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Chamfer-cutting tools

Abstract

Chamfer-cutting tool kits comprise a cutter, a bushing, an upper-edge guide block, and a lower-edge guide block, and are configured to be selectively assembled into an upper-chamfer configuration for cutting an upper chamfer and into a lower-chamfer configuration for cutting a lower chamfer.

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Background/Summary

FIELD

(1) The present disclosure relates to chamfer-cutting tools.

BACKGROUND

(2) Chamfers are utilized for various reasons across various manufacturing industries. In the aerospace industry, as an example, I-beam-shaped stringers may be used in the construction of skin

assemblies for horizontal stabilizers and vertical fins of aircraft. In some modern aircraft, these stringers are fabricated from a carbon fiber and an epoxy resin system. After cure, each stringer is trimmed to its engineered shape. FIG. **1** schematically represents an I-beam stringer **150** having a cap **152**, a base **156**, and a web **154** extending between the cap **152** and the base **156**. The sharp edges of the cap **152** and the base **156** typically are chamfered to deburr the edges. In some applications, a peel ply **21** is applied to the upper face **14** of the cap **152**, which peel ply **21** may result in extraneous fibers, or fuzz, extending from the cap **152** as a result of the trimming process and needing to be removed. A given horizontal stabilizer skin assembly or vertical fin skin assembly will use numerous stringers. These stringers range in length, shape, and configuration according engineering requirements. In particular, while the base **156** generally may be uniform across numerous I-beam stringers, the cap **152** often varies in thickness and width for various engineering requirements. As an example, the cap **152** may comprise one or more tab-outs **17**, in which the cap **152** is wider than adjacent regions of the cap **152**. These changes in width of the cap **152** may be significant along a single I-beam stringer, such as ranging from as small as 1 centimeter (cm) or smaller to as large as 12 cm or larger.

(3) Currently, deburring I-beam stringer caps and bases is performed by hand using sanding blocks. All eight edges are deburred using this manual process, which is time-consuming and may result in inconsistent edge profiles. Accordingly, there is a need for specialized tools to cut chamfers on I-beam stringers in the aerospace industry.

SUMMARY

(4) Chamfer-cutting tools and chamfer-cutting tool kits are disclosed herein.

(5) Chamfer-cutting tools comprise a cutter and bushing. Some chamfer-cutting tools are for cutting an upper chamfer between an upper face of a workpiece and an edge face of the workpiece and further comprise an upper-edge guide block comprising an upper-face guide surface that is configured to engage the upper face of the workpiece. Some chamfer-cutting tools are for cutting a lower chamfer between a lower face of a workpiece and an edge face of the workpiece adjacent to the lower face and further comprise a lower-edge guide block comprising a lower-face guide surface configured to engage the lower face of the workpiece. Chamfer-cutting tool kits comprise a cutter, a bushing, an upper-edge guide block, and a lower-edge guide block, and are configured to be selectively assembled into an upper-chamfer configuration for cutting an upper chamfer and into a lower-chamfer configuration for cutting a lower chamfer.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) FIG. **1** illustrates an example workpiece.

(2) FIG. **2** is a schematic illustration representing example chamfer-cutting tools.

(3) FIG. **3** is another schematic illustration representing example chamfer-cutting tools.

(4) FIG. **4** is a perspective view of an example chamfer-cutting tool.

(5) FIG. **5** is a cross-sectional view of the example chamfer-cutting tool of FIG. **4**.

(6) FIG. **6** is a cross-sectional view of the example chamfer-cutting tool of FIG. **4**.

(7) FIG. **7** is a perspective view of an example chamfer-cutting tool.

(8) FIG. **8** is a cross-sectional view of the example chamfer-cutting tool of FIG. **7**.

(9) FIG. **9** is a cross-sectional view of the example chamfer-cutting tool of FIG. **7**.

DESCRIPTION

(10) Chamfer-cutting tools and chamfer-cutting tool kits for assembling chamfer-cutting tools are disclosed herein. With reference also to FIG. **1**, FIG. **2** schematically represents chamfer-cutting tools **10** that are configured for cutting an upper chamfer **12** between an upper face **14** of a workpiece **18** and an edge face **16** of the workpiece **18** adjacent to the upper face **14**. FIG. **3**

schematically represents chamfer-cutting tools **100** that are configured for cutting a lower chamfer **54** between a lower face **56** of a workpiece **18** and an edge face **16** of the workpiece **18** adjacent to the lower face **56**. Chamfer-cutting tools **10** and chamfer-cutting tools **100** may share common parts and be assembled from chamfer-cutting tool kits **200**. That is, a chamfer-cutting tool **10** may be assembled from a chamfer-cutting tool kit **200** into an upper-chamfer configuration **202**, as schematically represented in FIG. **2**, and a chamfer-cutting tool **100** may be assembled from the same chamfer-cutting tool kit **200** into a lower-chamfer configuration **204**, as schematically represented in FIG. **3**. Generally, in FIGS. **2** and **3**, elements that are likely to be included in a given example are illustrated in solid lines, while elements that are optional or correspond to an alternative example are illustrated in dashed lines. An example workpiece **18** is schematically illustrated in dash-dot lines as environment to the schematically represented chamfer-cutting tools **10** and **100**. However, elements that are illustrated in solid lines are not essential to all examples of the present disclosure, and an element shown in solid lines may be omitted from a particular example without departing from the scope of the present disclosure.

(11) Starting with FIG. **2**, chamfer-cutting tools **10** comprise at least a cutter **20**, a bushing **30**, and an upper-edge guide block **34**. The cutter **20** comprises a shaft **22** and a conical cutting surface **24**. The shaft **22** comprises a first end **23** and a second end **25** opposite the first end **23**. The shaft **22** defines a cutter rotation axis **26** and is configured to be operatively coupled to a motor **28** at the first end **23** of the shaft **22**. For example, chamfer-cutting tools **10** may be configured for use with a motor **28**, a housing **40** that supports the motor **28**, and a chuck **42** that is operatively coupled to the motor **28** for selective and operative engagement of the shaft **22** for operative rotation of the cutter **20** by the motor **28**. Some chamfer-cutting tools **10** comprise the motor **28**, the housing **40**, and the chuck **42**, which collectively may be described as a router **206**, and some such examples may be configured specifically for operative use with the upper-edge guide block **34** of a chamfer-cutting tool **10**. However, it also is within the scope of the present disclosure that a chamfer-cutting tool **10** comprising at least a cutter **20**, a bushing **30**, and an upper-edge guide block **34** may be used with an off-the-shelf, or other, motorized tool, such as a router. The motor **28** and a corresponding motorized tool may be powered electrically and/or pneumatically, as examples. The chuck **42** may take any suitable form configured to selectively couple to the shaft **22** of the cutter **20**, including so-called drill chucks, collet chucks, and the like.

(12) The bushing **30** of a chamfer-cutting tool **10** is rotatably coupled to the shaft **22** between the conical cutting surface **24** and the second end **25** of the shaft **22**. The bushing **30** comprises an outer cylindrical contact surface **32** configured to engage and operatively roll along the edge face **16** of a workpiece **18**. In some examples, an edge face **16** having a height, or thickness, as small as 1.5 millimeter (mm) or even smaller may be engaged by the outer cylindrical contact surface **32** and have the chamfer-cutting tool **10** operatively cut the desired upper chamfer **12**.

