

A TOOL, SYSTEM AND METHOD FOR IDENTIFYING THREADED PARTS OF AN UNKNOWN SIZE

5 FIELD OF INVENTION

The invention relates to a tool, system and method to identify threaded parts, and in particular, mechanical fasteners, of an unknown size.

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BACKGROUND

There are different types and numerous sizes of threads for mechanical fasteners that can be used in various industries and for various purposes. The two
15 main systems in use are the Imperial system and the Metric or International Standards Organisation (ISO) system. Within these systems, threads may also be classified as either coarse or fine. In the Imperial system, threads are distinguished by the nominal diameter of the fastener (in inches) and the number of threads per inch. For example, 5/16 18 UNC (Unified Coarse Thread) is a Unified Coarse thread
20 of diameter 5/16 inch and 18 threads per inch. In the Metric system, threads are distinguished by the nominal diameter and thread pitch, which is the separation between consecutive threads; both measured in millimetres (mm) and preceded by the letter M. For example, M8 is a regular (coarse) Metric thread of diameter 8mm having a regular pitch of 1.25mm, and M8 x 1 is a fine Metric thread of diameter
25 8mm having a fine pitch of 1mm.

Oftentimes, an individual needs to identify the size of a threaded fastener in order, for example, to procure threaded fasteners of a particular size for a particular application. The individual may have an example of the threaded fastener required,
30 but not know its specific size. The identification and selection of these threaded fasteners having an unknown size can be very tedious and inaccurate because of the co-existence of the different thread standards. In one current approach, the external diameter of a bolt or the internal diameter of a nut is measured and used as

the nominal diameter. The thread profile of the fastener is then compared against a set of thread gauges until a good match is found. Using the nominal diameter value and the value of the matching gauge, the user may check available thread specification tables to identify the thread.

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With the above approach, the user needs to be technically trained in order to be able to accurately measure the diameter using a measuring instrument, identify the critical dimensional values, and interpret a list of thread specification tables. Measuring instruments, such as pin gauges for measuring small tap holes or vernier calipers for small screws, are also required for use with the thread specification tables. In many situations, the necessary tools or trained personnel may not be available, thus complicating the identification of these fasteners. In addition, the current approach involves multiple steps, hence multiple opportunities for error. It may also be very time consuming.

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A need therefore exists to provide a tool, system and/or method that addresses at least one of the above problems.

20 SUMMARY

A first aspect of the present invention provides a tool for identifying a threaded mechanical fastener of an unknown size. The tool may include a threaded section of a known size on one end and a threaded opening of a known size on an opposite end, and means for identifying the known sizes; wherein the threaded mechanical fastener is identified by positively engaging a portion of the threaded mechanical fastener with a corresponding threaded section or threaded opening of said tool.

30 In some embodiments, the means for identifying the known sizes may be formed by an engraving process and may include at least one of numbers, letters, symbols, and bar codes such as Universal Product Codes. The known sizes may include values from one thread specification table selected from a group consisting of Metric, UNC and UNF thread specification tables.

In alternate embodiments, the positive engagement of the threaded mechanical fastener with a tool may include a smooth rotational advancement of the threaded section of the tool into a corresponding threaded portion of the fastener for a number of revolutions. Furthermore, the positive engagement of the threaded mechanical fastener with the tool may include a smooth rotational advancement of a threaded portion of the threaded fastener into the corresponding threaded opening of the tool for a number of revolutions. In some embodiments, the number of revolutions may be at least three.

In some embodiments, the tool may be made of a material selected from a group consisting of steel, stainless steel, brass, wood, ceramics and plastics. The threaded mechanical fastener may include a male threaded portion. Alternately or additionally, the threaded mechanical fastener may comprise a female threaded portion.

Additional embodiments of the present invention provide a system including a plurality of tools, each of the plurality of tools including a threaded section of a known size on one end and a threaded opening of a known size on an opposite end; wherein a threaded section of one tool may be rotationally engaged with a threaded opening of an adjacent tool in an axial direction to form said system. In some embodiments of the system, the absence of any one tool may prevent complete assembly of the system.

An alternate aspect of the present invention provides a method of identifying a threaded mechanical fastener of an unknown size, the method including the steps of providing a tool having a threaded section of a known size on one end and a threaded opening of a known size on the other end, and means for identifying the known sizes; positively engaging the threaded mechanical fastener with a corresponding portion of the tool; and providing an identification of the threaded mechanical fastener based on the known size of the tool.

In some embodiments, the means for identifying the known sizes may include at least one of numbers, letters, symbols, and Universal Product Codes, and

the step of providing an identification may comprise reading said numbers, letters, symbols, and Universal Product Codes.

