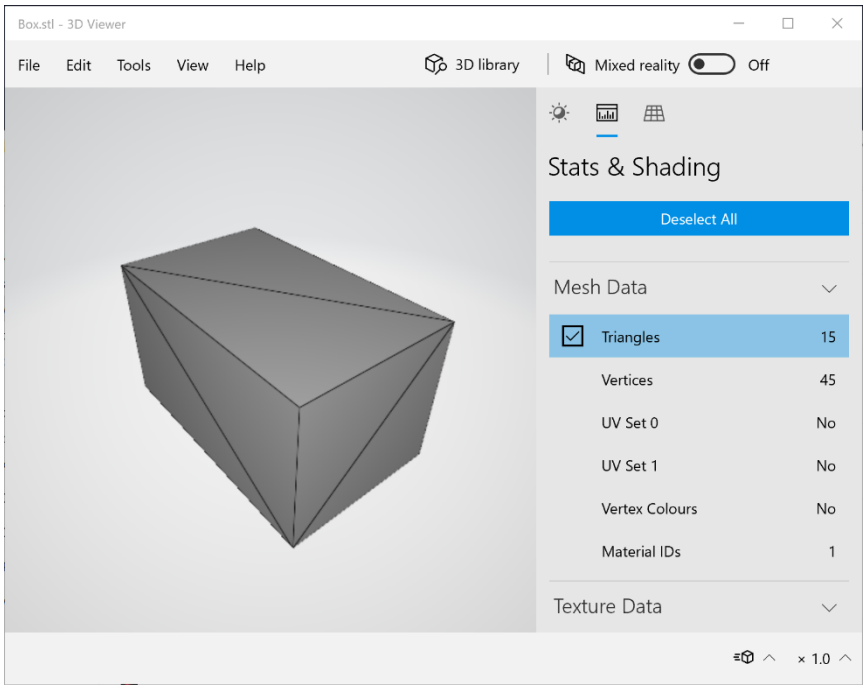
White space (spaces, tabs, newlines) may be used anywhere in the file except within numbers or words. The spaces between "facet" and "normal" and between "outer" and "loop" are required. [2]

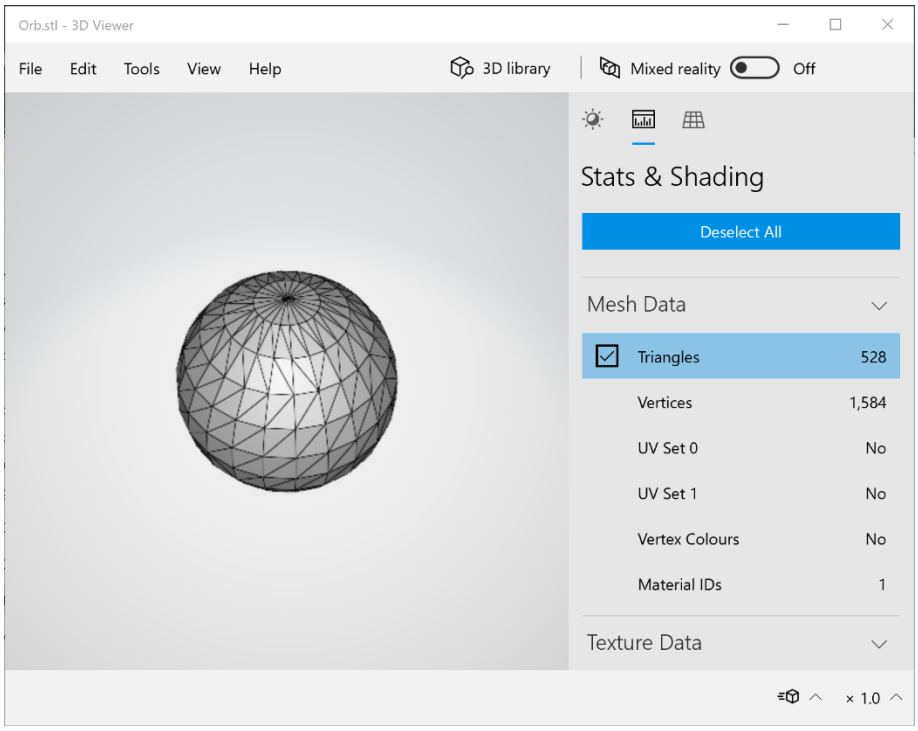
V. Test and Result

Run Plugin file in Visual Studio -> AutoCAD automatically starts and creates new the file -> Enter in command of AutoCAD to run file .dll -> Command “MYREADSTL” (See details in attached video).

