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The Benefits of Using the MEP Toolset in AutoCAD

A productivity study detailing the differences between AutoCAD® and the MEP toolset

MEP TOOLSET

The MEP toolset (previously referred to as AutoCAD MEP) is now included with AutoCAD as a specialized toolset. The MEP toolset contains tools geared to mechanical, electrical, and plumbing professionals in the building industry. The various workspace environments (electrical, HVAC, piping, plumbing, and schematic) include individual palettes and domain-specific ribbons to optimize specific workflow tasks. The MEP toolset is built specifically to create and modify software-based design and documentation productivity to help eliminate errors and provide accurate information to the user, allowing more time for MEP design. This study details the productivity gains that users may experience when using AutoCAD with the MEP toolset rather than basic AutoCAD when designing and documenting a building.*

Executive Summary

Designed by Autodesk and commissioned to an outside consultant, this study explores common MEP design challenges when preparing construction documents in basic AutoCAD and the potential productivity gains by using the MEP toolset. A set of design documents were recreated using both basic AutoCAD and AutoCAD with the MEP toolset.

Tasks ranged from project setup to electrical, HVAC, piping, and plumbing design that include MEP equipment, such as ducting, piping, equipment, and fittings. The MEP toolset provided an 85% overall productivity gain over the time taken to accomplish the demonstrated tasks in basic AutoCAD (depending on user expertise level with the MEP toolset).

Key Findings

Using the MEP toolset:

Project setup time was **reduced by 81%**.

The time taken to create an MEP power/electrical plan was **reduced by 86%**.

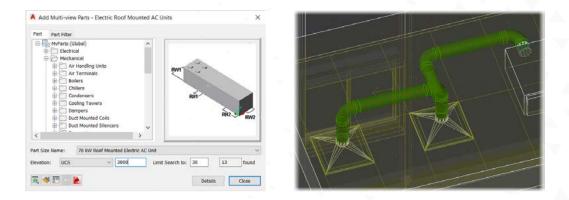The time taken to create an HVAC/ducting plan was **reduced by 81%**.

The time taken to create a mechanical/piping plan was **reduced by up to 91%**.

There was an **overall productivity gain of 85%** when using the MEP toolset.

The Study

This study explored six common design challenges and showed direct comparisons of the time and effort required to accomplish each specific task in basic AutoCAD versus with the MEP toolset.*

The same tasks were completed up to 85% faster using AutoCAD with the MEP toolset.*

The performance results in this paper were achieved by one user, with expert-level experience, using both basic AutoCAD and AutoCAD with the MEP toolset, conducting comparative tests on the same sample AutoCAD project of a small one-story community center. The tasks are comprehensive in nature. The total time it took to complete each task using both basic AutoCAD and AutoCAD with the MEP toolset is documented in each case.
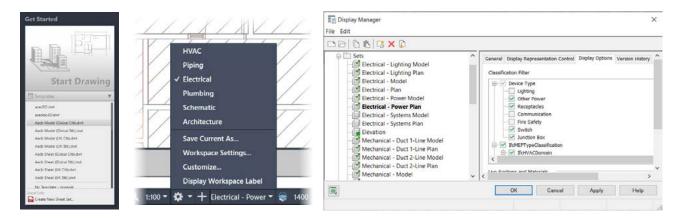
It was assumed during the study that all symbols and title blocks needed in basic AutoCAD for the design process were local to the document. Searching time is subjective and the methodologies allowed for the quick placement of required blocks in the shortest amount of time possible.

A detailed description of the study follows.

Project setup

When working with basic AutoCAD, a set of engineering documents created by the MEP designer/engineer would begin with the floor plans. Before that process starts any templates, styles, and symbols that will be used need to be created and developed: text styles, dimension styles, standard blocks, etc. This includes MEP objects, such as ducting, piping, equipment, and fittings, plus the appropriate tags and annotation required to communicate design intent. The MEP

toolset includes an extensive library of multi-view parts (MvParts) for use in MEP design, as well as specific templates and workspaces to assist with the MEP design workflow. There is also the facility to revert to the architectural workspace, to add spaces and rooms, to enhance the MEP workflow.

The task was to set up an MEP project from scratch, using an MEP template, and the appropriate MEP workspaces.

