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# **dxfgripper Documentation**

*Release 1.0.0*

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last updated Jan 01, 2018.

*dxfgripper* is a Python library to grab information from DXF drawings - all DXF versions supported.

Python compatibility: *dxfgripper* is tested with CPython 3.6 and PyPy.

License: *dxfgripper* is licensed under the MIT license.

simple usage:

```
dxfgripper = dxfgripper.readfile("drawing.dxf")
print("DXF version: {}".format(dxfgripper.dxfversion))
header_var_count = len(dxfgripper.header) # dict of dxf header vars
layer_count = len(dxfgripper.layers) # collection of layer definitions
block_definition_count = len(dxfgripper.blocks) # dict like collection of block definitions
entity_count = len(dxfgripper.entities) # list like collection of entities
```



# CHAPTER 1

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## Development Status

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With version 1.0.0 dxfgripper enters the just maintenance and bugfix mode, no further development (features) planned.





**readfile** (*filename* [, *options=None* ])

Read DXF file *filename* from the file system, and returns an object *Drawing*. *options* is a dict with options for reading DXF files.

**read** (*stream* [, *options=None* ])

Like *readfile* (), but reads the DXF data from a *stream*. *stream* only requires a method *readline* ()

## 2.1 Options dict for reading DXF files

default options:

```
DEFAULT_OPTIONS = {
    "grab_blocks": True,
    "assure_3d_coords": False,
    "resolve_text_styles": True,
}
```

key	description
grab_blocks	if True read block definitions from DXF file, else the dict <i>Drawing.blocks</i> is empty.
assure_3d_coords	guarantees (x, y, z) tuples for ALL coordinates
resolve_text_styles	if True <i>Text</i> , <i>Attrib</i> , <i>Attdef</i> and <i>MText</i> attributes will be set by the associated text style if necessary



## CHAPTER 3

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### Helper Functions

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**aci\_to\_true\_color** (*index*)

Returns the DXF default true color value for AutoCAD Color Index *index* as *TrueColor* object. Raises *IndexError* for *index* < 0 and *index* > 255.



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## Drawing Content

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**class Drawing**

Contains all collected data from the DXF file.

**Drawing.dxfversion**

DXF version as *string*.

DXF	AutoCAD Version
AC1009	AutoCAD R12
AC1015	AutoCAD R2000
AC1018	AutoCAD R2004
AC1021	AutoCAD R2007
AC1024	AutoCAD R2010
AC1027	AutoCAD R2013
AC1032	AutoCAD R2018

**Drawing.encoding**

content encoding, default is cp1252

**Drawing.filename**

*filename* if read from a file.

**Drawing.header**

Contains all the DXF header vars in a *dict* like object. For explanation of DXF header vars and their content see the DXF specifications from [Autodesk](#). Header var content are basic Python types like *string*, *int*, and *float* as simple types and *tuples of float values* for 2D- and 3D points.

**Drawing.layers**

Contains all layer definitions in an object of type *LayerTable*.

**Drawing.styles**

Contains all text style definitions in an object of type *StyleTable*.

**Drawing.linetypes**

Contains all linetype definitions in an object of type *LinetypeTable*.

Drawing.**blocks**

Contains all block definitions in a *dict* like object of type *BlocksSection*.

Drawing.**entities**

Contains all drawing entities in a *list* like object of type *EntitySection*.

Drawing.**objects**

Contains DXF objects from the objects section in a *list* like object of type *EntitySection*.

Drawing.**modelspace** ()

Iterate over all DXF entities in *modelspace*.

Drawing.**paperspace** ()

Iterate over all DXF entities in *paperspace*.

## 4.1 Layer Table

**class LayerTable**

Contains all layer definitions as objects of type *Layer*.

LayerTable.**get** (*name*)

Return layer *name* as object of type *Layer*. Raises *KeyError*

LayerTable.**\_\_getitem\_\_** (*name*)

Support for index operator: `dwg.layers[name]`

LayerTable.**names** (*name*)

Returns a sorted list of all layer names.

LayerTable.**\_\_iter\_\_** ()

Iterate over all layers, yields *Layer* objects.