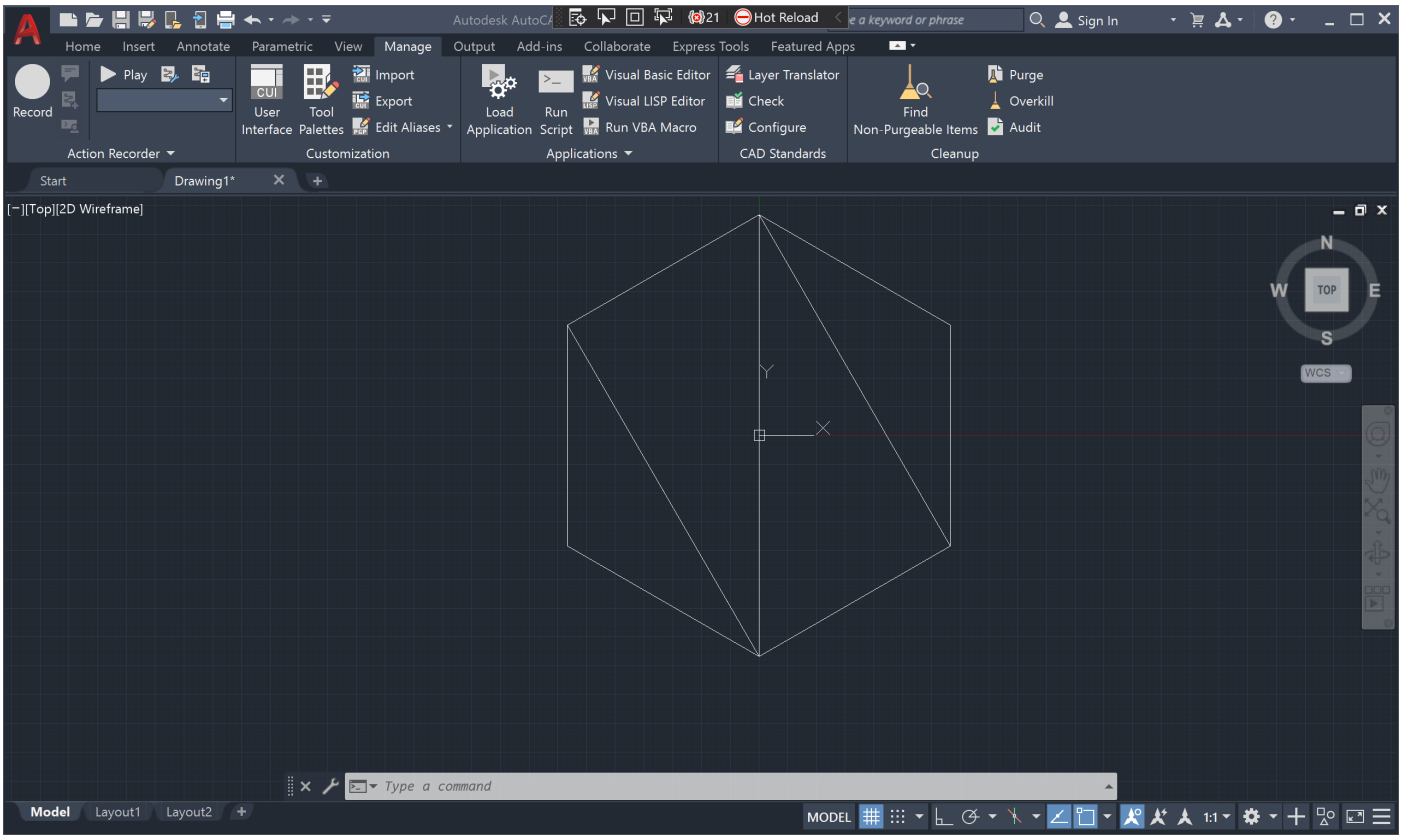
The sample dataset **“Untiled1.stl” (2D sharp)**, **“Box.stl” (box shape), “Orb.stl” (sphere)** and is given initially:







