A system for fabricating a steel component is provided. The system includes an edging apparatus configured to receive a steel sheet from an uncoiler and configured to edge and deburr the vertical edge of the steel sheet; and a roll-forming device configured to receive the edge of the steel sheet. A method for fabricating a steel component and the product of the method is also provided.
100

Provide a steel coiled sheet at an uncoiler

102

Feeding the steel sheet through a deburring/edging apparatus

104

Deburring and edging the vertical edge of the steel sheet

106

Punching / Broaching a hole of a predetermined size in the sheet

108

Passing the steel sheet through a roll forming apparatus

110

FIG. 1
Initiating workflow and production of steel component

Selecting a type of edging process

Edges smoothed to predetermined standards

Queue the next component

FIG. 6
A STEEL COMPONENT AND METHOD OF MAKING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

The present Utility patent application claimed the priority benefit of the U.S. provisional application for patent Ser. No. 61/753,157 filed on Jan. 16, 2013, entitled A Steel Component and Method of Making the Same, under 35 U.S. C. 119(e). The contents of this related provisional application are incorporated herein by reference for all purposes.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

REFERENCE TO SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

Not Applicable

BACKGROUND OF THE INVENTION

This application relates generally to structural framing components, steel framing components, and methods and systems of making and manufacturing the same. More particularly, the application relates to variable steel studs, tracks, joints and edges, and methods and systems of making the same.

Steel framing components and associated accessories are widely used in both the commercial and residential construction industries for many different structural framing applications. Steel framing components have been increasingly used in the industry based on their exceptional design flexibility. For example, due to the inherent strength of steel (e.g., high tensile strength), steel framing components can span a much greater distance than wood, while also being able to resist wind, most earthquake loads and have a high fire rating.

Steel framing components may comprise load bearing studs, non-load baring studs, framing accessories, and drywall finishing products. More specifically, a few examples of the above-described steel framing components include: “C”-shaped wall studs, floor joists, roof rafters, and tracks, each of which may be manufactured from mill-certified galvanized prime steel. These steel framing components are typically made of light steel, and are manufactured and formed according to various needs. For example, some load-bearing structural studs may require greater steel thickness than a dry-wall stud. According to the construction need, the steel components may be formed and manufactured with varying gauges and dimensions.

Steel studs and tracks are typically fabricated from a roll forming process using a sheet of coiled steel. Roll forming is a continuous bending operation in which a long strip of sheet metal (typically coiled steel) is passed through sets of rolls mounted on consecutive stands, each set performing only an incremental part of the bend, until the desired cross-section profile is obtained. Known methods of roll forming steel components, and the products these methods produce, suffer serious drawbacks, particularly with regard to various safety concerns during manufacture, and with the resulting final product.

Indeed, construction related injuries have consistently plagued the construction industry, and while significant improvements have been to mitigate the risk of injury, further mitigation is a major focus for not only the companies involved, but for numerous governmental labor departments, such as OSHA in the United States. In the steel structural component forming industry, known methods of forming steel components leave the lips and edges dangerously sharp, with numerous burrs and/or surfaces that are capable of injuring not only the manufacturing engineers that handle them, but also the on-site construction workers who are responsible for constructing the components for which they were ultimately formed.

Furthermore, particularly in relation to steel studs, current safeguards are unduly expensive, and are also wasteful of raw materials. For example, some manufacturers have introduced hemmed edges, in which the steel is rolled over at the edge a smooth “grip” surface. However to hem, the manufacturers must use additional raw materials, which is expensive and wasteful, since the hem does not contribute to structural integrity.

Accordingly, the present invention is directed towards overcoming these aforementioned problems, while setting forth a steel component that obviates safety concerns, and a providing a method of manufacturing this steel component in an economical and expeditious manner.

SUMMARY OF THE INVENTION

The following summary of the invention is provided in order to provide a basic understanding of some aspects and features of the invention. This summary is not an extensive overview of the invention and as such it not intended to particularly identify key or critical elements of the invention or to delineate the scope of the invention. Its sole purpose is to present some concepts of the invention in a simplified form as a prelude to the more detailed description that is presented below.