Steps:

- Start a project from an MEP template, if available

- Using workspaces and display configurations, adapt the drawing display to suit the MEP workflow

Project setup	AutoCAD	MEP toolset
Open drawing using new MEP template	20:00	2:00
Create/use the relevant MEP workspace	15:00	2:00
Attach the necessary external references (XREFs)	5:00	5:00
Adapt display configuration to suit the MEP workflow	30:00	5:00
Add new rooms/spaces where required	30:00	5:00
Total time to complete task	100:00	19:00
Time savings with the MEP toolset		**81%**

(Figures shown in minutes and seconds)

Advantages:

The MEP toolset provides pre-set template (DWT) files and specific MEP workspaces and design configurations to set up a new MEP project. Basic AutoCAD does not have these pre-set tools, hence a lot of time will be used when setting up an MEP project in basic AutoCAD for the first time. The MEP toolset also provides a huge library of MEP components, including MvParts, which allow for more productivity when setting up MEP designs in 3D. Regular AutoCAD blocks can still be used, but the blocks must be moved and rotated to align with chosen views. Inserting MvParts will also increase productivity if users use them in their plans.

Any elevation views will automatically pick the intelligent views of these parts.

Also, the MEP toolset works in conjunction with the Architecture toolset. By opening an architectural project created in the Architecture toolset, the MEP toolset can then be used to occupy the project with MEP objects and data, thus allowing for more seamless collaboration between the different disciplines. The XREF Compare function will also benefit both disciplines by allowing easier comparison of existing and new design revisions on a collaborative project.
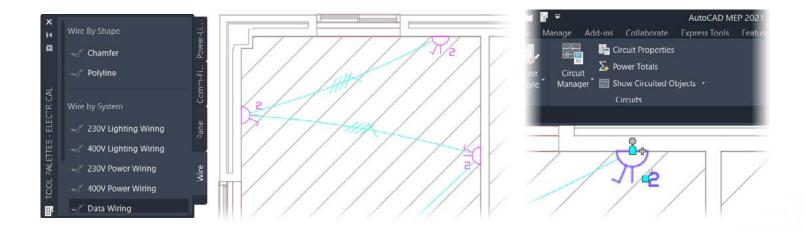
MEP – Electrical

The task was to create an MEP power plan, adding receptacles for wiring in the power circuit. This would utilize the Electrical workspace and Electrical design configuration in the MEP toolset. The MEP toolset would also allow for the full wiring circuit to be created for scheduling later, if required. Basic AutoCAD does not have the workspaces or design configurations provided by the MEP toolset, so this task would be much more time consuming.

Steps:

• Set up the Electrical workspace and design configuration

• Create a power plan drawing using the MEP Display Manager

• Add receptacles and wiring, where required, and add to circuit

MEP – Electrical	AutoCAD	MEP toolset
Set up an Electrical workspace and design configuration	35:00	2:00
Create a power plan drawing, setting the layer display	25:00	5:00
Add receptacles and wiring to the electrical circuit	60:00	10:00
Total time to complete task	120:00	17:00
Time savings with the MEP toolset		**86%**

(Figures shown in minutes and seconds)

Advantages:

The MEP toolset can save vast amounts of tedious MEP design time that would be required in basic AutoCAD. During this task, it was obvious that using MEP specific workspaces and design configurations saved a significant amount of time. Also, the tool palettes available in each respective MEP workspace saved time when needing to find the appropriate MvParts for the electrical design.

There are numerous tools in the MEP toolset that give the MEP user a big advantage over basic AutoCAD. These tools can also be used for the likes of lighting plans, inserting lighting fixtures, adding switches, tagging, and scheduling.
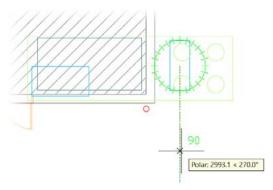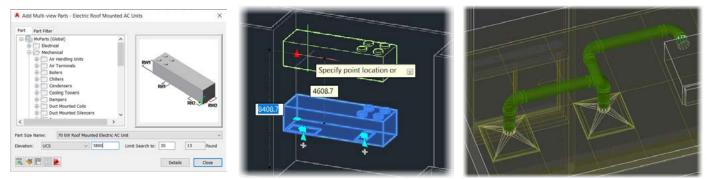
MEP – HVAC

The task was to generate a ducting plan for part of the MEP design, which was to include a rooftop HVAC unit, VAV units, ducting, and ceiling diffusers. There was then the need to provide a 3D view to show how the ducting was routed in the ceiling space. The MvParts available in the MEP toolset help make for significant time savings when searching for HVAC equipment, and it could be displayed accurately in any view in the MEP design. As the MEP toolset allows for working in 3D, the placement of ducting between items of equipment also becomes much more manageable and less time-consuming.