LayerTable.**\_\_len\_\_** ()

Returns count of layers, support for standard `len()` function.

## 4.2 Layer

**class Layer**

Layer.**name**

Layer name as *string*

Layer.**color**

Layer color as *int* in range 1 to 255.

Layer.**linetype**

Layer linetype as *string*.

Layer.**locked**

type is *bool*

Layer.**frozen**

type is *bool*

Layer.**on**

type is *bool*

## 4.3 Style Table

### class StyleTable

Contains all text style definitions as objects of type *Style*.

StyleTable.**get** (*name*)

Return text style *name* as object of type *Style*. Raises *KeyError*

StyleTable.**\_\_getitem\_\_** (*name*)

Support for index operator: `dwg.styles[name]`

StyleTable.**names** (*name*)

Returns a sorted list of all text style names.

StyleTable.**\_\_iter\_\_** ()

Iterate over all text styles, yields *Style* objects.

StyleTable.**\_\_len\_\_** ()

Returns count of text styles, support for standard `len()` function.

## 4.4 Style

### class Style

Style.**name**

Text style name.

Style.**height**

Text fixed height as *float*, is 0 for no fixed height.

Style.**width**

Text width factor.

Style.**oblique**

Text oblique angle. (0 deg = vertical)

Style.**is\_backwards**

*True* if text is mirrored in X.

Style.**is\_upside\_down**

*True* if text is mirrored in Y.

Style.**font**

Primary font file name

Style.**big\_font**

Bigfont file name

## 4.5 Linetype Table

### class LinetypeTable

Contains all linetype definitions as objects of type *Linetype*.

LinetypeTable.**get** (*name*)

Return linetype *name* as object of type *Linetype*. Raises *KeyError*

LinetypeTable.**\_\_getitem\_\_** (*name*)

Support for index operator: `dwg.linetypes[name]`

`LinetypeTable.names` (*name*)

Returns a sorted list of all linetype names.

`LinetypeTable.__iter__` ()

Iterate over all linytypes, yields *Linetype* objects.

`LinetypeTable.__len__` ()

Returns count of linytypes, support for standard `len()` function.

## 4.6 Linetype

**class** `Linetype`

TODO

## 4.7 Blocks Section

**class** `BlocksSection`

Contains all block definitions as objects of type *Block*.

`BlocksSection.__len__` ()

Returns count of blocks, support for standard `len()` function.

`BlocksSection.__iter__` ()

Iterates over blocks, yields *Block* objects.

`BlocksSection.__contains__` (*self*, *name*)

Returns True if a block *name* exists, support for standard `in` operator.

`BlocksSection.__getitem__` (*name*)

Returns block *name*, support for the index operator: `block = dwg.blocks[name]`. Raises *KeyError*

`BlocksSection.get` (*name* [, *default=None* ])

Returns block *name* if exists or *default*.

## 4.8 Entity Section

**class** `EntitySection`

Contains all drawing entities.

`EntitySection.__len__` ()

Returns count of entities, support for standard `len()` function.

`EntitySection.__iter__` ()

Iterates over all entities.

`EntitySection.__getitem__` (*index*)

Returns entity a location *index*, *slicing* is possible, support for the index operator `dwg.entity = entities[index]`. Raises *IndexError*

example for accessing entities:

```
dwg = dxfgripper.readfile('test.dxf')
all_layer_0_entities = [entity for entity in dwg.entities if entity.layer == '0']
```



## 5.1 Base Class Shape

**class Shape**

Base class for all drawing entities.

**Shape.paperspace**

True for *paperspace* and False for *modelspace*.

**Shape.dxfname**

DXF entity name, like CIRCLE or LINE

**Shape.layer**

Layer name as *string*

**Shape.linetype**

Linetype as *string* or *None*, *None* means linetype by layer.

**Shape.thickness**

Element thickness as *float*.

**Shape.extrusion**

Vector as (x, y, z) *tuple*, indicate the the entity's extrusion direction. Default = (0, 0, 1)

**Shape.ltscale**

Linetype scale as *float*

**Shape.invisible**

True if entity is invisible.