In exemplary embodiments, a method for forming a steel component, the method comprising feeding a steel sheet through a deburring and/or edging apparatus; and deburring a vertical edge of the steel sheet is provided. The edging and deburring process comprises mechanical deburring, electrochemical deburring, thermal deburring and/or manual deburring.

In another exemplary embodiment, a system for forming a steel component is provided. The system comprises an edging apparatus configured to receive a steel sheet from an uncurler and configured to edge and deburr the vertical edge of the steel sheet; and a roll-forming device configured to receive the edged steel sheet is provided.

In another exemplary embodiment, the edging apparatus comprises a head portion, a laterally adjustable flange connected to the head, the flange configured to be fitted with a mechanical, thermal, or electrochemical edging component. The flange is configured to receive the steel sheet, and as the sheet passes through the flange, edge and deburr the vertical edges of the steel sheet to create a smoothed edge.

In an exemplary embodiment, a steel component comprising a formed sheet, wherein the sheet comprises a vertically deburred and/or edged side, wherein the steel component comprises a steel stud. The apparatus, the roll forming apparatus configured to form the steel sheet into the steel component. The edging device comprises a head portion; a
flange connected to the head, the flange configured to be fitted with a mechanical, thermal, or electrochemical edging component. The flange is configured to receive the steel sheet, and as the sheet passes through the edge and deburr the vertical edges of the steel sheet to create a smooth edge. The deburring and edging step is automated and adjustable using a processor based controller configured to provide a motive control of the steel component, wherein an operator adjusts the edging step according to the steel component specifications.

Various embodiments of the subject invention provide a steel structural framing component that is safe to the touch, particularly in areas in which they are likely to be contacted by workers. Other embodiments describe a method of manufacturing the steel component in a fast and economical manner.

Other features, advantages, and aspects of the present invention will become more apparent and be more readily understood from the following detailed description, which should be read in conjunction with the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0018]** FIG. 1 is a flow chart describing a step-wise method in accordance with an embodiment of the present invention;

**[0019]** FIG. 2a is a top view of system for fabricating a steel component in accordance with embodiments of the present invention;

**[0020]** FIG. 2b is a front view of system for fabricating a steel component in accordance with embodiments of the present invention;

**[0021]** FIG. 2c is another front view of system for fabricating a steel component in accordance with another embodiment of the present invention;

**[0022]** FIG. 2d is a front view of system for fabricating a steel component in accordance with further embodiments of the present invention;

**[0023]** FIG. 2e is a front view of system for fabricating a steel component in accordance with further embodiments of the present invention;

**[0024]** FIG. 3 is a perspective view of the systems of FIGS. 2a–2e.

**[0025]** FIG. 4 is a front view of a steel component in accordance with embodiments of the present invention.

**[0026]** FIG. 5 is a flow chart describing a processor-based step-wise method in accordance with an embodiment of the present invention.

**[0027]** FIG. 6 is a microscopic photograph showing a cross-sectional view of a vertical edge of a steel sheet before and after the edging portion of the system.

**DETAILED DESCRIPTION OF THE INVENTION**

**[0028]** The present invention is best understood by reference to the detailed figures and description set forth herein.

**[0029]** Embodiments of the invention are discussed below with reference to the Figure. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the invention extends beyond these limited embodiments. For example, it should be appreciated that those skilled in the art will, in light of the teachings of the present invention, recognize a multiplicity of alternate and suitable approaches, depending upon the needs of the particular application, to implement the functionality of any given detail described herein, beyond the particular implementation choices in the following embodiments described and shown. For example, while steel studs are primarily referred to herein, it will be appreciated that other steel components such as floor joists, roof rafters, and tracks are applicable to embodiments of the present invention. That is, there are numerous modifications and variations of the invention that are too numerous to be listed but that all fit within the scope of the invention. Also, singular words should be read as plural and vice versa and masculine as feminine and vice versa, where appropriate, and alternative embodiments do not necessarily imply that the two are mutually exclusive.

