DECLARATION OF JOHN WALKER

I, John Walker, pursuant to 28 U.S.C. § 1746 hereby declare and say as follows:

1. I was a co-founder of Autodesk, Inc. (ADSK:NASDAQ), developer of the AutoCAD® computer-aided design software. I was president, chairman, and chief executive officer from the incorporation of the company in April 1982 until November 1986, more than a year after its initial public stock offering in June 1985. I continued to serve as chairman of the board of directors until April 1988, after which I concentrated on software development.

2. Autodesk is the developer of the AutoCAD® software, one of the most widely-used computer-aided design and drafting software packages in the world. AutoCAD allows creation of two- and three-dimensional models of designs and, with third-party products, their analysis and fabrication.

3. During the start-up phase of Autodesk, I was one of the three principal software developers of AutoCAD and wrote around one third of the source code of the initial release of the program.

4. Subsequently, I contributed to the development of three-dimensional extensions of the original AutoCAD drafting system, was lead developer on AutoShade[tm], which produced realistic renderings of three-dimensional models, and developed the prototype of integration of constructive solid geometry into AutoCAD, which was subsequently marketed as the AutoCAD Advanced Modeling Extension (AME).

5. I retired from Autodesk in 1994 and since have had no connection with the company other than as a shareholder with less than 5% ownership of the company's common stock.

Design Versus Fabrication

6. From my experience at Autodesk, I became aware of the distinction between the design of an object and the fabrication of that object from the design. For example, the patent drawings and written description in firearms patents provide sufficient information "as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention" [35 U.S.C. § 112 (a)]. But this is in no way a mechanical process. One must interpret the design, choose materials suitable for each component, and then decide which manufacturing process (milling, stamping, turning, casting, etc.) is best to

produce it, including steps such as heat-treating and the application of coatings. This process is called "production planning", and it is a human skill that is required to turn a design, published in a patent description or elsewhere, into a physical realisation of the object described by that design.

7. A three-dimensional model of an object specifies its geometry but does not specify the materials from which it is fabricated, how the fabrication is done, or any special steps required (for example, annealing or other heat treating, coatings, etc.) before the component is assembled into the design.

8. Three-dimensional models of physical objects have many other applications than computer-aided manufacturing. Three-dimensional models are built to permit analysis of designs including structural strength and heat flow via the finite element method. Models permit rendering of realistic graphic images for product visualisation, illustration, and the production of training and service documentation. Models can be used in simulations to study the properties and operation of designs prior to physically manufacturing them. Models for finite element analysis have been built since the 1960s, decades before the first additive manufacturing machines were demonstrated in the 1980s.

9. Some three-dimensional models contain information which goes well beyond a geometric description of an object for manufacturing. For example, it is common to produce "parametric" models which describe a family of objects which can be generated by varying a set of inputs ("parameters"). For example, a three-dimensional model of a shoe could be parameterised to generate left and right shoes of various sizes and widths, with information within the model automatically adjusting the dimensions of the components of the shoe accordingly. The model is thus not the rote expression of a particular manufactured object but rather a description of a potentially unlimited number of objects where the intent of the human designer, in setting the parameters, determines the precise geometry of an object built from the model.

10. A three-dimensional model often expresses relationships among components of the model which facilitate analysis and parametric design. Such a model can be thought of like a spreadsheet, in which the value of cells are determined by their mathematical relationships to other cells, as opposed to a static table of numbers printed on paper.

Additive Manufacturing ("3D Printing")

11. Additive manufacturing (often called, confusingly, "3D [for three-dimensional] printing") is a technology by which objects are built to the specifications of a three-dimensional computer model by a device which fabricates the object by adding material according to

the design. Most existing additive manufacturing devices can only use a single material in a production run, which limits the complexity of objects they can fabricate.

12. Additive manufacturing, thus, builds up a part by adding material, while subtractive manufacturing (for example, milling, turning, and drilling) starts with a block of solid material and cuts away until the desired part is left. Many machine shops have tools of both kinds, and these tools may be computer controlled.

13. Additive manufacturing is an alternative to traditional kinds of manufacturing such as milling, turning, and cutting. With few exceptions, any object which can be produced by additive manufacturing can be produced, from paper drawings or their electronic equivalent, with machine tools that date from the 19th century. Additive manufacturing is simply another machine tool, and the choice of whether to use it or other tools is a matter of economics and the properties of the part being manufactured.