**Shape.color**

Entity color as ACI (AutoCAD Color Index) where 256 means color by layer and 0 means color by block.

**Shape.true\_color**

Entity color as 0x00RRGGBB 24-bit integer value, returns a *TrueColor* object. Value is *None* if not set.

**Shape.transparency**

Entity transparency as float from 0.0 to 1.0, 0.0 is opaque and 1.0 is 100% transparent. Value is *None* if not set.

Shape.**shadow\_mode**

Value	Description
0	Casts and receives shadows
1	Casts shadows
2	Receives shadows
3	Ignores shadows
None	if not set

**class TrueColor** (*int*)

Represents a true color value as *int*. Create new *TrueColor* objects:

```
t = TrueColor(0xAABBCC)
t = TrueColor.from_rgb(0xAA, 0xBB, 0xCC)
t = TrueColor.from_aci(1) # ACI for red (AutoCAD Color Index)
```

Unpack TrueColor:

```
r, g, b = t.rgb() # fastest way
r, g, b = t # unpacking by t.__getitem__()

red = t.r
green = t.g
blue = t.b

red = t[0]
green = t[1]
blue = t[2]
```

**TrueColor.r**

Red value as *int*.

**TrueColor.g**

Green value as *int*.

**TrueColor.b**

Blue value as *int*.

**TrueColor.rgb()**

Returns a tuple (red, green, blue) each value in range 0 to 255. (255, 255, 255) = white.

**TrueColor.from\_rgb** (*r, g, b*)

Returns a *TrueColor* object.

**TrueColor.from\_aci** (*index*)

Returns the DXF default true color value for AutoCAD Color Index *index* as *TrueColor* object. Raises *IndexError* for *index* < 1 and *index* > 255.

## 5.2 Block

**class Block** (*Shape*)

**Block.basepoint**

Base point of block definition as 2D- or 3D point of type *tuple*.

**Block.name**

Block name as *string*

**Block.flags**

Block flags as int, for explanation see the DXF specifications from Autodesk and see also `Block.is_...` properties.

**Block.xrefpath**

Path to external reference as *string*

**Block.is\_xref**

True if block is an external reference.

**Block.is\_xref\_overlay**

True if block is an external overlay reference.

**Block.is\_anonymous**

True if block is an anonymous block, created by hatch or dimension.

**Block.\_\_iter\_\_:**

Support for iterator protocol, iterates over all block entities.

**Block.\_\_getitem\_\_(index):**

Returns block entity at location *index*, *slicing* is supported.

**Block.\_\_len\_\_():**

Returns count of block entities, support for standard `len()` function.

## 5.3 Line

**class Line** (*Shape*)**Line.start**

Start point of line (x, y[, z]) as *tuple*

**Line.end**

End point of line (x, y[, z]) as *tuple*

## 5.4 Point

**class Point** (*Shape*)**Point.point**

Location of point (x, y[, z]) as *tuple*

## 5.5 Circle

**class Circle** (*Shape*)**Circle.center**

Location of circle center point (x, y[, z]) as *tuple*

**Circle.radius**

Circle radius as *float*

## 5.6 Arc

**class Arc** (*Shape*)

**Arc.center**

Location of arc center point (x, y[, z]) as *tuple*

**arc.radius**

Arc radius as *float*

**arc.start\_angle**

Arc start angle in degrees as *float*. (full circle = 360 degrees)

**arc.end\_angle**

Arc end angle in degrees as *float*. (full circle = 360 degrees)

## 5.7 Solid

**class Solid** (*Shape*)

A solid filled shape with 4 points. For Triangles point 3 and point 4 has the same location.

**Solid.points**

List of points (x, y[, z]) as *tuple*.

## 5.8 Trace

**class Trace** (*Solid*)

Same as *Solid*.

## 5.9 Face

**class Face** (*Trace*)

A solid filled 3D shape with 4 points. For Triangles point 3 and point 4 has the same location. *DXF entity 3DFACE*

**Face.points**

List of points (x, y, z) as *tuple*.