**[0030]** Those skilled in the art will readily recognize, in accordance with the teachings of the present invention, that any of the foregoing steps and/or system modules may be suitably replaced, reordered, removed and additional steps and/or system modules may be inserted depending upon the needs of the particular application, and that the systems of the foregoing embodiments may be implemented using any of a wide variety of suitable processes and system modules, and is not limited to any particular computer hardware, software, middleware, firmware, microcode and the like. For any method steps described in the present application that can be carried out on a computing machine, a typical computer system can, when appropriately configured or designed, serve as a computer system in which those aspects of the invention may be embodied.

**[0031]** Referring now to FIG. 1, a method for manufacturing a structural component, in this embodiment a steel stud, is provided generally at 100. The flowchart is shown to better help illustrate this exemplary method. While the flowchart shows an exemplary step-by-step method, it is to be appreciated that a skilled artisan may rearrange or reorder the method while maintaining like results.

**[0032]** The method includes providing a steel coiled sheet proximate an uncoiler device, step 102. This step includes attaching a steel coiled sheet to an uncoiler device, such that the steel coiled sheet is supported by the uncoiler device. The steel coiled sheet may comprise, in various embodiments of the present invention, galvanized hot-dipped steel coils, rolled on five-stand (or less), six-high cold mill and annealed and coated on a continuous galvanizing line. The steel coils may be manufactured using a tension leveler to supply third standard flatness tolerances, a temper mill to provide superior surface quality, minimum spangle equipment and a galvannealed induction furnace. The steel coils may be corrosion resistant with varying surface, gauge, and shape. In exemplary embodiments, the shape may comprise ½ ASTM Flatness Standards, dimensions thickness 0.0150" MIN to 0.0994" NOM, width typically up to 55.5" and higher, in gauges that range from 25 gauge (18 mils) up to 12 gauge (97 mils) to accommodate both load and non-load bearing conditions.

**[0033]** The steel coiled sheets may comprise a base metal of Iron (Fe), Alloying elements comprising Calcium, Carbon, Copper, Phosphorus silicon, Sulfur, and metallic coatings comprising Aluminum, Antimony, Lead and Zinc.

**[0034]** In optional embodiments of the invention, the steel coiled sheet may be manufacture using hot-rolling processes or cold-rolling annealing process. A skilled artisan will recognize that any type of metals or metals alloys are applicable to embodiments of the present invention.
Still with reference to FIG. 1, the coiled steel sheet may be disposed on an uncoiler. The uncoiler may be comprise either a motorized or non-motorized uncoiler, having any predetermined width (60 inch), capacity (e.g., 12,000 lbs.), and spindle count. In operation, the coiled steel sheet is fed from the uncoiler through a nip between a slitter comprising two circular cutting wheels where excess or predetermined materials are cut or sheered from the steel to a predetermined width, dependent upon the product to be formed.

At step 104, the uncoiled flat steel sheet is fed through a deburring and edging apparatus. The deburring edging apparatus (also referred to herein as “edger”) may be either attached to, or proximate the uncoiler, the arrangement to be discussed in greater detail with reference to FIGS. 2-5. Further, the edger can also act as a guide configured to guide the sheet through the rollers. Also, the edger may be attached to and work concurrently with the slitter. The edger is configured to deburr and edge the vertical edges of the steel sheet as it is fed through the edger to create a smooth edge, which obviates a myriad of safety issues such as lacerations during handling of the steel component.

Deburring and edging the vertical edges of the steel sheet, step 106, may occur at any point during the forming process. In this exemplary embodiment of the present invention, the deburred and edged vertical sides of the sheet forms what is commonly referred to as the “lip” of a steel stud, which is typically used as a “handle” to which engineers, operators and workers to carry the studs. In this embodiment, the uncoiler device may comprise an attached deburring/edging apparatus that machines the vertical edges of the steel sheet as it is being pulled through by the rotary punch. In this optional embodiment, no stand-alone equipment is necessary, nor is there additional pulling or stretching of the steel sheet than would have occurred without the deburring and edging step. In optional embodiments of the present invention, the deburring process may include mass-finishing, spindle finishing, media blasting, sanding, grinding, wire brushing, abrasive flow machining, electrochemical deburring, electro polishing, skiving, edge trimming, laser, thermal energy method, machining, and/or manual deburring; each of which will be discussed with greater detail with reference to the accompanying FIGS. 2-5.