5 In alternate embodiments, the known sizes may include values from one thread specification table selected from a group consisting of Metric, UNC and UNF thread specification tables. The step of positively engaging may include rotationally advancing the threaded section of the tool into a corresponding threaded portion of the fastener for a number of revolutions. Alternately, the step of positively engaging may include rotationally advancing a threaded portion of the fastener into the
10 corresponding threaded opening of the tool for a number of revolutions. The number of revolutions may be at least three.

In some embodiments, the providing step may further include providing a plurality of said tools; and the positively engaging step may further include positively
15 engaging the threaded mechanical fastener with a corresponding portion of one of said tools.

BRIEF DESCRIPTION OF THE DRAWINGS

20 Embodiments of the invention will be better understood and readily apparent to one of ordinary skill in the art from the following written description, by way of example only, and in conjunction with the drawings, in which:

Figure 1 is an exploded perspective view of one embodiment of a system for
25 identifying the size of threaded mechanical fasteners;

Figure 2 is a cross-sectional view of the assembled system of Figure 1;

Figure 3 is an exploded perspective view of one tool of the system of Figures
30 1 and 2, and corresponding unknown threaded mechanical fasteners;

Figure 4 is a perspective view of a portion of Figure 3 showing a positive engagement between the unknown threaded mechanical fastener and a threaded portion of the tool of Figure 3; and

Figure 5 shows a flowchart illustrating one method of identifying a threaded mechanical fastener of an unknown size using the system of Figures 1-4.

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DETAILED DESCRIPTION

Figure 1 is an exploded perspective view of one embodiment of a system 100 for identifying the size of threaded mechanical fasteners. Figure 2 is a cross-sectional view of an assembled system 100 of Figure 1. The system 100 may include a plurality of tools 110, 120, 130, 140. Each tool 110, 120, 130, 140 may have a threaded section 114, 124, 134, 144 with corresponding threads 115, 125, 135, 145, respectively. Similarly, each tool 110, 120, 130, 140 may have a threaded opening 116, 126, 136, 146 with corresponding threads 117, 127, 137, 147, respectively.

The diameters of the threaded sections 114, 124, 134, 144 and threaded openings 116, 126, 136, 146 may be of common known sizes that can be found in major thread specification tables, including but not limited to Metric, UNC and UNF (Uniform Fine Thread) thread tables. Identification markings adjacent the threaded sections and threaded openings may be used to indicate the size of the sections and openings, respectively. For example, each threaded section 114, 124, 134, 144 may have a corresponding marking 118, 128, 138, 148 adjacent to it to indicate the size of the corresponding threaded section 114, 124, 134, 144, respectively. Likewise, each threaded opening 116, 126, 136, 146 may have a corresponding marking 119, 129, 139, 149 adjacent to it to indicate the size of the corresponding threaded opening 116, 126, 136, 146, respectively. In some embodiments, the identification markings 118, 128, 138, 148 and 119, 129, 139, 149 may be consecutive common sizes on a thread specification table such that the threaded sections 114, 124, 134, of one tool 110, 120, 130, can fully engage with the threaded opening 126, 136, 146 of another tool 120, 130, 140, respectively. In some embodiments, the identification markings 118, 128, 138, 148 and 119, 129, 139, 149, can be formed using an engraving process. Other processes for marking the tools 110, 120, 130, and 140 may also be used including, but not limited to, laser

machining, printing and spraying. The identification markings can be at least one of numbers, letters, symbols, and bar codes such as Universal Product Codes.

5 In some embodiments, as indicated in Figure 2, a threaded section of a tool may engage with a corresponding threaded opening of an adjacent tool. For example, the threaded section 114 of the tool 110 can fully engage with the threaded opening 126 of the tool 120, and so on. To provide a specific example, tool 110 may have a threaded opening 116 of size M8 and a threaded section 114 of size M6, while tool 120 may have a corresponding threaded opening 126 of size M6
10 and threaded section 124 of size M5. This pattern may be repeated such that the tools 110, 120, 130, 140 can be assembled into a unitary system 100 in the axial direction. In this embodiment, the size increments may be discrete and standardized, even across different industries and in different countries. While the system 100 of Figure 1 illustrates 4 discrete tools 110, 120, 130, 140, it is
15 understood that the system 100 could include various numbers of tools, depending on the range of unknown threaded fasteners that may require identification.

Each tool 110, 120, 130, 140 may have a length and width range that is able to accommodate both the internal and external threads for most common fastener
20 sizes. It is understood that other lengths and widths may also be used, depending on the size of the threaded mechanical fasteners to be identified. In some embodiments, tool widths may be uniform, hence forming a uniform system for ease of storage and handling. Alternately, the tool widths may vary to optimize the amount of material used such that tools with small threaded sections and threaded
25 openings have correspondingly small tool widths. The body 112, 122, 132, 142 of each tool 110, 120, 130, 140, respectively, may have a cross-section that is circular, hexagonal, etc, with or without knurling to provide a better grip. In a preferred embodiment, the cross section of the tools 110, 120, 130, 140 may have a hexagonal cross-section that corresponds to a standard cross-section for a threaded
30 part of the same size. In this embodiment the tools 110, 120, 130, 140 may be assembled axially using a rotational movement to engage threaded sections 114, 124, 134 into corresponding threaded openings 126, 136, 146, respectively.