14. Over time, machine tools have become easier to use. The introduction of computer numerical control (CNC) machine tools has dramatically reduced the manual labour required to manufacture parts from a design. The computer-aided design industry, of which Autodesk is a part, has, over the last half-century, reduced the cost of going from concept to manufactured part, increasing the productivity and competitiveness of firms which adopt it and decreasing the cost of products they make. Additive manufacturing is one of a variety of CNC machine tools in use today.

15. It is in no sense true that additive manufacturing allows the production of functional objects such as firearms from design files without human intervention. Just as a human trying to fabricate a firearm from its description in a patent filing (available in electronic form, like the additive manufacturing model), one must choose the proper material, its treatment, and how it is assembled into the completed product. Thus, an additive manufacturing file describing the geometry of a component of a firearm is no more an actual firearm than a patent drawing of a firearm (published worldwide in electronic form by the U.S. Patent and Trademark Office) is a firearm.

Computer Code and Speech

16. Computer programs and data files are indistinguishable from speech A computer file, including a three-dimensional model for additive manufacturing, can be expressed as text which one can print in a newspaper or pamphlet, declaim from a soapbox, or distribute via other media. It may be boring to those unacquainted with its idioms, but it is speech nonetheless. There is no basis on which to claim that computer code is not subject to the same protections as verbal speech or

printed material.

17. For example, the following is the definition of a unit cube in the STL language used to to express models for many additive manufacturing devices.

```
solid cube_corner
  facet normal 0.0 -1.0 0.0
    outer loop
      vertex 0.0 0.0 0.0
      vertex 1.0 0.0 0.0
      vertex 0.0 0.0 1.0
    endloop
  endfacet
endsolid
```

This text can be written, read, and understood by a human familiar with the technology as well as by a computer. It is entirely equivalent to a description of a unit cube written in English or another human language. When read by a computer, it can be used for structural analysis, image rendering, simulation, and other applications as well as additive manufacturing. The fact that the STL language can be read by a computer in no way changes the fact that it is text, and thus, speech.

18. As an additional example, the following is an AutoCAD DXF[tm] file describing a two-dimensional line between the points (0, 0) and (1, 1), placed on layer 0 of a model.

```
0
SECTION
  2
ENTITIES
  0
LINE
  8
0
 10
0.0
20
0.0
11
1.0
21
1.0
  0
ENDSEC
  0
EOF
```

Again, while perhaps not as easy to read as the STL file until a human has learned the structure of the file, this is clearly text, and thus speech.

19. It is common in computer programming and computer-aided design to consider computer code and data files written in textual form as simultaneously communicating to

humans and computers. Donald E. Knuth, professor emeritus of computer science at Stanford University and author of "The Art of Computer Programming", advised programmers:

> "Instead of imagining that our main task is to instruct a computer what to do, let us concentrate rather on explaining to human beings what we want a computer to do."[Knuth 1992]

A design file, such as those illustrated above in paragraphs 17 and 18 is, similarly, a description of a design to a human as well as to a computer. If it is a description of a physical object, a human machinist could use it to manufacture the object just as the object could be fabricated from the verbal description and drawings in a patent.

20. Computer code has long been considered text indistinguishable from any other form of speech in written form. Many books, consisting in substantial part of computer code, have been published and are treated for the purpose of copyright and other intellectual property law like any other literary work. For example the "Numerical Recipes"[Press] series of books presents computer code in a variety of programming languages which implements fundamental algorithms for numerical computation.

Conclusions

21. There is a clear distinction between the design of an artefact, whether expressed in paper drawings, a written description, or a digital geometric model, and an object manufactured from that design.

22. Manufacturing an artefact from a design, however expressed, is a process involving human judgement in selecting materials and the tools used to fabricate parts from it.

23. Additive manufacturing ("3D printing") is one of a variety of tools which can be used to fabricate parts. It is in no way qualitatively different from alternative tools such as milling machines, lathes, drills, saws, etc., all of which can be computer controlled.

24. A digital geometric model of an object is one form of description which can guide its fabrication. As such, it is entirely equivalent to, for example, a dimensioned drawing (blueprint) from which a machinist works.

25. Digital geometric models of objects can be expressed as text which can be printed on paper or read aloud as well as stored and transmitted electronically. Thus they are speech.

References

[Knuth 1992] Knuth, Donald E. Literate Programming. Stanford, CA: Center for the Study of Language and Information, 1992. ISBN: 978-0-937073-80-3.

[Press] Press, William H. et al. Numerical Recipes. Cambridge (UK): Cambridge University Press, (various dates).
Programming language editions:

C++	978-0-521-88068-8
C	978-0-521-43108-8
Fortran	978-0-521-43064-7
Pascal	978-0-521-37516-0

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on November 22, 2018.

John Walker