Steps:

- Create an HVAC and ducting plan, using the MEP Display Manager

- Add a rooftop HVAC unit and associated VAV units

- Place diffusers and add necessary ducting

- Create a 3D view to show ducting routing

MEP – HVAC	AutoCAD	MEP toolset
Create an HVAC and ducting plan	20:00	3:00
Add rooftop HVAC unit and VAV units	25:00	5:00
Place diffusers and ducting	25:00	2:00
Create 3D view to show ducting routing in ceiling	10:00	5:00
Total time to complete task	80:00	15:00
Time savings with the MEP toolset		81%

(Figures shown in minutes and seconds)

Advantages:

The MEP toolset provides the following advantages:

- When working collaboratively with the Architecture toolset, ceiling grids from existing room and space outlines are already available, saving valuable design time

- The MEP toolset features an extensive content library of HVAC MvParts

- Automatically inserts HVAC equipment from the MEP tool palettes with no further editing required
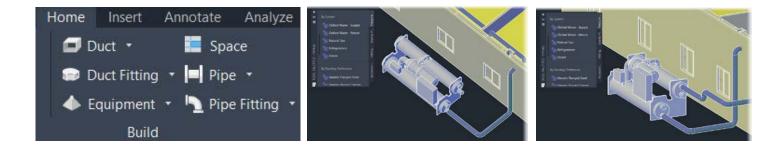
- Helps avoid costly errors

MEP - Piping

Piping is another important part of any MEP design. The MEP toolset provides extensive tools and parts that allow for efficient piping design in any MEP project, especially in 3D. This provides significant time savings over basic AutoCAD. The task was to create a

piping plan that included mechanical equipment for a water chiller and then route the associated chilled water piping into the water system in the design, along with chilled water return piping.

Steps:

• Create a piping plan using MEP templates and the MEP Display Manager

• Add the necessary mechanical equipment (water chiller)

• Route the chilled water piping and return chilled water piping into the MEP system in the design
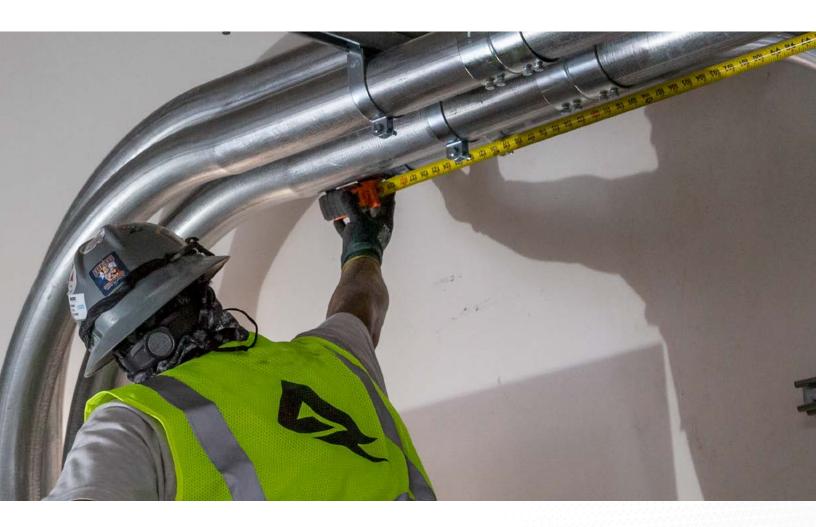

MEP – Piping	AutoCAD	MEP toolset
Create a piping plan	20:00	2:00
Add mechanical equipment (water chiller)	15:00	2:00
Route chilled water piping into system	25:00	2:00
Route return chilled water piping into system	25:00	2:00
Total time to complete task	85:00	8:00
Time savings with the MEP toolset		91%

(Figures shown in minutes and seconds)

Advantages:

The MEP toolset provides the following advantages:

- A piping plan can easily be set up using the MEP templates and the MEP Display Manager

- The MEP toolset provides an extensive range of equipment in its MvParts library

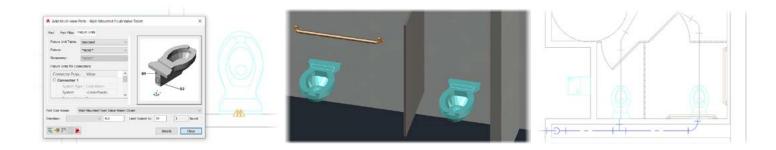- Working in 3D allows for efficient pipe placement and orientation