In optional embodiments of the present invention, the steel sheet may be fed, into the deburring and edging device prior to roll forming. In this way, the deburring device may be arranged such that steel sheet is automatically fed from uncoiler to the deburring an edging apparatus so that the edging apparatus acts as a guide as well.

Punching a hole in the stud, step 108, comprises providing a rotary punch press or like component to form a hole of a predetermined size in the steel sheet. In exemplary embodiments of the present invention, the steel component may or may not be necessary. Where needed, the punching process may be performed by using a metal forming process that comprises a punch press to force a punch through the workpiece to create a hole via shearing. The scrap slug from the hole is deposited into a die in the process, and may be recycled, reused or discarded. In optional embodiments of the present invention, hot punching may be used as well.

Passing the steel sheet through a roll forming apparatus, step 110, comprises feeding the steel strip from the rotary punch to the entry guide to align the sheet with a series of rollers, the number of which is predetermined and a function of a desired shape of the component. Indeed, the shaped steel sheets, now in the form of steel studs, can be cut ahead of the roll or behind it.

While C-shaped drywall or structural studs are described as the exemplary embodiment with reference to FIG. 1, the methods described herein are applicable to a myriad of steel components that are cold-formed, such as wall studs, floor joists, roof rafters, and tracks interior non-load bearing studs and track designed for wall partitions in office buildings, apartments, houses, and other structures as the framework for gypsum drywall panels; exterior load bearing studs and tracks designed for use in curtain-wall and load bearing applications. Furthermore, the present methods are applicable to framing accessories as well, drywall finishing products such as cornerbead, mini-beads, and J L beads, and leg tracks used in interior and exterior wall framing, having weep holes punched at intervals to allow for the quick removal of any unintentional water build up in the track cavity.

Moreover, in exemplary embodiments of the present invention, lath and plaster accessories including expansion and control joint products, scrims, weeps, corners, and architectural profiles as a plaster base and reinforcement for all types of construction in walls, ceilings, and fireproofing of steel beams and columns, flat rib lath, hi rib lath, expansion joints, patches, tile products may undergo the method as described. The present invention is applicable to hot formed steel processes as well.

Referring now to FIGS. 2a-e, of a system for manufacturing a structural component, in this embodiment a steel stud, is shown generally at 200. The steel component formed by this system obviates many safety concerns, particularly with regard to handler lacerations. The products formed by this system shown in FIG. 2 have vertical lips and edges that are deburred, edged and smoothed for handling, while doing so in an economical and expeditious manner.

FIG. 2a shows a top-view of the system 200. The system 200 comprises an uncoiler device 202 having a coiled sheet 204 attached thereto. The steel coil sheet 204 is attached to the to the uncoiler device 202, such that the steel coiled sheet 204 is supported by the uncoiler device 204, and able to be uncoiled or fed though the plurality of rollers 208a-d. As in FIG. 1, the steel coiled sheet 204 may comprise, in various embodiments of the present invention, galvanized hot-dipped steel coils with varying surface, gauge, and shape. The uncoiler 202 may comprise either a motorized or non-motorized uncoiler. In exemplary embodiments of the present invention, the roll-former provide the motive force to pull the coiled sheet so that it becomes a flat steel sheet 212.

An edging and deburring apparatus 206 is, in this exemplary embodiment, connected to the uncoiler 204 through arms 214 and 216. At an end of each arm is a head portion with a V or U-shaped flange 216 between which the steel sheet 212 is fed. The flange 216 is fitted with a mechanical component 250 (See FIG. 2b) configured to deburr, edge, and/or chamfer the vertical edges 212 edges of the steel sheet 212 to create a smooth edge, which obviates a myriad of safety issues (e.g., lacerations) during handling of the steel component.

A slitter 290 is disposed between the uncoiler 203 and the roll-former 208a-d. In operation, the coiled steel sheet is fed from the uncoiler through a nip between a slitter comprising two circular cutting wheels where excess or predetermined materials are cut or sheered from the steel to a predetermine
termined width, dependent upon the product to be formed. In optional embodiments of the present invention, the edger is connected to the slitter and performs the edging operations approximately simultaneously or directly after the slitter cuts the steel.