(13) The upper-edge guide block **34** of a chamfer-cutting tool **10** comprises an upper-face guide surface **36** that is configured to engage the upper face **14** of a workpiece **18**. In addition, the upper-edge guide block **34** is configured to be selectively positioned along the cutter rotation axis **26** relative to the conical cutting surface **24** of the cutter **20** and relative to the outer cylindrical contact surface **32** of the bushing **30** to selectively define a chamfer cutting region **38** of the conical cutting surface **24** between the upper-face guide surface **36** and the outer cylindrical contact surface **32** of the bushing **30**.

(14) Accordingly, the size, or depth, of the chamfer cutting region **38**, and thus the resulting upper chamfer **12**, may be selectively adjusted. In particular, upper chamfers **12** as small as 0.125 mm or even smaller in height and/or width may be accomplished with chamfer-cutting tools **10**.

(15) To facilitate the adjustment of the size of an upper chamfer **12**, a chamfer-cutting tool **10** may further comprise an adjustment mechanism **35** that is configured to operatively adjust a position of the upper-edge guide block **34** along the cutter rotation axis **26**, such as by being operatively coupled between the upper-edge guide block **34** and a housing **40**. Any suitable adjustment

mechanism **35** configured to permit for selective and operative translation of the upper-edge guide block **34** relative to the cutter **20** may be utilized and incorporated into a chamfer-cutting tool **10**. As an example, an adjustment mechanism **35** may comprise or take the form of a ball lock screw assembly.

(16) In some examples, the upper-edge guide block **34** defines an upper-edge guide-block passage **82**, and when present, the cutter **20** extends through the upper-edge guide-block passage **82**. Accordingly, the upper-face guide surface **36** of the upper-edge guide block **34** may extend partially or even fully around the cutter **20**, thereby permitting the chamfer-cutting tool **10** to be rotationally positioned about the cutter rotation axis **26** in multiple positions and still be functional with the upper-face guide surface **36** able to operatively engage and slide along the upper face **14** of a workpiece **18**. Moreover, chamfer-cutting tools **10** may be utilized with workpieces **18** having an edge face **16** that has varying features, such as tab-outs **17**, with the upper-face guide surface **36** remaining in operative and sliding engagement with the upper face **14** of a workpiece **18** as the chamfer-cutting tool **10** is translated along a length of the workpiece **18**.

(17) In some examples, the upper-edge guide block **34** is freely rotatably coupled relative to the motor **28**. That is, the upper-edge guide block **34** may freely rotate relative to the motor **28**, the cutter **20**, and at least a portion of the housing **40**. As a result, when a chamfer-cutting tool **10** is translated along the length of a workpiece **18**, the upper-edge guide block **34** is permitted to freely rotate while the upper-face guide surface **36** remains in operative engagement with an upper face **14** of the workpiece **18**.

(18) In some examples, the bushing **30** comprises a bushing body **64** and at least one bushing roller bearing **66**. Any suitable number of bushing roller bearings **66** may be utilized, including one, two, or more than two bushing roller bearings **66**, such that the bushing roller bearing(s) **66** provide sufficient stability for operative and smooth rotation of the shaft **22** of the cutter **20** within the bushing **30**. Each bushing roller bearing **66** typically comprises an outer race **68** that is engage with the bushing body **64** and an inner race **70** that is engaged with the shaft **22** of the cutter **20**. As schematically illustrated in FIG. **2**, in some examples, the cutter **20** defines a shoulder **72** that engages the inner race **70** of at least one bushing roller bearing **66** to prevent the conical cutting surface **24** from engaging the bushing body **64**. Accordingly, the cutter **20** is free to rotate relative to the bushing without engagement with the conical cutting surface **24** and with the inner race **70** being the only contact with the cutter **20**. As illustrated in FIG. **2**, in some examples, the bushing body **64** defines a conical surface **65** that is parallel to the conical cutting surface **24** of the cutter **20**, thereby permitting the bushing **30** to be positioned in very close proximity to the conical cutting surface **24** without engagement with the conical cutting surface **24**.

(19) With continued reference to FIG. **2**, some chamfer-cutting tools **10** further comprise a bushing retainer **44** that is operatively coupled to the shaft **22** and that is configured to retain the bushing **30** in a fixed positioned along the cutter rotation axis **26** relative to the cutter **20**. For example, the bushing retainer **44** may comprise a retainer body **46** that defines a bushing cavity **48** that is sized to receive a lower portion **50** of the bushing **30**. The bushing retainer **44** may further comprise a retainer nut **52** that is operatively coupled with the shaft **22** of the cutter **20** and that is configured to urge the retainer body **46** against the bushing **30** and thereby urge the bushing **30** toward the cutter **20**. As a result, the bushing retainer **44** rotates with the cutter **20** relative to the bushing body **64**. In some examples, a sleeve **55** is provided that is configured to position the bushing retainer **44** relative to the bushing **30**. In particular. The sleeve **55** is engaged with the inner race **70** of a bushing roller bearing **66** of the bushing **30** and is sized to space the bushing retainer **44** away from the bushing body **64**.

(20) Some such examples of chamfer-cutting tools **10** further comprise a cover **53** that is configured to be selectively positioned over the second end **25** of the shaft **22** of the cutter **20** and coupled to the bushing retainer **44**, such as the retainer body **46** thereof. When present, the cover **53** restricts material removed from a workpiece **18** from becoming wrapped around the second end **25**

of the shaft **22** of the cutter **20**. For example, when a workpiece **18** has a peel ply **21** constructed of a fabric, the fibers of the peel ply may not be cut by the cutter, thus resulting in lengthy strands of fibers that could otherwise wrap-around or tangle with the cutter **20**.

(21) As schematically illustrated in FIG. **2**, in some examples, the housing **40** defines one or more air passages **80** that are configured to direct airflow from the motor **28** toward the workpiece **18**. For example, the motor **28** may be a pneumatically actuated motor, and the airflow may be utilized to disperse material removed from the workpiece **18** during operative use of a chamfer-cutting tool **10**. For example, and as schematically represented in FIG. **2**, the one or more air passages **80** may be configured to direct airflow from the motor **28** into the upper-edge guide-block passage **82** of the upper-edge guide block **34**.

(22) As also schematically illustrated in FIG. **2**, some chamfer-cutting tools **10** further comprise a frame **86** that is configured to operatively support the housing **40** to operatively position the chamfer-cutting tool **10** relative to the workpiece **18**. For example, the frame **86** may provide structure, such as handles or other structures, that facilitate manipulation of the chamfer-cutting tool **10** by a user and/or by a robotic assembly. In addition, the frame **86** may provide structure to operatively guide the chamfer-cutting tool **10** along a length of a workpiece **18** for cutting chamfers. In some examples, the frame **86** comprises one or more rollers **88** that are configured to operatively engage the workpiece **18** to maintain the conical cutting surface **24** in operative engagement with the workpiece **18**. As examples, the rollers **88** may be configured for operative engagement with the lower face **56** of a workpiece **18** and/or with a vertical web **154** of a workpiece **18**.

(23) Turning now to FIG. **3**, chamfer-cutting tools **100** similarly comprise at least a cutter **20** and a bushing **30** as described in detail above with respect to chamfer-cutting tools **10**. However, rather than the upper-edge guide block **34** of a chamfer-cutting tool **10**, chamfer-cutting tools **100** comprise a lower-edge guide block **58**. Moreover, rather than the first end **23** of the shaft **22** of the cutter **20** being coupled to a motor **28**, in chamfer-cutting tools **100**, the second end **25** of the shaft **22** is operatively coupled to a motor **28**. That is, the orientation of the cutter **20** is reversed in a chamfer-cutting tool **100** relative to a chamfer-cutting tool **10**, and identically configured cutters **20** may be utilized with both a chamfer-cutting tool **10** and a chamfer-cutting tool **100**. Similarly, identically configured bushings **30** may be utilized with both a chamfer-cutting tool **10** and a chamfer-cutting tool **100**. Additionally, a single cutter **20** and a single bushing **30** may be utilized with either of a chamfer-cutting tool **10** or a chamfer-cutting tool **100**.

