Technical Disclosure Commons

Defensive Publications Series

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HALOGEN LAMPS CONNECTION SYSTEM

HP INC

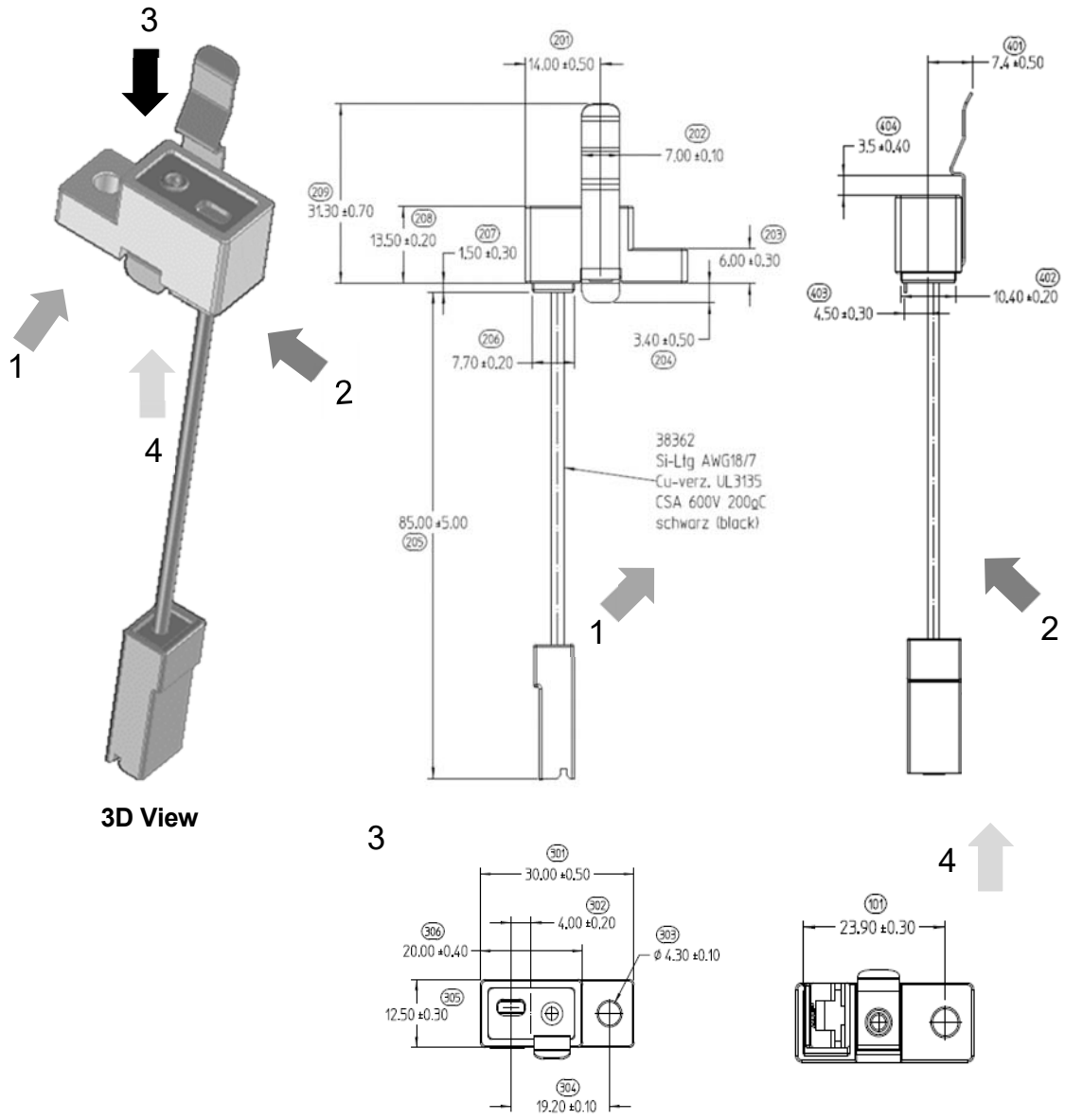
Halogen lamps connection system

Some printers are designed to print 3D plastic parts. Some of the advantages that such printers provide are: ease of use, clean solution, good price/performance, good reliability, and high productivity.