[0047] A hole punch 210 is disposed between the roll formers 208a-d and the slitter 290. The hole punch 210 is configured to punch a hole of predetermined size in the sheet steel prior to the roll-forming and the formation of the end product, such as 294.

[0048] FIG. 2b is an enlarged front view of the sheet steel 212 being fed through the edger 206. In this exemplary embodiment, the edger 206 is a mechanical-type edger that comprises a mechanical component, for example, flap wheels 250 (See FIG. 2b), which are attached at the flanges 216 and configured to rotate in opposing directions. While only a single flap wheel 250 is shown at each flange, it is recognized that a plurality of flap wheels spinning in opposing directions may be disposed within flanges 214 and 216. In operation, as the steel sheet is fed through the edger 206, the flap wheels 250 deburr and edge the vertical edges 252 and 254 of the sheet steel 212. In embodiments of the present invention, the flap wheels 250 are adjustable and replaceable as they wear. Of course, any predetermined grit flap wheels may be used, having different speeds and deburring modes (e.g., fine or standard) are applicable to embodiments of the present invention.

[0049] FIG. 2c is an enlarged front view of another mechanical deburring embodiment in which the sheet steel 212 is being fed through the edger 206. In this exemplary embodiment, the edger 206 is a mechanical-type edger that comprises a mechanical component, for example, blades 280. In this embodiment, the flanges are part of the edging component 206. Further, each of the flanges are laterally adjustable as shown by arrows 282 and 284. The edges are adjustable using, for example, air pressure, springs 286, pneumatic controls, and may be adjustable by hand (via crank 286) or remotely via motorized equipment and software, as discussed with reference FIG. 6.

[0050] Other mechanical-type edging that is in the purview of the present system may comprises sandpaper (e.g., Silicone carbide), ceramics, aluminum oxide plates, in place of the flat wheels 250 or blades 280.

[0051] In optional embodiments of the present invention, electrochemical (ECM) edging and deburring may be employed. In optional embodiments of the present invention, ECM may be used for working extremely hard materials/components or materials that are difficult to machine due to their atypical size and shape, where relatively small or odd-shaped angles, intricate contours or cavities in hard and exotic metals, make mechanical deburring problematic.

[0052] With reference to FIG. 2d, an enlarged front view of the sheet steel 212 being fed through the edger 206 is shown generally at 260. In this exemplary embodiment, the edger 206 is an electrochemical-type edger that comprises a workpiece 266, an electrolytic fluid supply 262, and an electrode 264.

[0053] The fluid supply 262 may comprise a salt or glycol solution, while the electrode 264 is used to dissolve burrs and edge the vertical edges of the sheet 212. A controller 268 may be employed to provide motive control to the workpiece 266. The controller 268 may be in communication with a computer processor 272 at a main workstation 270 such that an operator may adjust the ECM procedures according to the component specifications.

[0054] CPU 272 may be comprised of a single processor or multiple processors. CPU 272 may be of various types including micro-controllers (e.g., with embedded RAM/ROM) and microprocessors such as programmable devices (e.g., RISC or CISC based, or CPLDs and FPGAs) and devices not capable of being programmed such as gate array ASICs (Application Specific Integrated Circuits) or general purpose microprocessors.

[0055] In optional embodiments, CPU 272 optionally may be coupled to network interface 274 which enables communication with an external device such as a database or a computer or telecommunication or internet network using an external connection which may be implemented as a hard-wired or wireless communications link using suitable conventional technologies. Communications via remote connectivity include, but are not limited to the Internet, Satellite networks, Cell Phone networks, other wireless networks and standards such as 802.11, 802.11b, 802.11g, or similar wireless LAN or WAN operating standards, or Bluetooth technologies, infrared connections, or any other similar technologies or other technologies such as those described above that permit the sending and/or receiving and/or processing of electronic information in either an encrypted or unencrypted format.

[0056] At the CPU 270 (e.g., operator workstation) the operator may control all aspects of the processes for forming the steel component 212. The operator may choose between a plurality of shapes for the component and areas to deburr and edge, together with types of deburring edging, and/or any other control operations, which will be discussed in greater detail with respect to FIG. 6.