MEP - Plumbing

The MEP toolset offers the same functionality for plumbing as it does for piping and mechanical requirements in the MEP design. The task was t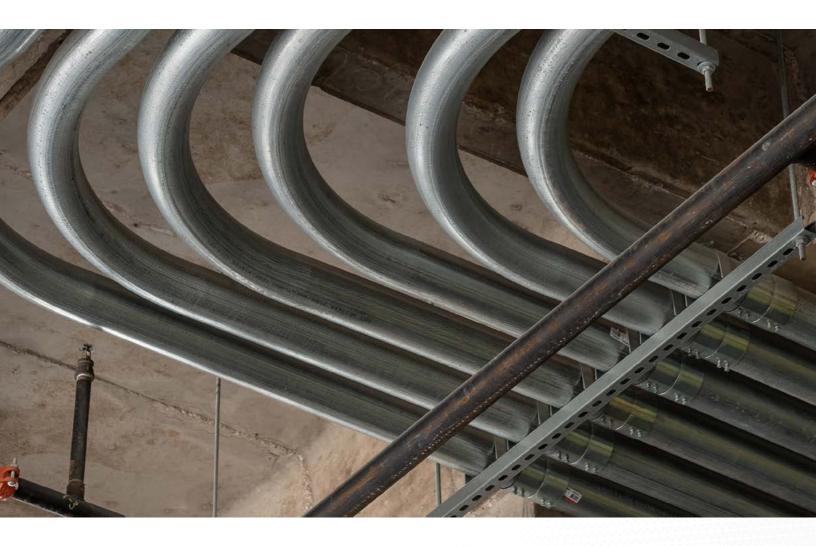o create a plumbing plan that included plumbing fixtures, drains, and the associated plumbing lines. Again, the functionality, features, and MvParts in the MEP toolset set it above and beyond what basic AutoCAD provides, offering substantial time savings.

Steps:

- Create a plumbing pan, using MEP templates and the MEP Display Manager

- Add the necessary plumbing fixtures (in this case toilets a bathroom) plus floor drains

- Route the necessary plumbing lines

MEP – Plumbing	AutoCAD	MEP toolset
Create a plumbing plan, using MEP templates	20:00	2:00
Add plumbing fixtures, plus floor drains	25:00	2:00
Route necessary plumbing lines	25:00	3:00
Total time to complete task	70:00	7:00
Time savings with the MEP toolset		90%

(Figures shown in minutes and seconds)

Advantages:

The MEP toolset provides significant time savings for plumbing in the MEP design because:

- The MEP toolset allows for easy plumbing plan creation, using MEP templates and the MEP Display Manager

- MvParts provide an extensive library of plumbing fixtures and drainage items

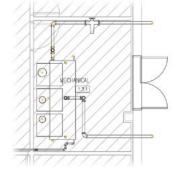- Routing plumbing lines is quick and easy in the MEP toolset due to easy connection via the MvParts
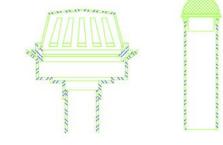
Detailing and sheets

MEP engineering projects, by their nature, require numerous details. Often, many sheets show MEP plans and details to allow for ease of installation on-site. Many times, 'typical' detail sheets are created to show overall views of various elements in the various systems, rather than numerous time-consuming sheets of every individual duct, diffuser, and detail in the project. This task comprised of finding and adding details to a MEP detail drawing and creating a sheet of an MEP plan in a scaled viewport.
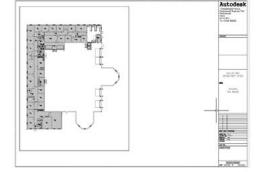
Steps:

- Create an MEP detail drawing using MEP templates and the MEP Display Manager

- Use the Detail Component Manager for easy management of detail blocks in the drawing

- Create a new MEP plan sheet with a scaled viewport from MEP templates

- Add a scaled plan view to the viewport with the display settings from the design configuration

Detailing and sheets	AutoCAD	MEP toolset
Create an MEP detail drawing, using MEP templates	10:00	2:00
Add MEP details using Detail Component Manager	15:00	2:00
Create a new MEP plan sheet with a scaled viewport	45:00	5:00
Add a scaled MEP plan, using design configuration settings	15:00	5:00
Total time to complete task	85:00	14:00
Time savings with the MEP toolset		84%

(Figures shown in minutes and seconds)

Advantages:

Creating details and sheets with basic AutoCAD can be done, but not with the ease and efficiency the MEP toolset provides. The MEP toolset provides substantial time savings, primarily due to the 3D model and pre-designed MvParts in the content library. Also, the MEP toolset provides extensive display configurations in specific sheet viewports which would otherwise need to be configured manually in basic AutoCAD.