(24) Like chamfer-cutting tools **10**, chamfer-cutting tools **100** may be configured for use with a motor **28**, a housing **40** that supports the motor **28**, and a chuck **42** that is operatively coupled to the motor **28** for selective and operative engagement of the shaft **22** for operative rotation of the cutter **20** by the motor **28**. Some chamfer-cutting tools **100** comprise the motor **28**, the housing **40**, and the chuck **42**. However, it also is within the scope of the present disclosure that a chamfer-cutting tool **100** comprising at least a cutter **20**, a bushing **30**, and an upper-edge guide block **34** may be used with an off-the-shelf, or other, motorized tool, such as a router.

(25) As in chamfer-cutting tools **10**, the bushing **30** of a chamfer-cutting tool **100** is rotatably coupled to the shaft **22** between the conical cutting surface **24** and the second end **25** of the shaft **22**. However, unlike in chamfer-cutting tools **10**, the bushing **30** of a chamfer-cutting tool **100** is positioned between the conical cutting surface **24** and the chuck **42**. That is, in a chamfer-cutting tool **10**, the bushing **30** is positioned distal to the chuck **42** relative to the conical cutting surface **24**, while in a chamfer-cutting tool **100**, the bushing **30** is positioned proximal to the chuck **42** relative to the conical cutting surface **24**.

(26) The lower-edge guide block **58** of chamfer-cutting tools **100** comprise a lower-face guide surface **60** that is configured to engage a lower face **56** of a workpiece **18**. In particular, the lower-edge guide block **58** is configured to be selectively positioned along the cutter rotation axis **26** of the cutter's shaft **22** relative to the conical cutting surface **24** of the cutter **20** and relative to the

outer cylindrical contact surface **32** of the bushing **30** to selectively define a chamfer cutting region **38** of the conical cutting surface **24** between the lower-face guide surface **60** and the outer cylindrical contact surface **32** of the bushing **30**. Accordingly, the size, or depth, of the chamfer cutting region **38**, and thus the resulting lower chamfer **54**, may be selectively adjusted. In particular, lower chamfers **54** as small as 0.125 mm, or even smaller, in height and/or width may be accomplished with chamfer-cutting tools **100**. Moreover, an edge face **16** having a height, or thickness, as small as 1.5 mm or even smaller may be engaged by the outer cylindrical contact surface **32** and have the chamfer-cutting tool **100** operatively cut the desired lower chamfer **54**.

(27) As with chamfer-cutting tools **10**, to facilitate the adjustment of the size of a lower chamfer **54**, a chamfer-cutting tool **100** may further comprise an adjustment mechanism **35** that is configured to operatively adjust a position of the lower-edge guide block **58** along the cutter rotation axis **26**, such as by being operatively coupled between the lower-edge guide block **58** and a housing **40**. Any suitable adjustment mechanism **35** configured to permit for selective and operative translation of the lower-edge guide block **58** relative to the cutter **20** may be utilized and incorporated into a chamfer-cutting tool **100**, including, for example, a ball lock screw assembly.

(28) In some examples, the lower-edge guide block **58** defines a lower-edge guide-block passage **84**, and when present, the cutter **20** extends through the lower-edge guide-block passage **84**. Accordingly, the lower-face guide surface **60** of the lower-edge guide block **58** may extend partially or even fully around the cutter **20**, thereby permitting the chamfer-cutting tool **100** to be rotationally positioned about the cutter rotation axis **26** in multiple positions and still be functional with the lower-face guide surface **60** able to operatively engage and slide along the lower face **56** of a workpiece **18**. Moreover, chamfer-cutting tools **100** may be utilized with workpieces **18** having an edge face **16** that has varying features, such as tab-outs **17**, with the lower-face guide surface **60** remaining in operative and sliding engagement with the lower face **56** of a workpiece **18** as the chamfer-cutting tool **100** is translated along a length of the workpiece **18**.

(29) Like the upper-edge guide block **34** of chamfer-cutting tools **10**, the lower-edge guide block **58** of chamfer-cutting tools **100** is freely rotatably coupled relative to the motor **28**. That is, the upper-edge guide block **34** may freely rotate relative to the motor **28**, the cutter **20**, and at least a portion of the housing **40**. As a result, when a chamfer-cutting tool **100** is translated along the length of a workpiece **18**, the lower-edge guide block **58** is permitted to freely rotate while the upper-face guide surface **36** remains in operative engagement with a lower face **56** of the workpiece **18**.

(30) As in chamfer-cutting tools **10**, the bushing **30** of a chamfer-cutting tool **100** may comprise a bushing body **64** and at least one bushing roller bearing **66** with an outer race **68** that is engaged with the bushing body **64** and an inner race **70** that is engaged with the shaft **22** of the cutter **20**. Moreover, in some examples, a shoulder **72** of the cutter **20** engages with the inner race **70** of at least one bushing roller bearing **66** to prevent the conical cutting surface **24** from engaging the bushing body **64**.

(31) With continued reference to FIG. **3**, some chamfer-cutting tools **100** further comprise a sleeve **62** that is configured to position the bushing **30** relative to a chuck **42**, a motor **28**, and/or a housing **40** of the chamfer-cutting tool **100**. In particular, when present, the sleeve **62** engages the inner race **70** of a bushing roller bearing **66** to operatively position the bushing **30** relative to the chuck **42**, the motor **28**, and/or the housing **40** of the chamfer-cutting tool **100**.

(32) In some examples of chamfer-cutting tools **100**, the lower-edge guide block **58** comprises a lower-edge guide-block body **90** and at least one lower-edge guide-block roller bearing **92** that rotatably couples the lower-edge guide-block body **90** to the shaft **22** of the cutter **20**.

(33) As with chamfer-cutting tools **10**, in some examples of chamfer-cutting tools **100**, the housing **40** defines one or more air passages **80** that are configured to direct airflow from the motor **28** toward the workpiece **18**, such as through the lower-edge guide-block passage **84** to disperse material removed from the workpiece **18** during operative use of a chamfer-cutting tool **100**.

(34) Also like chamfer-cutting tools **10**, chamfer-cutting tools **100** may further comprise a frame

102 that is configured to operatively support the housing **40** to operatively position the chamfer-cutting tool **100** relative to the workpiece **18**. For example, the frame **102**, like the frame **86** of chamfer-cutting tools **10**, may provide structure, such as handles or other structures, that facilitate manipulation of the chamfer-cutting tool **100** by a user and/or by a robotic assembly. In addition, the frame **102** may provide structure to operatively guide the chamfer-cutting tool **100** along a length of a workpiece **18** for cutting chamfers. In some examples, the frame **102** comprises one or more rollers **88** that are configured to operatively engage the workpiece **18** to maintain the conical cutting surface **24** in operative engagement with the workpiece **18**. As examples, the rollers **88** may be configured for operative engagement with one or more of the upper face **14**, the lower face **56**, or a vertical web **154** of a workpiece **18**.