[0057] In optional embodiments of the present invention, thermal energy method (TEM), also known as thermal deburring may be employed. Like ECM deburring, TEM may be used to remove burrs that are disposed in difficult to reach positions, or remove burrs from multiple surfaces. TEM deburring may comprise the use of a gas mixture to provide thermal energy to deburr the vertical edges of the steel sheet 212.

[0058] With reference to FIG. 2e, an enlarged front view of the sheet steel 212 being fed through the TEM edger 206 is shown generally at 260. In this exemplary embodiment, the edger 206 is a thermal-type edger that comprises a combustion chamber 276, which houses a combustible gas mixture 278.

[0059] Like in other optional embodiments of the present invention, a controller 268 may be employed to provide motive control to the TEM edger 206. The controller 268 may be in communication with a computer processor 272 at a main workstation 270 such that an operator may adjust the TEM procedures according to the component specifications. In operations, the steel sheet 212 may be loaded into an explosion-proof chamber (not shown), and an electrical igniter 280 then ignites the mixture to deburr the vertical edges 254 of the steel sheet 212.

[0060] In other optional embodiments, cryogenic deburring techniques may be employed as well with similar techniques as described with relation to FIG. 2e. In this embodiment, the process employs abrasively blasting the workpieces at cryogenic temperature levels (i.e., approximately −195°C (−320°F)) using liquid nitrogen, liquid carbon dioxide, or dry ice.

[0061] Referring now to FIG. 3, a perspective view of the system 200 is shown. Like the system shown in FIG. 2, the
The system comprises FIG. 2a shows a top-view of the system 200. The system 200 comprises an uncoiler device 202 having a coiled sheet 204 attached thereto. The steel coil sheet 204 is attached to the uncoiler device 202, such that the steel coil sheet 204 is supported by the uncoiler device 204, and able to be uncoiled or fed though the plurality of rollers 208a-d.

However, in this embodiment, the edging and deburring apparatus 206 is a stand-alone device that may be placed at any position during the CTE processes. In this exemplary embodiment, the deburring apparatus 206, which may comprise any of the mechanical, electrochemical, or thermal edges 206 is positioned after the rollers 208a-c form the steel component, in this case, stud 302. As shown, the edge 206 comprises flange 210 which is fitted with any of edging and deburring techniques described above to deburr, edge, and/or chamfer the vertical edges 212 of the steel sheet 254 to create a smooth edge, which obviates a myriad of safety issues (e.g., lacerations) during handling of the steel component.

A controller 268 may be employed to provide motive control to the workpiece 266. The controller 268 may be in communication with a computer processor 272 at a main workstation 270 such that an operator may adjust the edging and deburring procedures according to the component specifications.

With reference now to FIG. 4, a front view of a U-shaped stud is shown generally at 400. The U-shaped stud has been formed using the method as described with reference to FIGS. 1 and 2 and comprises a deburred and/or edged lip. As can be seen in the blown up view 402 the edge of the steel sheet of which the stud is formed has been through a smoothing process, such as deburring or edging. As can be seen, the lip 404 is smoothed to avoid injury to the engineers and workers. The deburring and edging process of the recited method can produce asymmetrical sides such that lip 404 and outer edge 406 are smoothed and precise as to specification.

For example, referring now to FIG. 5, a microscopic view of the vertical sheet 204 prior the edging and deburring step is shown at view 502. As can be seen, there are burrs and sharp edges at 506. As shown after the deburring step, view 504, the vertical edges of the steel sheets are smoothed out 508.

Each of the methods, and the steel components produced by the methods, may be systematically controlled by the CPU 272 together with an engineer or operator. Referring back to FIG. 3, in embodiments of the present invention, CPU 272 may be supplied with multiple processors, micro-controllers (e.g., with embedded RAM/ROM) and microprocessors such as programmable devices (e.g., RISC or SISC based, or CPLDs and FPGAs) and devices not capable of being programmed such as gate array ASICs (Application Specific Integrated Circuits) or general purpose microprocessors. The CPU 272 may further be supplied with appropriate hard discs for storage and memory, which may include any suitable computer-readable media, intended for data storage, such as those described above excluding any wired or wireless transmissions unless specifically noted. Mass memory storage may also be coupled bi-directionally to CPU 272 provide additional data storage capacity and may include any of the computer-readable media described above.