Conclusion

In this MEP toolset productivity study, the six design tasks analyzed were just a few examples of how AutoCAD with the MEP toolset can provide tools and workflows to make you more productive.

Project tasks	AutoCAD (mins:secs)	MEP Design toolset (mins:secs)	Time savings
1 Project setup	100:00	19:00	81%
2 MEP – Electrical	120:00	17:00	86%
3 MEP – HVAC	80:00	15:00	81%
4 MEP – Piping	85:00	8:00	91%
5 MEP – Plumbing	70:00	7:00	90%
6 Detailing and sheets	85:00	14:00	84%
Total time	**540:00**	**80:00**	
Overall time savings with the MEP toolset			**85%**

(Figures shown in minutes and seconds)

With the MEP toolset, it is possible to save about 85% of the 2D CAD working time when compared to using basic AutoCAD for completing the tasks specified in this study.*
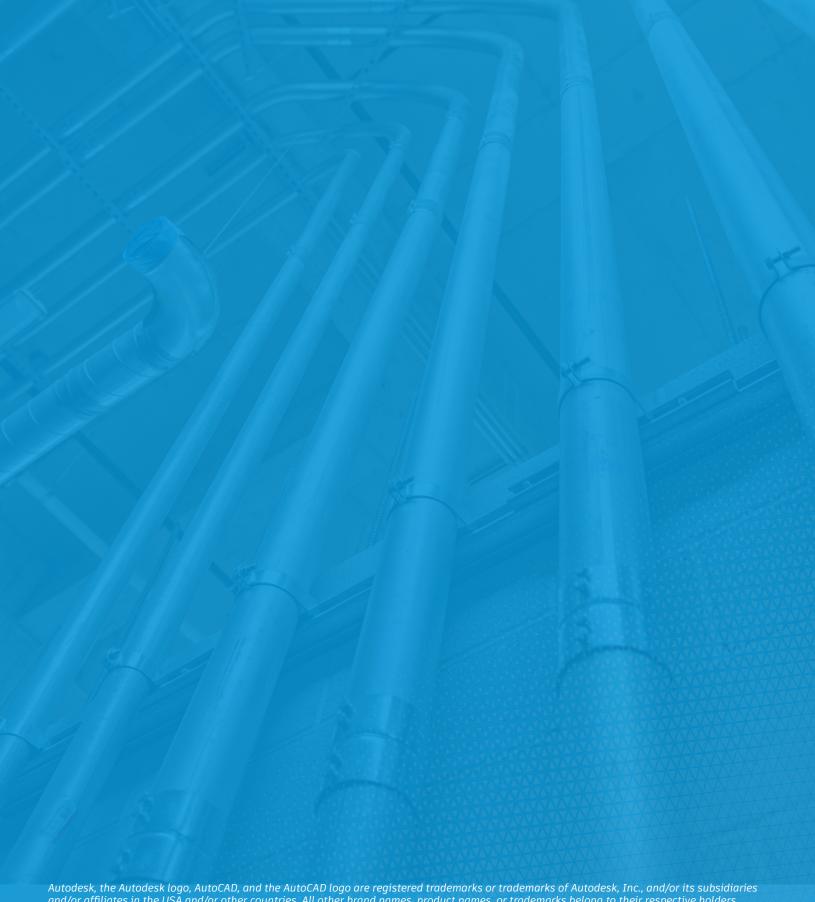
The advantages of the MEP toolset

Based on these six selected tasks, the MEP toolset could provide a level of productivity for MEP engineers and designers that is not possible with basic AutoCAD. Because the MEP toolset is built specifically for MEP design, you could realize immediate and substantial productivity benefits such as the ones discussed in this paper.

*As with all performance tests, results may vary based on machine, operating system, filters, and even source material. While every effort has been made to make the tests as fair and objective as possible, your results may differ. Product information and specifications are subject to change without notice. Autodesk provides this information "as is", without warranty of any kind, either express or implied.