(35) Now with reference to FIGS. **2-3** in tandem, a chamfer-cutting tool **10** may be reconfigurable to a chamfer-cutting tool **100**, and a chamfer-cutting tool **100** may be reconfigurable to a chamfer-cutting tool **10**. As discussed, the cutter **20** and the bushing **30**, as well as the motor **28**, the housing **40**, and the chuck **42** may be identical between a chamfer-cutting tool **10** and a chamfer-cutting tool **100**, and thus may be utilized with an upper-edge guide block **34** when configured to cut an upper chamfer **12** and may be utilized with a lower-edge guide block **58** when configured to cut a lower chamfer **54**. Accordingly, also within the scope of the present disclosure are chamfer-cutting tool kits **200** that are configured to be selectively assembled into an upper-chamfer configuration **202** (FIG. **2**) for cutting an upper chamfer **12** and be selectively assembled into a lower-chamfer configuration **204** (FIG. **3**) for cutting a lower chamfer **54**. Such chamfer-cutting tool kits **200** comprise at least a cutter **20**, a bushing **30**, an upper-edge guide block **34**, and a lower-edge guide block **58**, and optionally also a router **206** comprising a motor **28**, a housing **40**, and a chuck **42** as disclosed herein. Chamfer-cutting tool kits **200** also may comprise one or more of a frame **86**, a frame **102**, a bushing retainer **44**, a sleeve **55**, a cover **53**, and a sleeve **62** as disclosed herein.

(36) Turning now to FIGS. **4-9**, illustrative non-exclusive examples of a chamfer-cutting tool **10** (FIGS. **4-6**) and a chamfer-cutting tool **100** (FIGS. **7-9**) are illustrated. Where appropriate, the reference numerals from the schematic illustrations of FIGS. **2-3** are used to designate corresponding parts of the examples of FIGS. **4-9**; however, the examples of FIGS. **4-9** are non-exclusive and do not limit chamfer-cutting tools **10**, chamfer-cutting tools **100**, and/or chamfer-cutting tool kits **200** to the illustrated embodiments of FIGS. **4-9**. For the purpose of brevity, each previously discussed component, part, portion, aspect, region, etc. or variants thereof may not be discussed, illustrated, and/or labeled again with respect to the examples of FIGS. **4-9**; however, it is within the scope of the present disclosure that the previously discussed features, variants, etc. may be utilized with the illustrated examples.

(37) FIGS. **4-6** illustrate an example chamfer-cutting tool **10** in the form of chamfer-cutting tool **300**, which may be assembled from a chamfer-cutting tool kit **200**. As illustrated, chamfer-cutting tool **300** is an example of a chamfer-cutting tool **10** that comprises a router **206**, a cutter **20**, a bushing **30**, an upper-edge guide block **34**, a bushing retainer **44**, a retainer nut **52**, and a cover **53**. In addition, as best seen in FIGS. **5** and **6**, chamfer-cutting tool **300** further comprises a sleeve **55**, the housing **40** of the router **206** defines an air passage **80** for directing airflow from the motor **28** into the upper-edge guide-block passage **82** of the upper-edge guide block **34**, the bushing **30** comprises two roller bearings **66**, and the cutter **20** defines a shoulder **72** engaged with the inner race **70** of the upper of the two roller bearings **66**. Moreover, chamfer-cutting tool **300** is an example of a chamfer-cutting tool **10** whose upper-edge guide block **34** is freely rotatably coupled relative to the motor **28**. In particular, the housing **40** of chamfer-cutting tool **300** comprises an outer portion **302** and an inner portion **304** that is freely rotatably coupled to the outer portion **302** by a set of roller bearings **306**. The upper-edge guide block **34** is coupled to the inner portion **304** of the housing **40** via a ball screw lock assembly **308**, which also facilitates the selective adjustment of the upper-edge guide block **34** relative to the housing **40**, and thus the selective adjustment of the chamfer cutting region **38** of the conical cutting surface **24** of the cutter **20**.

(38) FIGS. **7-9** illustrate an example chamfer-cutting tool **100** in the form of chamfer-cutting tool **400**, which may be assembled from a chamfer-cutting tool kit **200**. As illustrated, chamfer-cutting tool **400** is an example of a chamfer-cutting tool **100** that comprises a router **206**, a cutter **20**, a bushing **30**, and a lower-edge guide block **58**. In addition, as best seen in FIGS. **8** and **9**, chamfer-cutting tool **400** further comprises a sleeve **62** engaged between the chuck **42** and the inner race **70** of the upper of two bushing roller bearings **66**, the housing **40** of the router **206** defines air passages **80** for directing airflow from the motor **28** into the lower-edge guide-block passage **84** of the lower-edge guide block **58**, the bushing **30** comprises two bushing roller bearings **66**, the cutter **20** defines a shoulder **72** engaged with the inner race **70** of the lower of the two bushing roller bearings **66**, and the lower-edge guide block **58** comprises a lower-edge guide-block roller bearing **92**. Moreover, chamfer-cutting tool **400** is an example of a chamfer-cutting tool **100** whose lower-edge guide block **58** is freely rotatably coupled relative to the motor **28**. In particular, the housing **40** of chamfer-cutting tool **400** comprises an outer portion **302** and an inner portion **304** that is freely rotatably coupled to the outer portion **302** by a set of roller bearings **306**. The lower-edge guide block **58** is coupled to the inner portion **304** of the housing **40** via a ball screw lock assembly **308**, which also facilitates the selective adjustment of the lower-edge guide block **58** relative to the housing **40**, and thus the selective adjustment of the chamfer cutting region **38** of the conical cutting surface **24** of the cutter **20**.

(39) Illustrative, non-exclusive examples of inventive subject matter according to the present disclosure are described in the following enumerated paragraphs: A. A chamfer-cutting tool (**10**) for cutting an upper chamfer (**12**) between an upper face (**14**) of a workpiece (**18**) and an edge face (**16**) of the workpiece (**18**) adjacent to the upper face (**14**), the chamfer-cutting tool (**10**) comprising: a cutter (**20**) comprising a shaft (**22**) and a conical cutting surface (**24**), wherein the shaft (**22**) comprises a first end (**23**) and a second end (**25**) opposite the first end (**23**), and wherein the shaft (**22**) defines a cutter rotation axis (**26**) and is configured to be operatively coupled to a motor (**28**); a bushing (**30**) rotatably coupled to the shaft (**22**) between the conical cutting surface (**24**) and the second end (**25**) of the shaft (**22**) and comprising an outer cylindrical contact surface (**32**) configured to engage and operatively roll along the edge face (**16**) of the workpiece (**18**); and an upper-edge guide block (**34**) comprising an upper-face guide surface (**36**) configured to engage the upper face (**14**) of the workpiece (**18**), wherein the upper-edge guide block (**34**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a chamfer cutting region (**38**) of the conical cutting surface (**24**) between the upper-face guide surface (**36**) and the outer cylindrical contact surface (**32**) of the bushing (**30**). A1. The chamfer-cutting tool (**10**) of paragraph A, wherein the upper-edge guide block (**34**) defines an upper-edge guide-block passage (**82**), and wherein the cutter (**20**) extends through the upper-edge guide-block passage (**82**). A2. The chamfer-cutting tool (**10**) of any of paragraphs A-A1, wherein the bushing (**30**) comprises: a bushing body (**64**); and at least one bushing roller bearing (**66**) comprising an outer race (**68**) engaged with the bushing body (**64**) and an inner race (**70**) engaged with the shaft (**22**) of the cutter (**20**); and wherein the cutter (**20**) defines a shoulder (**72**) engaged with the inner race (**70**) of the at least one bushing roller bearing (**66**) to prevent the cutting surface (**24**) from engaging the bushing body (**64**). A3. The chamfer-cutting tool (**10**) of any of paragraphs A-A2, further comprising: the motor (**28**) operatively coupled to the first end (**23**) of the shaft (**22**); and a housing (**40**) that operatively supports the motor (**28**), wherein the upper-edge guide block (**34**) is coupled to the housing (**40**) and is configured to be selectively translated toward and away from the housing (**40**) along the cutter rotation axis (**26**) to define the chamfer cutting region (**38**) of the conical cutting surface (**24**). A3.1. The chamfer-cutting tool (**10**) of paragraph A3, further comprising a chuck (**42**) operatively coupled to the motor (**28**) and configured to selectively and operatively engage the shaft (**22**) for operative rotation of the cutter (**20**) by the motor (**28**). A3.2. The chamfer-cutting tool (**10**) of any of paragraphs A3-A3.1, wherein the housing (**40**) defines one