The CPU 272 is further connected to a Graphical User Interface (GUI) 278 to enable a user to view the operation of the system 300. The CPU 272 is also connected to a network interface, which may communicate in either a unidirectional manner or a bi-directional manner with the system 200, via wireless or hard-lined communication in any known manner of communication such as a cellular phone or personal digital assistant (PDA). While as shown, the CPU 272 is connected to the edger, it should be appreciated that the communications exchange may be attached or in communication with all elements of the system.

In optional embodiments of the present invention, the CPU 272 may be loaded with manufacturing workflow software. In an exemplary embodiment, the workflow software comprises instructions for the automation of a process, in which a steel component is to be manufactured edged according to methods described herein. The workflow software provides a system for digitizing a production flowchart over a network 274. The workflow software may further include digitizing the flowchart for automated tasks such as edging a steel component.

Referring now to FIG. 5, a flow-chart to better help illustrate a method for workflow application of an industrial system is shown generally at reference numeral 500. While the flowchart shows an exemplary step-by-step method, it is to be appreciated that a skilled artisan may rearrange or reorder the steps while maintaining like results.

At step 502, the process may execute or initiate production of a steel component. In this exemplary embodiment, the processes may include those processes discussed with manufacturing a drywall stud in relation to FIG. 1 of the present invention. Initiating this process may comprise starting a motorized uncoiler to feed a steel coil sheet through a edging apparatus.

At step 504, the operator may select a type of edging operation using the GUI 278. For example, depending upon the type of the component being fabricated, the operator may choose between mechanical, electrochemical, or thermal edging operations. The operator may further be able to drill down to any of the following operations: Mass-finishing, spindle finishing, media blasting, sanding, grinding, wire brushing, abrasive flow machining, electrochemical deburring, electropolishing, thermal energy method, machining, and/or manual deburring. These processes are exemplary only and not meant to limit the operations to any of the aforementioned edging operation.

At step 506, the system is configured to verify that the edges are smoothed to predetermined standards. To do so, the system may be fit with a plurality of sensors proximate the edge or disposed thereon, such that the sensors together with the workflow software ensure proper edging. If the system approves the edges, the steel sheet moves to the next fabrication step 508. If the edges are not approved, then the steel component may be re-edged or used as scrap.

In optional embodiments of the present invention, the system is configured to establish whether the edger performed the edging correctly. If the edger worked to specification, the workflow software will queue the next (Step 508) component. If the system finds that the edging was not performed sufficiently, the workflow software will reset the step.

Specific configurations and arrangements of the invention, discussed above with reference to the accompanying drawings, are for illustrative purposes only. Other configurations and arrangements that are within the purview of a skilled artisan can be made, used, or sold without departing from the spirit and scope of the invention. For example, a reference to “an element” is a reference to one or more ele-
ments and includes equivalents thereof known to those skilled in the art. All conjunctions used are to be understood in the most inclusive sense possible. Thus, the word “or” should be understood as having the definition of a logical “or” rather than that of a logical “exclusive or” unless the context clearly necessitates otherwise. Structures described herein are to be understood also to refer to functional equivalents of such structures. Language that may be construed to express approximation should be so understood unless the context clearly dictates otherwise.

[0075] The order or sequence of any process or method steps may be varied or re-sequenced according to alternative embodiments. Other substitutions, modifications, changes and omissions may be made in the design, operating conditions and arrangement of the embodiments without departing from the spirit and scope of the methods and systems described herein.

What is claimed is:

1. A method for forming a steel component, the method comprising:
   feeding the steel sheet through an edging apparatus, wherein the edging apparatus is proximate a roll-forming device; and
   edging and deburring a vertical edge of the steel sheet prior to forming the steel component.

2. The method of claim 1, wherein the edging and deburring step occurs as a continuous operation as part of the method for forming the steel component, requiring no user intervention, and wherein edging device is configured to guide the steel sheet through a roll-forming device.