**Face.is\_edge\_invisible** (*index*)

Returns True if edge *index* is invisible, index in [0, 1, 2, 3].

## 5.10 Text

The attributes *height*, *width*, *oblique*, *is\_backwards* and *is\_upside\_down* are defined in the associated *Style* object, if the value of these attributes are 0 (*height*, *width*) or None (*oblique*, *is\_backwards*, *is\_upside\_down*).

If the import option "resolve\_text\_styles" is *True*, all the above mentioned attributes and *font* and *big\_font* already have the 'final' value, no need to look into the *Style* object.

**class Text** (*Shape*)

**Text.insert**

Location of text (x, y, z) as *tuple*.

**Text.text**

Text content as *string*.

**Text.height**

Text height as *float*, if 0 you have to look into the styles table *Drawing.styles* with *Text.style* as key.

**Text.width**

Text width factor.

**Text.oblique**

Text oblique angle. (0 deg = vertical)

**Text.rotation**

Rotation angle in degrees as *float*. (full circle = 360 degrees)

**Text.style**

Text style name as *string*

**Text.halign**

Horizontal alignment as *int*.

Value	Alignment
0	Left
1	Center
2	Right
3	Aligned (if vertical alignment = 0)
4	Middle (if vertical alignment = 0)
5	Fit (if vertical alignment = 0)

**Text.valign**

Vertical alignment as *int*.

Value	Alignment
0	Baseline
1	Bottom
2	Middle
3	Top

**Text.is\_backwards**

*True* if text is mirrored in X.

**Text.is\_upside\_down**

*True* if text is mirrored in Y.

**Text.align\_point**

Second alignment point as *tuple* or *None*.

**Text.font**

Font name as *string*, if import option *resolve\_text\_styles* is *True* else "".

**Text.big\_font**

Bigfont name as *string*, if import option *resolve\_text\_styles* is *True* else "".

**Text.plain\_text()**

Get text content without formatting codes like %u.

## 5.11 **Attrib**

**class Attrib** (*Text*)

A text entity, in usual cases attached to a block reference entity *Insert*, inherits from *Text*.

**Attrib.tag**

The attribute tag as *string*.

## 5.12 **Attdef**

Same as *Attrib*, but located in a block definition entity *Block*.

## 5.13 **Insert**

**class Insert** (*Shape*)

**Insert.name**

Name of block definition as *string*.

**Insert.insert**

Location of block reference (x, y, z) as *tuple*.

**Insert.rotation**

Rotation angle in degrees as *float*. (full circle = 360 degrees)

**Insert.scale**

(x, y, z) block scaling as *tuple*, default is (1.0, 1.0, 1.0)

**Insert.row\_count**

Row count for multiple block references.

**Insert.col\_count**

Column count for multiple block references.

**Insert.row\_spacing**

Row distance for multiple block references.

**Insert.col\_spacing**

col distance for multiple block references.

**Insert.attrs**

List of *Attrib* entities attached to the *Insert* entity.

**Insert.find\_attrrib(tag) :**

Get *Attrib* entity by *tag*, returns *None* if not found.

## 5.14 **Polyline**

**class Polyline** (*Shape*)

Multiple 2D- or 3D vertices connected by lines. The DXF entity *POLYLINE* is also used to define *Polyfaces* and *Polymeshes*, dxfgripper defines separated classes for this entities see: *Polyface* and *Polymesh*.

**Polyline.is\_closed**

True if polyline is closed.

**Polyline.mode**

Returns the polyline mode: `polyline2d`, `polyline3d` or `spline2d`.

**Polyline.spline\_type**

If polyline is a 2D spline: `quadratic_bspline`, `cubic_bspline`, `bezier_curve` else `None`.

**Polyline.default\_start\_width**

Default line segment start width, if not set in vertex entity.

**Polyline.default\_end\_width**

Default line segment end width, if not set in vertex entity.

**Polyline.points**

List of all vertex locations as  $(x, y[, z])$  *tuple*. If this polyline is a 2d spline these points are just the fit points.

**Polyline.control\_points**

List of all control points as  $(x, y[, z])$  *tuple*, if this polyline is a 2d spline.