or more air passages (**80**) configured to direct airflow from the motor (**28**) toward the workpiece (**18**). A3.2.1. The chamfer-cutting tool (**10**) of paragraph A3.2, wherein the one or more air passages (**80**) are configured to direct airflow from the motor (**28**) into a/the upper-edge guide-block passage (**82**) of the upper-edge guide block (**34**). A3.3. The chamfer-cutting tool (**10**) of any of paragraphs A3-A3.2.1, further comprising a frame (**86**) configured to operatively support the housing (**40**) to operatively position the chamfer-cutting tool (**10**) relative to the workpiece (**18**). A3.3.1. The chamfer-cutting tool (**10**) of paragraph A3.3, wherein the frame (**86**) comprises one or more rollers (**88**) configured to operatively engage the workpiece (**18**) to maintain the conical cutting surface (**24**) in operative engagement with the workpiece (**18**). A4. The chamfer-cutting tool (**10**) of any of paragraphs A-A3.3.1, further comprising a bushing retainer (**44**) operatively coupled to the shaft (**22**) and configured to retain the bushing (**30**) in a fixed positioned along the cutter rotation axis (**26**) relative to the cutter (**20**). A4.1. The chamfer-cutting tool (**10**) of paragraph A4, wherein the bushing retainer (**44**) comprises: a retainer body (**46**) that defines a bushing cavity (**48**) sized to receive a lower portion (**50**) of the bushing (**30**); and a retainer nut (**52**) operatively coupled with the shaft (**22**) and configured to urge the retainer body (**46**) against the bushing (**30**) and thereby urge the bushing (**30**) toward the cutter (**20**). A4.2. The chamfer-cutting tool (**10**) of any of paragraphs A4-A4.1, further comprising a sleeve (**55**) configured to position the bushing retainer (**44**) relative to the bushing (**30**). A4.2.1. The chamfer-cutting tool (**10**) of paragraph A4.2, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) engaged with the sleeve (**55**). A4.3. The chamfer-cutting tool (**10**) of any of paragraphs A4-A4.2.1, further comprising a cover (**53**) configured to be selectively positioned over the second end (**25**) of the shaft (**22**) of the cutter (**20**), optionally wherein the cover (**53**) is configured to be selectively coupled to a/the retainer body (**46**). A5. The chamfer-cutting tool (**10**) of any of paragraphs A-A4.3, wherein the chamfer-cutting tool (**10**) is further for cutting a lower chamfer (**54**) between the edge face (**16**) of the workpiece (**18**) and a lower face (**56**) of the workpiece (**18**) adjacent to the edge face (**16**) and opposite the upper face (**14**), wherein the upper-edge guide block (**34**) is configured to be selectively removed from the cutter (**20**), and wherein the chamfer-cutting tool (**10**) further comprises: a lower-edge guide block (**58**) comprising a lower-face guide surface (**60**) configured to engage the lower face (**56**) of the workpiece (**18**), wherein the lower-edge guide block (**58**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a second chamfer cutting region (**38**) of the conical cutting surface (**24**) between the lower-face guide surface (**60**) and the outer cylindrical contact surface (**32**) of the bushing (**30**). A5.1. The chamfer-cutting tool (**10**) of paragraph A5, wherein the lower-edge guide block (**58**) defines a lower-edge guide-block passage (**84**) through which the cutter (**20**) is configured to extend. A5.2. The chamfer-cutting tool (**10**) of any of paragraphs A5-A5.1, further comprising a (second) sleeve (**62**) configured to receive the shaft (**22**) of the cutter (**20**) and engage the bushing (**30**) to position the bushing (**30**) relative to a/the chuck (**42**), the motor (**28**), and/or a/the housing (**40**) of the chamfer-cutting tool (**10**). A5.2.1. The chamfer-cutting tool (**10**) of paragraph A5.2, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) engaged with the shaft (**22**) of the cutter (**20**); and wherein the (second) sleeve (**62**) is configured to engage the inner race (**70**) to operatively position the bushing (**30**) relative to the chuck (**42**), the motor (**28**), and/or the housing (**40**) of the chamfer-cutting tool (**10**). A5.3. The chamfer-cutting tool (**10**) of any of paragraphs A5-A5.2.1, wherein the lower-edge guide block (**58**) comprises: a lower-edge guide-block body (**90**); and at least one lower-edge guide-block roller bearing (**92**), wherein the at least one lower-edge guide-block roller bearing (**92**) is configured to rotatably couple the lower-edge guide-block body (**90**) to the shaft (**22**) of the cutter (**20**). B. A chamfer-cutting tool (**100**) for cutting a lower chamfer