In some embodiments, the threaded sections 114, 124, 134, 144 and threaded openings 116, 126, 136, 146 may be fabricated by first forming a section and an opening respectively. As is known in the art, the openings 116, 126, 136, 146 may then be tapped using a tap of the desired size to form the internal threads 117, 127, 137, 147, respectively. Similarly, the sections 114, 124, 134, 144 may then be threaded using a die of the desired size to form the external threads 115, 125, 135, 145, respectively. The length of the threaded sections 114, 124, 134, 144 may be slightly smaller than the depth of the adjacent threaded opening 126, 136, 146, etc. so that, when a plurality of tools is assembled, the threaded section 114, 124, 134 of one tool 110, 120, 130 is completely engaged with the threaded opening 126, 136, 146 of an adjacent tool 120, 130, 140.

In one embodiment, the tools 110, 120, 130, 140 may be made from stainless steel, as it is durable for repeated use and resistant against corrosion. However, other materials including but not limited to, steel, brass, plastics, wood, ceramics, or any other material capable of being tapped and threaded can also be used.

Figure 3 is an exploded perspective view of one tool 110 of the system 100 of Figure 1 and corresponding unknown threaded mechanical fasteners 210, 220. Figure 4 is a perspective view of a portion of Figure 3 showing a positive engagement between the unknown threaded mechanical fastener 210 and the threaded section 114 of the tool 110. The fastener 210 has a threaded opening 216 with corresponding threads 217. The fastener 220 has a threaded section 224 with corresponding threads 225.

With reference to Figures 3 and 4, the tool 110 has a threaded section 114 at one end and a threaded opening 116 at the other end such that the threads 115 of the threaded section 114 may engage the corresponding threads 217 of the hollow (or female type) threaded mechanical fastener 210, herein interchangeably called a nut. Similarly, the threads 117 of the threaded opening 116 may engage the corresponding threads 225 of the pin-type (or male type) threaded mechanical fastener 220, herein interchangeably called a bolt. It is understood that terms "bolt" and "nut" are used for purposes of illustration only. The system 100 may be used

with any type of threaded mechanical fastener. As previously discussed, the thread types of the threaded section 114 and threaded opening 116 may be the same, for example, both UNF, Metric, etc., but their diameters are different.

5 When a threaded mechanical fastener 210 or 220 of an unknown size is to be identified, a tool, e.g. 110, is chosen from the system 100 and an attempt is made to engage the unknown threaded fastener 210 or 220 with a corresponding portion of the tool 110. As shown in Figure 4, the threads 115 of the threaded section 114 of the tool 110 may be rotationally engaged with the internal threads
10 217 of the nut 210. Positive engagement of the internal threads 217 with the threads 115 of the threaded section 114 may be indicated by a smooth rotational advance of the threaded section 114 into the opening 216 of the nut 210. In a preferred embodiment, the rotational advance may continue for at least three revolutions. However, it is understood that a greater or lesser number of revolutions
15 may be used to indicate positive engagement. Positive engagement may also be indicated when there is no freedom of movement of the threaded section 114 in the radial direction once it engages with the threaded opening 216 of the nut 210. The size of the nut 210 may then be directly indicated by the value of the identification marking 118.

20 If the chosen tool 110 fails to engage with the nut 210, the tool 110 may be replaced by another tool from the system 100, until a positive engagement and identification is achieved. It would be appreciated by a person skilled in the art that the same working principle applies to other embodiments in which the threads 117
25 of the threaded opening 116 is used to engage and identify an unknown pin-type threaded mechanical fastener 220 using the threads 225 of the threaded section 224. Therefore, depending on the fastener to be identified, i.e. of a male type or a female type, a corresponding portion on the selected tool may be used for positive engagement and identification.

30 Figure 5 shows a flowchart illustrating a basic application of a method, designated generally as reference numeral 500, for identifying a threaded mechanical fastener of an unknown size using at least one of the tools 110, 120, 130, 140 of Figures 1-4, as discussed above. The method 500 begins by providing

a tool having a threaded section of a known size on one end and a threaded opening of a known size on the other end, as shown with reference numeral 502. The method 500 continues by positively engaging the threaded mechanical fastener with a corresponding portion of the tool, as shown with reference numeral 504. The
5 method 500 is completed by providing an identification of the threaded mechanical fastener based on the known size of the tool, as shown with reference numeral 506.