Results after running the plug-in


Home
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Add-ins
Collaborate
Express Tools
Featured Apps
Record
Play
Action Recorder
User Interface
Tool Palettes
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Export
Edit Aliases
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Load Application
Run Script
Visual Basic Editor
Visual LISP Editor
Run VBA Macro
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Layer Translator
Check
Configure
CAD Standards
Find Non-Purgeable Items
Purge
Overkill
Audit
Cleanup
Hot Reload
Sign In
Start
Drawing1*
[−][Top][2D Wireframe]
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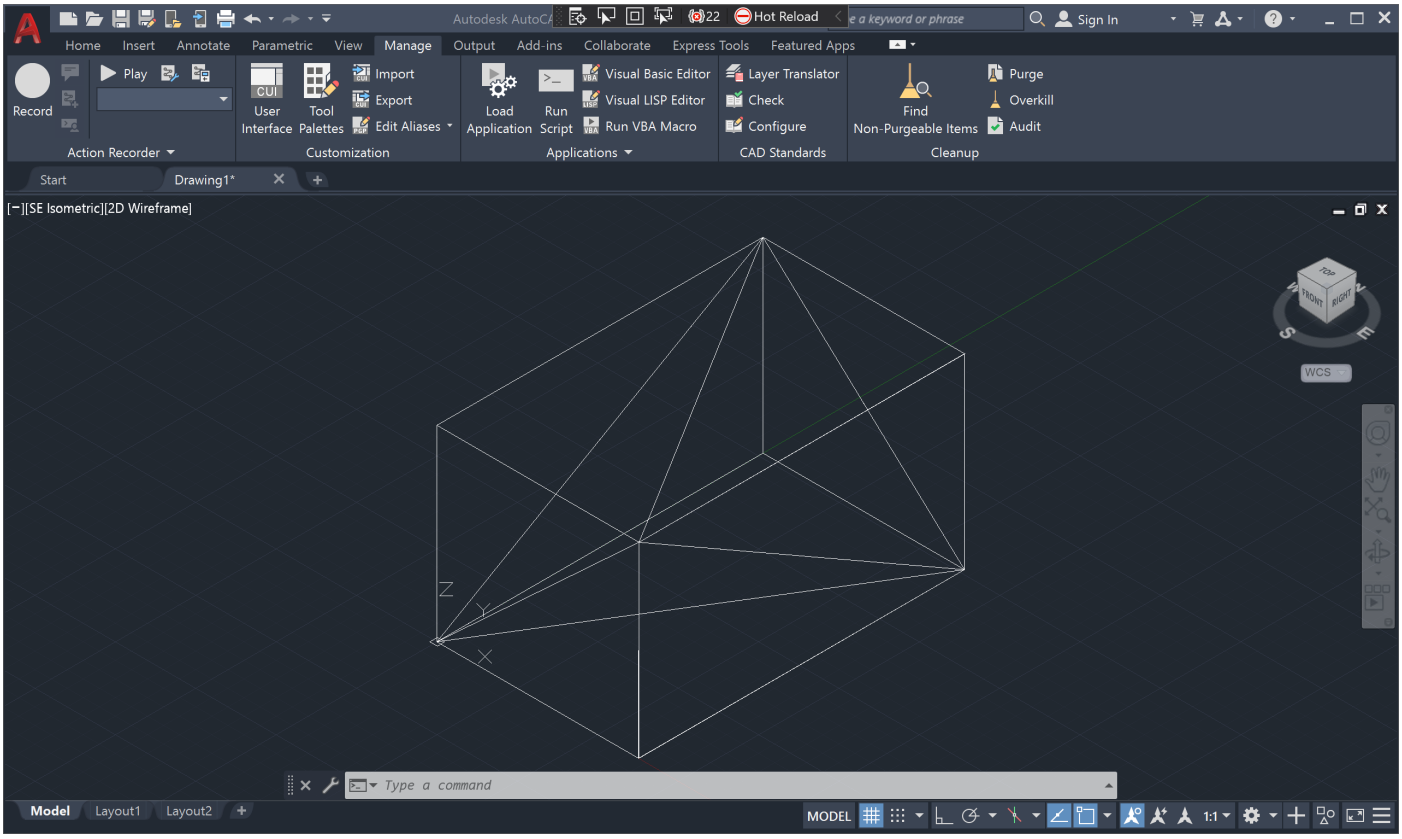
TOP
E
S
WCS
Type a command
Model
Layout1
Layout2
MODEL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Insert
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Manage
Output
Add-ins
Collaborate
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Record
Play
Action Recorder
User Interface
Tool Palettes
