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(54) **A method of manufacturing a conical tube element**

Verfahren zur Herstellung eines konischen Rohrelements

Méthode de fabrication d'un élément tubulaire conique

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Description

[0001] The object of the invention is a method of manufacturing a conical tube element, in particular from an aluminium cylindrical tube utilised as a straight-line or curved lighting column.

[0002] Known from EP-A-1690610, which is considered as being the closest prior art, is a method of manufacturing a conical tube element by subjecting a straight-line tube element to plastic forming processes. For example, a Polish patent description PL194795 discloses a method of forming cylindrical and tapered tubes, in particular made from aluminium and alloys thereof. A cylindrical tube is placed onto a mandrel and set in rotary motion, whereas the outside surface of the tube is subjected to cold regulated pressing by at least two non-driven forming rollers with an outside diameter 2-6 times larger than the smallest diameter of the formed cone, consisting of a cylindrical part and a tapered front part and preferably spaced in one plane and distributed uniformly around the perimeter of the tube, which are pressed in a regulated manner to the outside surface of the tube and simultaneously rolled along the axis of the tube, preferably at a speed in the range between 1 and 15 mm/tube rotation. The pressing of the forming rolls is regulated.

[0003] The known method of forming tube elements on a mandrel ensures the required strength of a column, it is, however, time-consuming, costly and impedes bending columns into curved form.

[0004] The invention concerns a method of forming a conical tube element, in particular from an aluminium cylindrical tube, wherein the straight-line tube element undergoes plastic forming. According to the invention the straight-line tube element is put on a mandrel of a forming device, which mandrel is two metres long at the most, and then a section of said tube element put on said mandrel is rolled, and after that without interrupting the forming process, the remaining part of the tube element is rolled and drawn.

[0005] The formed tube element may have a conical shape along the entire length of said element or along a part thereof. In the latter case the remaining part of the tube element will be a cylindrical tube.

[0006] Preferably a straight-line tube element is placed onto two mandrels of the forming device on each side of the tube element, wherein said mandrels are two metres long at the most and then sections of the tube element placed on the mandrel are rolled, taperingly towards the centre of the tube element and after that, without interrupting the forming process, the remaining part of the tube element is rolled and drawn, and after that the formed conical element is cut in the area of a taper.

[0007] In order to form a curved column it is advisable that following the removal of the tube element off the mandrel, a part of said tube element previously rolled and drawn is bent to the predetermined curved shape.

[0008] The method according to the invention allows

for fast, uncomplicated and economical manufacturing of conical tube elements in one process. A part of the column formed on a mandrel has the required high strength and the remaining part of the column which does not need to meet such strict strength criteria may be easily bent. Conical tube elements formed using the method according to the invention may also be used as straight-line lighting columns. In an embodiment of the invention two conical tube elements may be formed in one process, which significantly increases the effectiveness of the production process.

[0009] The invention is presented in more detail in the following embodiments.

[0010] The method of forming a conical tube element, in particular from an aluminium cylindrical tube consists in that an input straight-line cylindrical tube is placed onto a mandrel of a forming device. The mandrel is two metres long at the most, for example, 1.8 m. After complete placing the tube on the mandrel and fixing said tube thereto, the mandrel is set in rotary motion, thus the tube is also set in rotary motion around the axis thereof. A section of the tube element placed onto the mandrel is rolled by means of forming rollers, and after that, without interrupting the process, the remaining part of the tube element is subjected to rolling and drawing.

[0011] The so formed conical tube element, following the removal thereof off the mandrel, may be subjected to bending to the predetermined curved shape at the part of said tube element which was previously rolled and drawn.

[0012] In one embodiment of the invention a straight-line, cylindrical input tube is mounted on two mandrels of a forming device, on each side of the tube element. Said mandrels are two metres long at the most, for example 1.6 m. After complete mounting of the tube on the mandrels and fixing it thereto, the mandrels are set in synchronous rotary motion and thus the tube is also set in rotary motion around the axis thereof. Sections of the tube element mounted on the mandrels are subjected to rolling, each with the use of a set of forming rollers, taperingly towards the centre of the tube element. Without interrupting the process, the remaining part of the tube element is subjected to rolling and drawing. Finally, the formed conical element is cut in the area of tapering of the conical tube element.