(**54**) between a lower face (**56**) of a workpiece (**18**) and an edge face (**16**) of the workpiece (**18**) adjacent to the lower face (**56**), the chamfer-cutting tool (**10**) comprising: a cutter (**20**) comprising a shaft (**22**) and a conical cutting surface (**24**), wherein the shaft (**22**) comprises a first end (**23**) and a second end (**25**) opposite the first end (**23**), and wherein the shaft (**22**) defines a cutter rotation axis (**26**) and is configured to be operatively coupled to a motor (**28**); a bushing (**30**) rotatably coupled to the shaft (**22**) between the conical cutting surface (**24**) and the first end (**23**) of the shaft (**22**) and comprising an outer cylindrical contact surface (**32**) configured to engage and operatively roll along the edge face (**16**) of the workpiece (**18**); and a lower-edge guide block (**58**) comprising a lower-face guide surface (**60**) configured to engage the lower face (**56**) of the workpiece (**18**), wherein the lower-edge guide block (**58**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a chamfer cutting region (**38**) of the conical cutting surface (**24**) between the lower-face guide surface (**60**) and the outer cylindrical contact surface (**32**) of the bushing (**30**). B1. The chamfer-cutting tool (**100**) of paragraph B, wherein the lower-edge guide block (**58**) defines a lower-edge guide-block passage (**84**), and wherein the cutter (**20**) extends through the lower-edge guide-block passage (**84**). B2. The chamfer-cutting tool (**100**) of any of paragraphs B-B1, wherein the bushing (**30**) comprises: a bushing body (**64**); and at least one bushing roller bearing (**66**) comprising an outer race (**68**) engaged with the bushing body (**64**) and an inner race (**70**) engaged with the shaft (**22**) of the cutter (**20**); and wherein the cutter (**20**) defines a shoulder (**72**) engaged with the inner race (**70**) of the at least one bushing roller bearing (**66**) to prevent the conical cutting surface (**24**) from engaging the bushing body (**64**). B3. The chamfer-cutting tool (**100**) of any of paragraphs B-B2, further comprising: the motor (**28**) operatively coupled to the second end (**25**) of the shaft (**22**); and a housing (**40**) that operatively supports the motor (**28**), wherein the lower-edge guide block (**58**) is coupled to the housing (**40**) and is configured to be selectively translated toward and away from the housing (**40**) along the cutter rotation axis (**26**) to define the chamfer cutting region (**38**) of the conical cutting surface (**24**). B3.1. The chamfer-cutting tool (**100**) of paragraph B3, further comprising a chuck (**42**) operatively coupled to the motor (**28**) and configured to selectively and operatively engage the shaft (**22**) for operative rotation of the cutter (**20**) by the motor (**28**). B3.2. The chamfer-cutting tool (**100**) of any of paragraphs B3-B3.1, wherein the housing (**40**) defines one or more air passages (**80**) configured to direct airflow from the motor (**28**) toward the workpiece (**18**). B3.2.1. The chamfer-cutting tool (**100**) of paragraph B3.2, wherein the one or more air passages (**80**) are configured to direct airflow from the motor (**28**) into a/the lower-edge guide-block passage (**84**) of the lower-edge guide block (**58**). B3.3. The chamfer-cutting tool (**100**) of any of paragraphs B3-B3.2.1, further comprising a frame (**102**) configured to operatively support the housing (**40**) to operatively position the chamfer-cutting tool (**100**) relative to the workpiece (**18**). B3.3.1. The chamfer-cutting tool (**100**) of paragraph B3.3, wherein the frame (**102**) comprises one or more rollers (**88**) configured to operatively engage the workpiece (**18**) to maintain the conical cutting surface (**24**) in operative engagement with the workpiece (**18**). B4. The chamfer-cutting tool (**100**) of any of paragraphs B-B3.3.1, further comprising a sleeve (**62**) configured to position the bushing (**30**) relative to a/the chuck (**42**), the motor (**28**), and/or a/the housing (**40**) of the chamfer-cutting tool (**100**). B4.1. The chamfer-cutting tool (**100**) of paragraph B4, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) engaged with the shaft (**22**) of the cutter (**20**); and wherein the sleeve (**62**) engages the inner race (**70**) to operatively position the bushing (**30**) relative to the chuck (**42**), the motor (**28**), and/or the housing (**40**) of the chamfer-cutting tool (**100**). B5. The chamfer-cutting tool (**100**) of any of paragraphs B-B4.1, wherein the lower-edge guide block (**58**) comprises: a lower-edge guide-block body (**90**); and at least one lower-edge guide-block roller bearing (**92**), wherein the at least one lower-edge guide-block roller bearing (**92**) rotatably couples the lower-edge guide-block body (**90**) to the shaft (**22**)

of the cutter (**20**). B6. The chamfer-cutting tool (**100**) of any of paragraphs B-B5, wherein the chamfer-cutting tool (**100**) is further for cutting an upper chamfer (**12**) between an upper face (**14**) of the workpiece (**18**) and the edge face (**16**) of the workpiece (**18**) adjacent to the upper face (**14**) and opposite the lower face (**56**), wherein the lower-edge guide block (**58**) is configured to be selectively removed from relative to the cutter (**20**), and wherein the chamfer-cutting tool (**100**) further comprises: an upper-edge guide block (**34**) comprising an upper-face guide surface (**36**) configured to engage the upper face (**14**) of the workpiece (**18**), wherein the upper-edge guide block (**34**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a second chamfer cutting region (**38**) of the conical cutting surface (**24**) between the upper-face guide surface (**36**) and the outer cylindrical contact surface (**32**) of the bushing (**30**). B6.1. The chamfer-cutting tool (**100**) of paragraph B6, wherein the upper-edge guide block (**34**) defines an upper-edge guide-block passage (**82**) through which the cutter (**20**) is configured to extend. B6.2. The chamfer-cutting tool (**100**) of any of paragraphs B6-B6.1, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) engaged with the shaft (**22**) of the cutter (**20**); and wherein the cutter (**20**) defines a shoulder (**72**) configured to be engaged with the inner race (**70**) of the at least one bushing roller bearing (**66**) to prevent the cutting surface (**24**) from engaging the bushing body (**64**). B6.3. The chamfer-cutting tool (**100**) of any of paragraphs B6-B6.2, further comprising a bushing retainer (**44**) configured to be operatively coupled to the shaft (**22**) to retain the bushing (**30**) in a fixed positioned along the cutter rotation axis (**26**) relative to the cutter (**20**). B6.3.1. The chamfer-cutting tool (**100**) of paragraph B6.3, wherein the bushing retainer (**44**) comprises: a retainer body (**46**) that defines a bushing cavity (**48**) sized to receive a lower portion (**50**) of the bushing (**30**); and a retainer nut (**52**) configured to be operatively coupled with the shaft (**22**) to urge the retainer body (**46**) against the bushing (**30**) and thereby urge the bushing (**30**) toward the cutter (**20**). B6.3.2. The chamfer-cutting tool (**100**) of any of paragraphs B6.3-B6.3.1, further comprising a (second) sleeve (**55**) configured to position the bushing retainer (**44**) relative to the bushing (**30**). B6.3.2.1. The chamfer-cutting tool (**100**) of paragraph B6.3.2, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) configured to engage the bushing body (**64**) and an/the inner race (**70**) configured to engage the (second) sleeve (**55**). B6.3.3. The chamfer-cutting tool (**100**) of any of paragraphs B6.3-B6.3.2.1, further comprising a cover (**53**) configured to be selectively positioned over the second end (**25**) of the shaft (**22**) of the cutter (**20**), optionally wherein the cover (**53**) is configured to be selectively coupled to a/the retainer body (**46**). C. A chamfer-cutting tool kit (**200**), wherein the chamfer-cutting tool kit (**200**) is configured to be selectively assembled into an upper-chamfer configuration (**202**) for cutting an upper chamfer (**12**) between an upper face (**14**) of a workpiece (**18**) and an edge face (**16**) of the workpiece (**18**) adjacent to the upper face (**14**), and wherein the chamfer-cutting tool kit (**200**) is further configured to be selectively assembled into a lower-chamfer configuration (**204**) for cutting a lower chamfer (**54**) between the edge face (**16**) of the workpiece (**18**) and a lower face (**56**) of the workpiece (**18**) adjacent to the edge face (**16**) and opposite the upper face (**14**), the chamfer-cutting tool kit (**200**) comprising: a cutter (**20**) comprising a shaft (**22**) and a conical cutting surface (**24**), wherein the shaft (**22**) comprises a first end (**23**) and a second end (**25**) opposite the first end (**23**), and wherein the shaft (**22**) defines a cutter rotation axis (**26**), wherein the first end (**23**) is configured to be operatively coupled to a motor (**28**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**), and wherein the second end (**25**) is configured to be operatively coupled to the motor (**28**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**); a bushing (**30**) comprising an outer cylindrical contact surface (**32**) configured to engage and operatively roll along the edge face (**16**) of the workpiece (**18**), wherein the bushing