In alternate embodiments, a plurality of tools may be provided as the system 100. The threaded mechanical fastener is then positively engaged with a
10 corresponding portion of one of the plurality of tools. As previously described, it may be necessary to attempt to engage the unknown threaded mechanical fastener with a plurality of the tools until a positive engagement is achieved. In some embodiments, a positive engagement is achieved when a portion of the threaded mechanical fastener rotationally engages with a corresponding portion of the tool for
15 at least three revolutions. It is understood that a greater or lesser number of revolutions may also be used.

Embodiments of the thread identification tool and system allow accurate identification of unknown threaded mechanical fasteners of common sizes. The
20 embodiments may be used for both internal and external threads without the need for measuring instruments, gauges or thread specification tables. Furthermore, as the identification is direct and immediate, the steps involved are simplified, areas for errors are minimized and technical knowledge is not required. The whole system can be made into a compact, handheld unit that can be conveniently stored or
25 transferred, and is suitable for use in various work environments. Furthermore, the integrity of the system is easily maintained because the absence of one tool prevents complete assembly.

It will be appreciated by a person skilled in the art that numerous variations
30 and/or modifications may be made to the present invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects to be illustrative and not restrictive.

CLAIMS

1. A tool for identifying a threaded mechanical fastener of an unknown size, the tool comprising:
 - 5 a threaded section of a known size on one end and a threaded opening of a known size on an opposite end; and
 - means for identifying the known sizes;
 - wherein the threaded mechanical fastener is identified by positively engaging a portion of the threaded mechanical fastener with
 - 10 a corresponding threaded section or threaded opening of said tool.
2. The tool according to claim 1, wherein the means for identifying the known sizes is formed by an engraving process.
- 15 3. The tool according to claims 1 or 2, wherein the means for identifying the known sizes comprises at least one of numbers, letters, symbols, and Universal Product Codes.
- 20 4. The tool according to any one of the preceding claims, wherein the known sizes comprise values from one thread specification table selected from a group consisting of Metric, UNC and UNF thread specification tables.
- 25 5. The tool according to any one of the preceding claims, wherein the positive engagement of the threaded mechanical fastener with a tool comprises a smooth rotational advancement of the threaded section of the tool into a corresponding threaded portion of the fastener for a number of revolutions.
- 30 6. The tool according to any one of the preceding claims, wherein the positive engagement of the threaded mechanical fastener with the tool comprises a smooth rotational advancement of a threaded portion of the threaded fastener into the corresponding threaded opening of the tool for a number of revolutions.

7. The tool according to claims 5 or 6, wherein the number of revolutions is at least three.
- 5 8. The tool according to any one of the preceding claims, wherein the tool comprises a material selected from a group consisting of steel, stainless steel, brass, wood, ceramics and plastics.
- 10 9. The tool according to any one of the preceding claims, wherein the threaded mechanical fastener comprises a male threaded portion.
10. The tool according to any one of the preceding claims, wherein the threaded mechanical fastener comprises a female threaded portion.
- 15 11. A system according to any one of the preceding claims, the system comprising a plurality of tools, each of the plurality of tools comprising a threaded section of a known size on one end and a threaded opening of a known size on an opposite end;
wherein a threaded section of one tool may be rotationally
20 engaged with a threaded opening of an adjacent tool in an axial direction to form said system.
12. The system according to claim 10, wherein an absence of any one tool prevents complete assembly of the system.
- 25 13. A method of identifying a threaded mechanical fastener of an unknown size, the method comprising:
providing a tool having:
a threaded section of a known size on one end and a
30 threaded opening of a known size on the other end; and
means for identifying the known sizes;
positively engaging the threaded mechanical fastener with a corresponding portion of the tool; and

providing an identification of the threaded mechanical fastener based on the known size of the tool.

- 5 14. The method according to claim 12, wherein the means for identifying the known sizes comprises at least one of numbers, letters, symbols, and Universal Product Codes, and the step of providing an identification comprises reading said numbers, letters, symbols, and Universal Product Codes.
- 10 15. The method according to any one of claims 12-13, wherein the known sizes comprise values from one thread specification table selected from a group consisting of Metric, UNC and UNF thread specification tables.
- 15 16. The method according to any one of claims 12-14, wherein the step of positively engaging comprises rotationally advancing the threaded section of the tool into a corresponding threaded portion of the fastener for a number of revolutions.
- 20 17. The method according to any one of claims 12-14, wherein the step of positively engaging comprises rotationally advancing a threaded portion of the fastener into the corresponding threaded opening of the tool for a number of revolutions.
- 25 18. The method according to claims 15 or 16, wherein the number of revolutions is at least three.
- 30 19. The method according to any one of claims 12-17, wherein:
 said providing step further comprises providing a plurality of said tools; and
 said positively engaging step further comprises positively engaging the threaded mechanical fastener with a corresponding portion of one of said tools.