[0013] The so formed conical tube element is removed from the mandrel and then the part of said tube element that was previously rolled and drawn may be subjected to bending to the predetermined curved shape.

[0014] The formed tube element may have conical form along full length thereof or only along a part thereof. In the latter case the remaining part of the tube element will have a form of a cylindrical tube.

Claims

1. A method of manufacturing a conical tube element,

in particular from an aluminium cylindrical tube, wherein a straight-line tube element is subjected to plastic forming processes, **characterised in that** said straight-line tube element is mounted on a mandrel of a forming device, which mandrel is two metres long at the most, and after that the section of the tube element mounted onto said mandrel is subjected to rolling, and then without interrupting the process the remaining part of the tube element is subjected to rolling and drawing.

2. The method according to claim 1 **characterised in that** a straight-line tube element is mounted onto two mandrels of the forming device on each side of the tube element, which mandrels are two metres long at the most and then sections of said tube element mounted on the mandrel are subjected to simultaneous rolling, tapering towards the centre of the tube element, and subsequently without interrupting the process, the remaining part of the tube element is subjected to rolling and drawing, and after that the formed conical element is cut in the area of the tapering.
3. The method according to claim 1 or 2 **characterised in that** after removing the tube element off the mandrel, a part of said tube element which was previously subjected to rolling and drawing is curve bent to the predetermined form.

Patentansprüche

1. Herstellungsart des kegelförmigen Rohrelementes, vor allem aus zylinderförmiger Aluminiumrohr, in dem der geradlinige Rohrelement der plastischen Verarbeitung unterzogen wird, charakteristisch dadurch, dass der geradlinige Rohrelement auf die Schaft des Formgeräts aufgezogen wird, wobei die Schaft die Länge von maximal 2m hat, danach wird ein Teil des Rohrelementes, der auf die Schaft aufgezogen wurde, gewalzt und dann wird der restliche Teil des Elementes gewalzt und gedehnt, ohne den technologischen Vorgang zu unterbrechen.
2. Art gemäß Anspruchs 1, charakteristisch dadurch, dass der geradlinige Rohrelement auf zwei Schäfte des Formgeräts, je auf einer Seite des Rohrelementes, aufgezogen wird, wobei die Schäfte die Länge von maximal 2m haben, danach werden die Teilen des Rohrelementes, die auf die Schäfte aufgezogen wurden, zusammenlaufend in die Richtung der Mitte des Rohrelementes gewalzt, dann wird der restliche Teil des Elementes gewalzt und gedehnt, ohne den technologischen Vorgang zu unterbrechen. Schließlich wird der geformte zylinderförmige Element an der Schnittstelle der Konvergenz geschnitten.

3. Art gemäß Anspruchs 1 oder 2, charakteristisch dadurch, dass der Teil des Rohrelementes, der vorher gewalzt und gedehnt wurde, bogenförmig zu der gewünschten Form gebogen wird, nachdem er aus der Schaft ausgezogen wurde.

Revendications

1. Procédé de fabrication d'un élément tubulaire conique, en particulier d'un tube cylindrique en aluminium, dans lequel l'élément tubulaire rectiligne est soumis au façonnage par déformation plastique **caractérisé en ce qu'**élément tubulaire rectiligne est superposé sur un mandrin d'un dispositif de formage, le dit mandrin est de longueur minimale de 2 m, ensuite le segment d'élément tubulaire superposé sur le mandrin est soumis au laminage, et sans interrompre le processus, la partie restante d'élément tubulaire est soumise au laminage avec la tension.
2. Procédé selon la revendication. 1, **caractérisé en ce que** l'élément tubulaire rectiligne est superposé sur deux mandris d'un dispositif de formage de chaque côté de l'élément tubulaire, les dits mandrins sont de longueur de plus que 2 m, et ensuite les segments d'élément tubulaire superposés sur le mandrin sont soumis simultanément au laminage, et sans interrompre le processus la partie restante d'élément tubulaire est soumise au laminage avec la tension, et ensuite l'élément conique formé est découpé dans la zone de jonction des convergences.
3. Procédé selon la revendication 1 ou 2, **caractérisé en ce que** par la suite, après avoir enlevé l'élément tubulaire du mandrin, la partie soumise au laminage avec la tension est courbée en arc qui est d'une forme prédéterminée.

REFERENCES CITED IN THE DESCRIPTION

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