3. The method of claim 1, wherein the edging and deburring process comprises mechanical deburring, electrochemical deburring, thermal deburring or manual deburring.

4. The method according to claim 1, further comprising providing a coiled steel sheet at an uncoiling device, wherein the uncoiling device is configured to uncoil the coiled steel sheet to yield the steel sheet prior to feeding the steel sheet rough the edging apparatus;
   wherein the uncoiling device is motorized or non-motorized.

5. The method of claim 1, further comprising passing the steel sheet through the roll forming apparatus after the steel sheet has been edged and deburred, wherein the roll forming apparatus is configured to form the steel sheet into the steel component.

6. The method of claim 1, wherein the edging device comprises:
   a head portion;
   a laterally adjustable flange connected to the head, the flange configured to be fitted with a mechanical, thermal, or electrochemical edging component;
   wherein the flange is configured to receive the steel sheet, and as the sheet passes through the flange, edge and deburr the steel sheet the vertical edges of the steel sheet to create a smoothed edge.

7. The method of claim 1, wherein the deburring and edging step is automated and adjustable using a processor-based controller configured to provide motive control to the steel sheet, wherein the controller is configured to adjust the flange laterally corresponding to a dimension of the steel sheet, and wherein the controller is further configured to alter a type of edge the steel sheet requires.

8. The method of claim 1, wherein the steel coiled sheet comprises a galvanized hot-dipped steel coil, and wherein the steel component comprises a steel stud.

9. The method of claim 1, further comprising punching a hole of predetermined size in the steel sheet, wherein punching the hole in the steel sheet comprises providing a rotary punch press to form the hole of a predetermined size in the steel sheet.

10. The method of claim 1, further comprising splitting the steel sheet prior to the roll forming step, wherein the edging step and the splitting step occur approximately simultaneously.

11. A system for fabricating a steel component, the system comprising:
   an edging apparatus configured to receive a steel sheet from an uncoiler and configured to edge and deburr the vertical edge of the steel sheet;
   a roll-forming device configured to receive the edged steel sheet.

12. The system of claim 11, wherein the edging apparatus is disposed between the uncoiler and the roll forming device, and is configured to guide the steel sheet through the roll-forming device.

13. The system of claim 11, wherein the edging apparatus is configured to mechanically deburr, electrochemically deburr, or thermally deburr.

14. The system of claim 11, wherein the uncoiler is configured to uncoil the coiled steel sheet to form the steel sheet prior to feeding the steel sheet rough the edging apparatus, and wherein the uncoiling device is motorized or non-motorized.

15. The system of claim 11, wherein the roll forming device is configured to form the steel sheet into the steel component having deburred vertical edges.

16. The system of claim 11, wherein the edging apparatus comprises:
   a head portion;
   a laterally adjustablerollable flange connected to the head, the flange configured to be fitted with a mechanical, thermal, or electrochemical edging component;
   wherein the flange is configured to receive the steel sheet, and as the sheet passes through the flange, edge and deburr the steel sheet the vertical edges of the steel sheet to create a smoothed edge.

17. The system of claim 1, further comprising a processor-based controller in electronic communication with the edging device, wherein the processor is configured to automate each of the edging apparatus, uncoiler, and roll-forming device, and wherein the controller is configured to adjust the flange laterally, corresponding to the dimensions of the steel sheet, and wherein the controller is further configured to alter a type of edge the steel sheet requires.

18. The system of claim 11, wherein the steel coiled sheet comprises a galvanized hot-dipped steel coil, and wherein the steel component comprises a steel stud.

19. The system of claim 11, further comprising:
   a hole punch disposed immediately prior to the roll-forming apparatus and configured to punch a hole of predetermined size in the steel sheet; and
   a slitter configured to slit the steel sheet prior to punching the hole in the steel sheet, splitting the steel sheet prior to the roll forming step.
wherein the edging device is connected to the slitter such that us step and the splitting step occur approximately simultaneously.

20. A steel component comprising:
a formed sheet, wherein the sheet comprises a vertically deburred and/or edged side, and wherein the steel component comprises a steel stud.

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