(**30**) is configured to be rotatably coupled to the shaft (**22**) between the conical cutting surface (**24**) and the second end (**25**) of the shaft (**22**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**) and when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**); an upper-edge guide block (**34**) configured to be selectively coupled relative to the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**), wherein the upper-edge guide block (**34**) comprises an upper-face guide surface (**36**) configured to engage the upper face (**14**) of the workpiece (**18**), wherein the upper-edge guide block (**34**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a first chamfer cutting region (**38**) of the conical cutting surface (**24**) between the upper-face guide surface (**36**) and the outer cylindrical contact surface (**32**) of the bushing (**30**); and a lower-edge guide block (**58**) configured to be selectively coupled relative to the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**), wherein the lower-edge guide block (**58**) comprises a lower-face guide surface (**60**) configured to engage the lower face (**56**) of the workpiece (**18**), wherein the lower-edge guide block (**58**) is configured to be selectively positioned along the cutter rotation axis (**26**) relative to the conical cutting surface (**24**) of the cutter (**20**) and relative to the outer cylindrical contact surface (**32**) of the bushing (**30**) to selectively define a second chamfer cutting region (**38**) of the conical cutting surface (**24**) between the lower-face guide surface (**60**) and the outer cylindrical contact surface (**32**) of the bushing (**30**). C1. The chamfer-cutting tool kit (**200**) of paragraph C, further comprising: the motor (**28**); and a housing (**40**) that operatively supports the motor (**28**), wherein the upper-edge guide block (**34**) is coupled to the housing (**40**) and is configured to be selectively translated toward and away from the housing (**40**) along the cutter rotation axis (**26**) to define the first chamfer cutting region (**38**) of the conical cutting surface (**24**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**), and wherein the lower-edge guide block (**58**) is coupled to the housing (**40**) and is configured to be selectively translated toward and away from the housing (**40**) along the cutter rotation axis (**26**) to define the second chamfer cutting region (**38**) of the conical cutting surface (**24**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C1.1. The chamfer-cutting tool kit (**200**) of paragraph C1, further comprising a chuck (**42**) operatively coupled to the motor (**28**) and configured to selectively and operatively engage the shaft (**22**) for operative rotation of the cutter (**20**) by the motor (**28**). C1.2. The chamfer-cutting tool kit (**200**) of any of paragraphs C1-C1.1, wherein the housing (**40**) defines one or more air passages (**80**) configured to direct airflow from the motor (**28**) toward the workpiece (**18**). C1.2.1. The chamfer-cutting tool kit (**200**) of paragraph C1.2, wherein the one or more air passages (**80**) are configured to direct airflow from the motor (**28**) into an upper-edge guide-block passage (**82**) of the upper-edge guide block (**34**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**) and into a lower-edge guide-block passage (**84**) of the lower-edge guide block (**58**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C1.3. The chamfer-cutting tool kit (**200**) of any of paragraphs C1-C.2.1, further comprising a frame (**86**,**102**) configured to be operatively coupled the housing (**40**) to operatively position a chamfer-cutting tool (**10**,**100**) assembled from the chamfer-cutting tool kit (**200**) relative to the workpiece (**18**). C1.3.1. The chamfer-cutting tool kit (**200**) of paragraph C1.3, wherein the frame (**86**,**102**) comprises one or more rollers (**88**) configured to operatively engage the workpiece (**18**) to maintain the conical cutting surface (**24**) in operative engagement with the workpiece (**18**). C2. The chamfer-cutting tool kit (**200**) of any of paragraphs C-C1.3.1, wherein the bushing (**30**) comprises: a bushing body (**64**); and at least one bushing roller bearing (**66**) comprising an outer race (**68**) engaged with the bushing body (**64**) and an inner race (**70**) configured to engage with the shaft (**22**) of the cutter (**20**); and wherein the cutter (**20**) defines a shoulder (**72**) configured to engage with the inner race (**70**) of the at least one bushing roller

bearing (**66**) to prevent the conical cutting surface (**24**) from engaging the bushing body (**64**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**) and when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C3. The chamfer-cutting tool kit (**200**) of any of paragraphs C-C2, wherein the upper-edge guide block (**34**) defines an/the upper-edge guide-block passage (**82**), and wherein the cutter (**20**) extends through the upper-edge guide-block passage (**82**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C4. The chamfer-cutting tool kit (**200**) of any of paragraphs C-C3, further comprising a bushing retainer (**44**) configured to be operatively coupled to the shaft (**22**) to retain the bushing (**30**) in a fixed positioned along the cutter rotation axis (**26**) relative to the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C4.1. The chamfer-cutting tool kit (**200**) of paragraph C4, wherein the bushing retainer (**44**) comprises: a retainer body (**46**) that defines a bushing cavity (**48**) sized to receive a lower portion (**50**) of the bushing (**30**); and a retainer nut (**52**) configured to be operatively coupled with the shaft (**22**) to urge the retainer body (**46**) against the bushing (**30**) and thereby urge the bushing (**30**) toward the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C4.2. The chamfer-cutting tool kit (**200**) of any of paragraphs C4-C4.1, further comprising a sleeve (**55**) configured to receive the shaft (**22**) of the cutter (**20**) and position the bushing retainer (**44**) relative to the bushing (**30**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C4.2.1. The chamfer-cutting tool kit (**200**) of paragraph C4.2, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) engaged with the sleeve (**55**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C4.3. The chamfer-cutting tool kit (**200**) of any of paragraphs C4-C4.2.1, further comprising a cover (**53**) configured to be selectively positioned over the second end (**25**) of the shaft (**22**) of the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the upper-chamfer configuration (**202**). C5. The chamfer-cutting tool kit (**200**) of any of paragraphs C-C4.3, wherein the lower-edge guide block (**58**) defines a/the lower-edge guide-block passage (**84**), and wherein the cutter (**20**) extends through the lower-edge guide-block passage (**84**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C6. The chamfer-cutting tool (**10**) of any of paragraphs C-C5, further comprising a (second) sleeve (**62**) configured to receive the shaft (**22**) of the cutter (**20**) and engage the bushing (**30**) to position the bushing (**30**) relative to a/the chuck (**42**), the motor (**28**), and/or a/the housing (**40**) of the chamfer-cutting tool (**10**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C6.1. The chamfer-cutting tool kit (**200**) of paragraph C6, wherein the bushing (**30**) comprises: a/the bushing body (**64**); and a/the at least one bushing roller bearing (**66**) comprising an/the outer race (**68**) engaged with the bushing body (**64**) and an/the inner race (**70**) configured to engage with the shaft (**22**) of the cutter (**20**); and wherein the (second) sleeve (**62**) is configured to engage the inner race (**70**) to operatively position the bushing (**30**) relative to the chuck (**42**), the motor (**28**), and/or the housing (**40**) of the chamfer-cutting tool (**10**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**). C7. The chamfer-cutting tool kit (**200**) of any of paragraphs C-C6.1, wherein the lower-edge guide block (**58**) comprises: a lower-edge guide-block body (**90**); and at least one lower-edge guide-block roller bearing (**92**), wherein the at least one lower-edge guide-block roller bearing (**92**) is configured to rotatably couple the lower-edge guide-block body (**90**) to the shaft (**22**) of the cutter (**20**) when the chamfer-cutting tool kit (**200**) is assembled into the lower-chamfer configuration (**204**).

(40) As used herein, the terms “adapted” and “configured” mean that the element, component, or other subject matter is designed and/or intended to perform a given function. Thus, the use of the terms “adapted” and “configured” should not be construed to mean that a given element, component, or other subject matter is simply “capable of” performing a given function but that the

element, component, and/or other subject matter is specifically selected, created, implemented, utilized, programmed, and/or designed for the purpose of performing the function. It is also within the scope of the present disclosure that elements, components, and/or other recited subject matter that is recited as being adapted to perform a particular function may additionally or alternatively be described as being configured to perform that function, and vice versa. Similarly, subject matter that is recited as being configured to perform a particular function may additionally or alternatively be described as being operative to perform that function.