**Polyline.tangents**

List of all vertex tangent angles as *float* in degrees or `None` if not defined. (Just for fit points)

**Polyline.width**

List of all vertex width values as  $(start\_width, end\_width)$  *tuple*. Just for fit points if this polyline is a 2D spline.

**Polyline.bulge**

List of all vertex bulge values as *floats*.

**Polyline.\_\_getitem\_\_** (*index*)

Returns vertex *index* as *Vertex* entity. support for standard operator `vertex = polyline[index]`.  
Raises *IndexError*

**Polyline.\_\_len\_\_** ()

Returns count of vertices.

**Polyline.\_\_iter\_\_** ()

Iterate of all vertices, as *Vertex* entity.

## 5.15 Vertex

**class Vertex** (*Shape*)**Vertex.location**

Location as  $(x, y, z)$ -tuple.

**Vertex.start\_width****Vertex.end\_width****Vertex.bulge**

The bulge is the tangent of one fourth the included angle for an arc segment, made negative if the arc goes clockwise from the start point to the endpoint. A bulge of 0 indicates a straight segment, and a bulge of 1 is a semicircle. If you have questions ask *Autodesk*.

**Vertex.tangent**

Curve fitting tangent in degrees as *float* or `None`. (full circle = 360 degrees)

## 5.16 Polyface

**class Polyface** (*Shape*)

DxfType is *POLYFACE*, which is a *POLYLINE* DXF entity.

**Polyface.vertices**

List of all *Polyface* vertices a *Vertex* object.

**Polyface.\_\_getitem\_\_** (*index*)

Returns face *index* as *SubFace* object. support for standard operator `face = polyface[index]`. Raises *IndexError*

**Polyface.\_\_len\_\_** ()

Returns count of faces.

**Polyface.\_\_iter\_\_** ()

Iterate of all faces, as *SubFace* objects.

**Polyface.smooth\_type**

Smooth surface type; integer codes, not bit-coded:

Value	Description
0	No smooth surface fitted
5	Quadratic B-spline surface
6	Cubic B-spline surface
8	Bezier surface

### 5.16.1 SubFace

**class SubFace**

A *SubFace* describes a single face of a *Polyface*.

**SubFace.face\_record**

Face record vertex, the basic DXF structure of faces, where you can get the DXF attributes of the face like color or linetype: `subface.face_record.color`

**SubFace.\_\_len\_\_** ()

Returns count of vertices 3 or 4.

**SubFace.\_\_getitem\_\_** (*pos*) :

Returns vertex at index *pos* as *Vertex* object

**SubFace.\_\_iter\_\_** () :

Returns a list of the face vertices as (x, y, z)-tuples.

**SubFace.indices** () :

Returns a list of vertex indices, get vertex by index from `Polyface.vertices[index]`.

**SubFace.is\_edge\_visible** (*pos*) :

Returns *True* if face edge *pos* is visible else *False*.

## 5.17 Polymesh

**class Polymesh** (*Shape*)

DxfType is *POLYMESH*, which is a *POLYLINE* DXF entity.



A *Polymesh* is a grid of  $m \times n$  vertices, where every vertex has its own 3D location.

`Polymesh.mcount`

Count of vertices in  $m$  direction as *int*.

`Polymesh.ncount`

Count of vertices in  $n$  direction as *int*.

`Polymesh.is_mclosed`

True if *Polymesh* is closed in  $m$  direction.

`Polymesh.is_nclosed`

True if *Polymesh* is closed in  $n$  direction.

`Polymesh.m_smooth_density`

Smooth surface  $M$  density.

`Polymesh.n_smooth_density`

Smooth surface  $N$  density.

`Polymesh.smooth_type`

Smooth surface type; integer codes, not bit-coded:

Value	Description
0	No smooth surface fitted
5	Quadratic B-spline surface
6	Cubic B-spline surface
8	Bezier surface

`Polymesh.get_vertex(pos)`

Returns the *Vertex* at *pos*, where *pos* is a *tuple* ( $m, n$ ). First vertex is (0, 0).