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Export
Edit Aliases
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Load Application
Run Script
Visual Basic Editor
Visual LISP Editor
Run VBA Macro
Applications
Layer Translator
Check
Configure
CAD Standards
Find Non-Purgeable Items
Purge
Overkill
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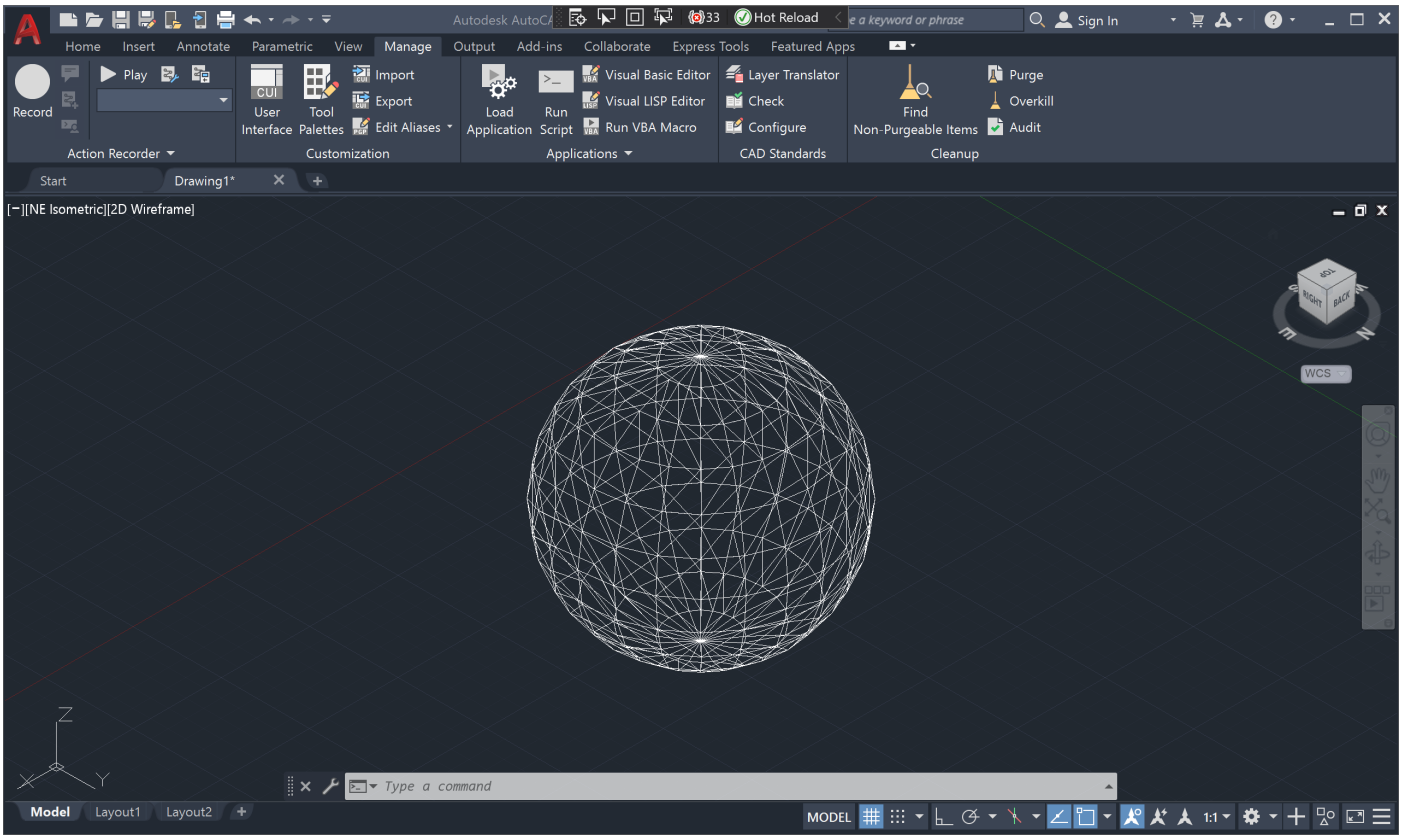
Layout1
Layout2
MODEL


Hot Reload
Sign In
Home
Insert
Annotate
Parametric
View
Manage
Output
Add-ins
Collaborate
Express Tools
Featured Apps
Record
Play
Action Recorder
User Interface
Tool Palettes
Import
Export
Edit Aliases
Customization
Load Application
Run Script
Visual Basic Editor
Visual LISP Editor
Run VBA Macro
Applications
Layer Translator
Check
Configure
CAD Standards
Find Non-Purgeable Items
Purge
Overkill
Audit
Cleanup
Start
Drawing1*
[−][NE Isometric][2D Wireframe]
WCS
Type a command
Model
Layout1
Layout2
MODEL

VII. Reference

[1] eRSVN
[2] STL (file format), Wikipedia
[3] Download dll file for AutoCAD