(41) As used herein, the term “and/or” placed between a first entity and a second entity means one of (1) the first entity, (2) the second entity, and (3) the first entity and the second entity. Multiple entries listed with “and/or” should be construed in the same manner, i.e., “one or more” of the entities so conjoined. Other entities optionally may be present other than the entities specifically identified by the “and/or” clause, whether related or unrelated to those entities specifically identified. Thus, as a non-limiting example, a reference to “A and/or B,” when used in conjunction with open-ended language such as “comprising,” may refer, in one example, to A only (optionally including entities other than B); in another example, to B only (optionally including entities other than A); in yet another example, to both A and B (optionally including other entities). These entities may refer to elements, actions, structures, steps, operations, values, and the like.

(42) The various disclosed elements of apparatuses and steps of methods disclosed herein are not required to all apparatuses and methods according to the present disclosure, and the present disclosure includes all novel and non-obvious combinations and subcombinations of the various elements and steps disclosed herein. Moreover, one or more of the various elements and steps disclosed herein may define independent inventive subject matter that is separate and apart from the whole of a disclosed apparatus or method. Accordingly, such inventive subject matter is not required to be associated with the specific apparatuses and methods that are expressly disclosed herein, and such inventive subject matter may find utility in apparatuses and/or methods that are not expressly disclosed herein.

Claims

1. A chamfer-cutting tool kit, wherein the chamfer-cutting tool kit is configured to be selectively assembled into an upper-chamfer configuration for cutting an upper chamfer between an upper face of a workpiece and an edge face of the workpiece adjacent to the upper face, and wherein the chamfer-cutting tool kit is further configured to be selectively assembled into a lower-chamfer configuration for cutting a lower chamfer between the edge face of the workpiece and a lower face of the workpiece adjacent to the edge face and opposite the upper face, the chamfer-cutting tool kit comprising: a cutter comprising a shaft and a conical cutting surface, wherein the shaft comprises a first end and a second end opposite the first end, and wherein the shaft defines a cutter rotation axis, wherein the first end is configured to be operatively coupled to a motor when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration, and wherein the second end is configured to be operatively coupled to the motor when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration; a bushing comprising an outer cylindrical contact surface configured to engage and operatively roll along the edge face of the workpiece, wherein the bushing is configured to be rotatably coupled to the shaft between the conical cutting surface and the second end of the shaft when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration and when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration; an upper-edge guide block configured to be selectively coupled relative to the cutter when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration, wherein the upper-edge guide block comprises an upper-face guide surface configured to engage the upper face of the workpiece, wherein a position of the upper-edge guide block is configured to be selectively adjusted along the cutter rotation axis relative to the conical cutting surface of the cutter and

relative to the outer cylindrical contact surface of the bushing to selectively define a first chamfer cutting region of the conical cutting surface between the upper-face guide surface and the outer cylindrical contact surface of the bushing; and a lower-edge guide block configured to be selectively coupled relative to the cutter when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration, wherein the lower-edge guide block comprises a lower-face guide surface configured to engage the lower face of the workpiece, wherein a position of the lower-edge guide block is configured to be selectively adjusted along the cutter rotation axis relative to the conical cutting surface of the cutter and relative to the outer cylindrical contact surface of the bushing to selectively define a second chamfer cutting region of the conical cutting surface between the lower-face guide surface and the outer cylindrical contact surface of the bushing.

2. The chamfer-cutting tool kit of claim 1, further comprising: the motor; and a housing that operatively supports the motor, wherein the upper-edge guide block is coupled to the housing and is configured to be selectively translated toward and away from the housing along the cutter rotation axis to define the first chamfer cutting region of the conical cutting surface when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration, and wherein the lower-edge guide block is coupled to the housing and is configured to be selectively translated toward and away from the housing along the cutter rotation axis to define the second chamfer cutting region of the conical cutting surface when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.

3. The chamfer-cutting tool kit of claim 2, wherein the housing defines one or more air passages configured to direct airflow from the motor toward the workpiece.

4. The chamfer-cutting tool kit of claim 3, wherein the one or more air passages are configured to direct airflow from the motor into an upper-edge guide-block passage of the upper-edge guide block when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration and into a lower-edge guide-block passage of the lower-edge guide block when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.

5. The chamfer-cutting tool kit of claim 2, further comprising a frame configured to be operatively coupled to the housing to operatively position a chamfer-cutting tool assembled from the chamfer-cutting tool kit relative to the workpiece.

6. The chamfer-cutting tool kit of claim 5, wherein the frame comprises one or more rollers configured to operatively engage the workpiece to maintain the conical cutting surface in operative engagement with the workpiece.

7. The chamfer-cutting tool kit of claim 2, further comprising a chuck operatively coupled to the motor and configured to selectively and operatively engage the shaft for operative rotation of the cutter by the motor.

8. The chamfer-cutting tool kit of claim 7, wherein when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration, the first end of the shaft of the cutting tool is engaged with the chuck.

9. The chamfer-cutting tool kit of claim 7, wherein when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration, the second end of the shaft of the cutting tool is engaged with the chuck.

10. The chamfer-cutting tool kit of claim 1, wherein the bushing comprises: a bushing body; and at least one bushing roller bearing comprising an outer race engaged with the bushing body and an inner race configured to engage with the shaft of the cutter; and wherein the cutter defines a shoulder configured to engage with the inner race of the at least one bushing roller bearing to prevent the conical cutting surface from engaging the bushing body when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration and when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.

11. The chamfer-cutting tool kit of claim 1, wherein the upper-edge guide block defines an upper-edge guide-block passage, and wherein the cutter extends through the upper-edge guide-block

passage when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
12. The chamfer-cutting tool kit of claim 1, further comprising a bushing retainer configured to be operatively coupled to the shaft to retain the bushing in a fixed position along the cutter rotation axis relative to the cutter when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
13. The chamfer-cutting tool kit of claim 12, wherein the bushing retainer comprises: a retainer body that defines a bushing cavity sized to receive a lower portion of the bushing; and a retainer nut configured to be operatively coupled with the shaft to urge the retainer body against the bushing and thereby urge the bushing toward the cutter when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
14. The chamfer-cutting tool kit of claim 12, further comprising a sleeve configured to receive the shaft of the cutter and position the bushing retainer relative to the bushing when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
15. The chamfer-cutting tool kit of claim 14, wherein the bushing comprises: a bushing body; and at least one bushing roller bearing comprising an outer race engaged with the bushing body and an inner race engaged with the sleeve when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
16. The chamfer-cutting tool kit of claim 12, further comprising a cover configured to be selectively positioned over the second end of the shaft of the cutter when the chamfer-cutting tool kit is assembled into the upper-chamfer configuration.
17. The chamfer-cutting tool kit of claim 1, wherein the lower-edge guide block defines a lower-edge guide-block passage, and wherein the cutter extends through the lower-edge guide-block passage when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.
18. The chamfer-cutting tool kit of claim 1, further comprising a sleeve configured to receive the shaft of the cutter and engage the bushing to position the bushing relative to a chuck, the motor, and/or a housing of the chamfer-cutting tool kit when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.
19. The chamfer-cutting tool kit of claim 18, wherein the bushing comprises: a bushing body; and at least one bushing roller bearing comprising an outer race engaged with the bushing body and an inner race configured to engage with the shaft of the cutter; and wherein the sleeve is configured to engage the inner race to operatively position the bushing relative to the chuck, the motor, and/or the housing of the chamfer-cutting tool kit when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.
20. The chamfer-cutting tool kit of claim 1, wherein the lower-edge guide block comprises: a lower-edge guide-block body; and at least one lower-edge guide-block roller bearing, wherein the at least one lower-edge guide-block roller bearing is configured to rotatably couple the lower-edge guide-block body to the shaft of the cutter when the chamfer-cutting tool kit is assembled into the lower-chamfer configuration.