`Polymesh.get_location(pos)`

Returns the location ( $x, y, z$ ) as *tuple* at *pos*, where *pos* is a *tuple* ( $m, n$ ). First vertex is (0, 0).

## 5.18 LWPolyline

**class** `LWPolyline` (*Shape*)

*LWPolyline* is a lightweight only 2D Polyline.

`LWPolyline.points`

List of 2D polyline points as ( $x, y$ ) *tuple*, or ( $x, y, z=0$ ) *tuple* if option `assure_3d_points` is *True*.

`LWPolyline.width`

List of (start\_width, end\_width) values. To be ignored if `const_width` is not 0.

`LWPolyline.bulge`

List of bulge values as *float*

`LWPolyline.const_width`

Polyline has this constant width, if this value is not 0.

`LWPolyline.is_closed`

True if the polyline is closed.

`LWPolyline.elevation`

`LWPolyline.__len__()`

Returns the count of polyline points.

`LWPolyline.__getitem__` (*index*)  
Returns polyline point at position *index*, *slicing* is supported. Raises *IndexError*

`LWPolyline.__iter__` ()  
Iterate over all polyline points.

## 5.19 Ellipse

**class** `Ellipse` (*Shape*)

`Ellipse.center`  
Location of ellipse center point (x, y[, z]) as *tuple*

`Ellipse.major_axis`  
End point of major axis (x, y[, z]) as *tuple*

`Ellipse.ratio`  
Ratio of minor axis to major axis as *float*.

`Ellipse.start_param`  
Start parameter (this value is 0.0 for a full ellipse).

`Ellipse.end_param`  
End parameter (this value is 2pi for a full ellipse)

## 5.20 Ray

**class** `Ray` (*Shape*)

`Ray.start`  
Location of the ray start point (x, y, z) as *tuple*

`Ray.unit_vector`  
Ray direction as unit vector (x, y, z) as *tuple*

## 5.21 XLine

**class** `XLine` (*Ray*)  
Same as `Ray`, except a `XLine` (construction line) has no beginning and no end.

## 5.22 Spline

**class** `Spline` (*Shape*)

`Spline.flags`  
Binary coded flags, constants stored in `dxfgripper.const`.

Spline.flags	value
SPLINE_CLOSED	1
SPLINE_PERIODIC	2
SPLINE_RATIONAL	4
SPLINE_PLANAR	8
SPLINE_LINEAR	16 (a linear spline is also a planar spline)

**Spline.degree**

Degree of the spline curve as *int*

**Spline.start\_tangent**

Start tangent as (x, y, z) as *tuple* or *None*

**Spline.end\_tangent**

End tangent as (x, y, z) as *tuple* or *None*

**Spline.control\_points**

List of control points (x, y, z) as *tuple*

**Spline.fit\_points**

List of fit points (x, y, z) as *tuple*

**Spline.knots**

List of knot values as *float*

**Spline.weights**

List of weight values as *float*

**Spline.normal\_vector**

Normal vector if spline is planar else *None*.

**Spline.is\_closed**

**Spline.is\_periodic**

**Spline.is\_rational**

**Spline.is\_planar**

**Spline.is\_linear**

## 5.23 Helix

3D spiral; Helix is also a *Spline*.

**class Helix** (*Spline*)

**Helix.helix\_version**

Tuple (main version, maintenance version)

**Helix.axis\_base\_point**

Helix axis base point as (x, y, z) as *tuple*.

**Helix.start\_point**

Helix start point as (x, y, z) as *tuple*.

**Helix.axis\_vector**

Helix axis vector as (x, y, z) as *tuple*.

**Helix.radius**

`Helix.turns`

Count of turns.

`Helix.turn_height`

Height of one turn.

`Helix.handedness`

0 = left; 1 = right;

`Helix.constrain`

0 = Constrain turn height; 1 = Constrain turns; 2 = Constrain height

## 5.24 MText

The *height* attribute is defined in the associated *Style* object, if the value of *height* is 0.

If the import option "resolve\_text\_styles" is *True*, *height*, *font* and *bigfont* already have the 'final' value, no need to look into the *Style* object.

**class MText** (*Shape*)

Multi line text entity.

`MText.insert`

Location of text (x, y, z) as *tuple*.

`MText.raw_text`

Whole text content as one *string*.

`MText.height`

Text height as *float*

`MText.rect_width`

Reference rectangle width as *float* in drawing units.

`MText.horizontal_width`

Horizontal width of the characters that make up the *MText* entity. This value will always be equal to or less than the *MText.rect\_width* value. In drawing units as *float*.

`MText.vertical_height`

Vertical height of the *MText* entity in drawing units as *float*.

`MText.line_spacing`

Text line spacing as *float*, valid from 0.25 to 4.00.

`MText.attachment_point`

Text attachment point as *int*.

Value	Description
1	Top left
2	Top center
3	Top right
4	Middle left
5	Middle center
6	Middle right
7	Bottom left
8	Bottom center
9	Bottom right

**MText.style**

Text style name as *string*.

**MText.xdirection**

X-Axis direction vector as (x, y, z) as *tuple*. (unit vector)

**MText.font**

Font name as string, if import option "resolve\_text\_styles" is *True* else "".

**MText.big\_font**

Bigfont name as string, if import option "resolve\_text\_styles" is *True* else "".

**MText.lines()**

Returns a *list* of lines. It is the `MText.rawtext` splitted into lines by the `\P` character.

**MText.plain\_text** (*split=False*)

Tries to remove format codes, returns a single string if *split* is *False* else multiple lines as list of strings without `\n`.

## 5.25 Sun

**class Sun** (*Entity*)

Sun representation. SUN is not a graphical object and resides in the objects section *Drawing.objects*.

**Sun.version**

**Sun.status**

Boolean value: on/off

**Sun.sun\_color**

Light color as ACI color index 1 - 255; 256 = BYLAYER; *None* if unset

**Sun.intensity**

**Sun.shadows**

Boolean value

**Sun.date**

A Python standard `datetime.datetime` object.

**Sun.daylight\_savings\_time**

Boolean value

**Sun.shadow\_type**

0 = Ray traced shadows; 1 = Shadow maps

**Sun.shadow\_map\_size**

**Sun.shadow\_softness**

## 5.26 Light

**class Light** (*Shape*)

Defines a light source.

**Light.version**

**Light.name**

**Light.light\_type**  
distant = 1; point = 2; spot = 3

**Light.status**  
Boolean value: on/off?

**Light.light\_color**  
Light color as ACI color index 1 - 255; 256 = BYLAYER; *None* if unset

**Light.true\_color**  
Light color as 24-bit RGB color 0x00RRGGBB, *None* if unset

**Light.plot\_glyph**  
Boolean value

**Light.intensity**

**Light.position**  
3D position of the light source as (x, y, z) tuple.

**Light.target**  
3D target location of the light, determines the light direction as (x, y, z) tuple.

**Light.attenuation\_type**  
0 = None; 1 = Inverse Linear; 2 = Inverse Square

**Light.use\_attenuation\_limits**  
Boolean value

**Light.attenuation\_start\_limit**

**Light.attenuation\_end\_limit**

**Light.hotspot\_angle**

**Light.fall\_off\_angle**

**Light.cast\_shadows**  
Boolean value

**Light.shadow\_type**  
0 = Ray traced shadows; 1 = Shadow maps

**Light.shadow\_map\_size**

**Light.shadow\_softness**

## 5.27 Mesh

**class Mesh** (*Shape*)  
3D mesh entity similar to the *Polyface* entity.

**Mesh.version**

**Mesh.blend\_crease**  
Boolean value (on/off)

**Mesh.subdivision\_levels**

**Mesh.vertices**  
List of 3D vertices (x, y, z).

**Mesh.faces**

List of mesh faces as tuples of vertex indices (v1, v2, v3, ...). Indices are 0-based and can be used with the mesh.vertex list:

```
first_face = mesh.faces[0]
first_vertex = mesh.vertices[first_face[0]]
```

**Mesh.edges**

List of mesh edges as 2-tuple of vertex indices (v1, v2). Indices are 0-based and can be used with the mesh.vertex list:

```
first_edge = mesh.edges[0]
first_vertex = mesh.vertices[first_edge[0]]
```

**Mesh.edge\_crease\_list**

List of float values, one for each edge.

**Mesh.get\_face** (*index*)

Returns a tuple of 3D points ((x1, y1, z1), (x2, y2, z2), ...) for face at position *index*.

**Mesh.get\_edge** (*index*)

Returns a 2-tuple of 3D points ((x1, y1, z1), (x2, y2, z2)) for edge at position *index*.

## 5.28 Body

**class Body** (*Shape*)

ACIS based 3D solid geometry.

**Body.acis**

SAT (Standard ACIS Text) data as list of strings. AutoCAD stores the ACIS data since DXF version AC1027 (R21013) as SAB (Standard ACIS Binary) data in the undocumented (2014-05-06) section ACDSDATA and *acis* is a binary string.

**Body.is\_sat**

Is *True* if data is stored as SAT, no guarantee for presence of data, but *acis* is a list of strings for sure.

**Body.is\_sab**

Is *True* if data is stored as SAB and *acis* is a binary string.

## 5.29 Region

**class Region** (*Body*)

ACIS based 2D enclosed areas.

## 5.30 3DSolid

**class 3DSolid** (*Body*)

ACIS based 3D solid geometry.

## 5.31 Surface

**class Surface** (*Body*)  
ACIS based 3D freeform surfaces.

## 5.32 PlaneSurface

**class PlaneSurface** (*Surface*)  
ACIS based 3D plane surfaces.



## 6.1 Open a DXF file

Open files from file system:

```
dwg = readfile("myfile.dxf")
```

To read file from a stream use: `read()`

## 6.2 Query Header Variables

The HEADER section of a DXF file contains the settings of variables associated with the drawing.

Example:

```
dxfgversion = dwg.header['$ACADVER']
```

For available HEADER variables and their meaning see: [DXF Reference](#)

## 6.3 Query Entities

All entities of the DXF drawing, independent from *modelspace* or *paperspace*, resides in the `Drawing.entities` attribute and is an `EntitySection` object. Iterate over all entities with the `in` operator:

```
all_lines = [entity for entity in dwg.entities if entity.dxftype == 'LINE']  
all_entities_at_layer_0 = [entity for entity in dwg.entities if entity.layer == '0']
```

## 6.4 Query Blocks

Block references are just DXF entities called INSERT.

Get all block references for block TestBlock:

```
references = [entity for entity in dwg.entities if entity.dxftype == 'INSERT' and
↳entity.name == 'TestBlock']
```

See available attributes for the *Insert* entity.

To examine the Block content, get the block definition from the blocks section:

```
test_block = dwg.blocks['TestBlock']
```

and use the `in` operator (Iterator protocol):

```
circles_in_block = [entity for entity in test_block if entity.dxftype == 'CIRCLE']
```

## 6.5 Layers

Layers are nothing special, they are just another attribute of the DXF entity, *dxfgripper* stores the layer as a simple *string*. The DXF entity can inherit some attributes from the layer: *color*, *linetype*

To get the real value of an attribute value `== BYLAYER`, get the layer definition:

```
layer = dwg.layers[dxfgripper.entity.layer]
color = layer.color if dxfgripper.entity.color == dxfgripper.BYLAYER else dxfgripper.entity.color
linetype = layer.linetype if dxfgripper.entity.linetype is None else dxfgripper.entity.linetype
```

Layers can be *locked* (if True else *unlocked*), *on* (if True else *off*) or *frozen* (if True else *thawed*).

## 6.6 Layouts (Modelspace or Paperspace)

*dxfgripper* just supports the *paperspace* attribute, it is not possible to examine in which layout a paperspace object resides (DXF12 has only one paperspace).

Get all *modelspace* entities:

```
modelspace_entities = [entity for entity in dwg.entities if not entity.paperspace]
```

shortcuts since 0.5.1:

```
modelspace_entities = list(dwg.modelspace())
paperspace_entities = list(dwg.paperspace())
```

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