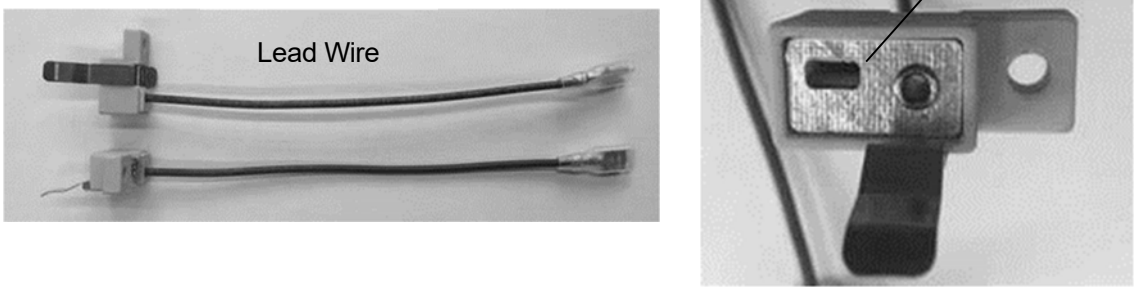
Some 3D printers use a pair of halogen lamp-based energy sources: a first source on the top of the printer composed of an array of lamps and used to maintain certain temperature on the printing zone (close to melting point), and a second source placed on the print carriage that applies the extra energy to fuse and melt the selected powder. This last system is called the fusing module.

The lamps used in the fusing module have to work under demanding operational conditions, for example they may operate near the lamp technology color temperature limit to selectively fuse the desired powder. Due to this, the lamps in the fusing module may need replacing frequently.

A new holder/connection system for these lamps has been developed. Below, the design specifications for the connector are shown:


3
1
2
4
3D View
201
14.00 ±0.50
202
7.00 ±0.10
209
31.30 ±0.70
208
13.50 ±0.20
207
1.50 ±0.30
203
6.00 ±0.30
206
7.70 ±0.20
3.40 ±0.50
204
38362
Si-Ltg AWG18/7
Cu-verz. UL3135
CSA 600V 200qC
schwarz (black)
85.00 ±5.00
205
401
7.4 ±0.50
404
3.5 ±0.40
403
4.50 ±0.30
402
10.40 ±0.20
301
30.00 ±0.50
302
4.00 ±0.20
306
20.00 ±0.40
303
ø 4.30 ±0.10
305
12.50 ±0.30
304
19.20 ±0.10
101
23.90 ±0.30

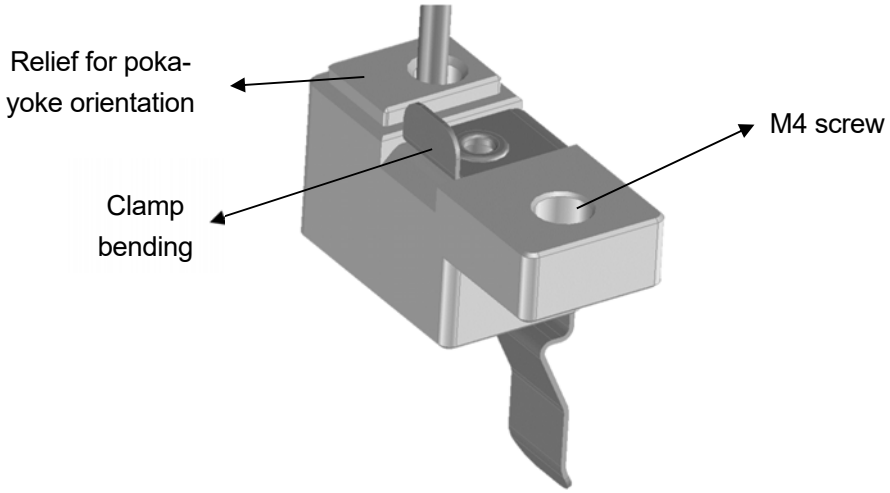
Below are two pictures in which the real connector is shown:



The lamp is expected to be assembled from below. The spring inside the ceramic connector has the necessary stiffness to provide a force against the metallic pin from the lamp to hold it by itself. However, a metallic pin, made of a FH steel , was added with the purpose of helping the lamp during transportation and preventing the lamp from falling due to vibrations..

The lead wire exiting the ceramic connector is routed inside the fusing module. As this part (connector and cable) is expected to be fixed and not replaced in the fusing module, the other part of the connection of the lead wire can positioned in a hidden location.

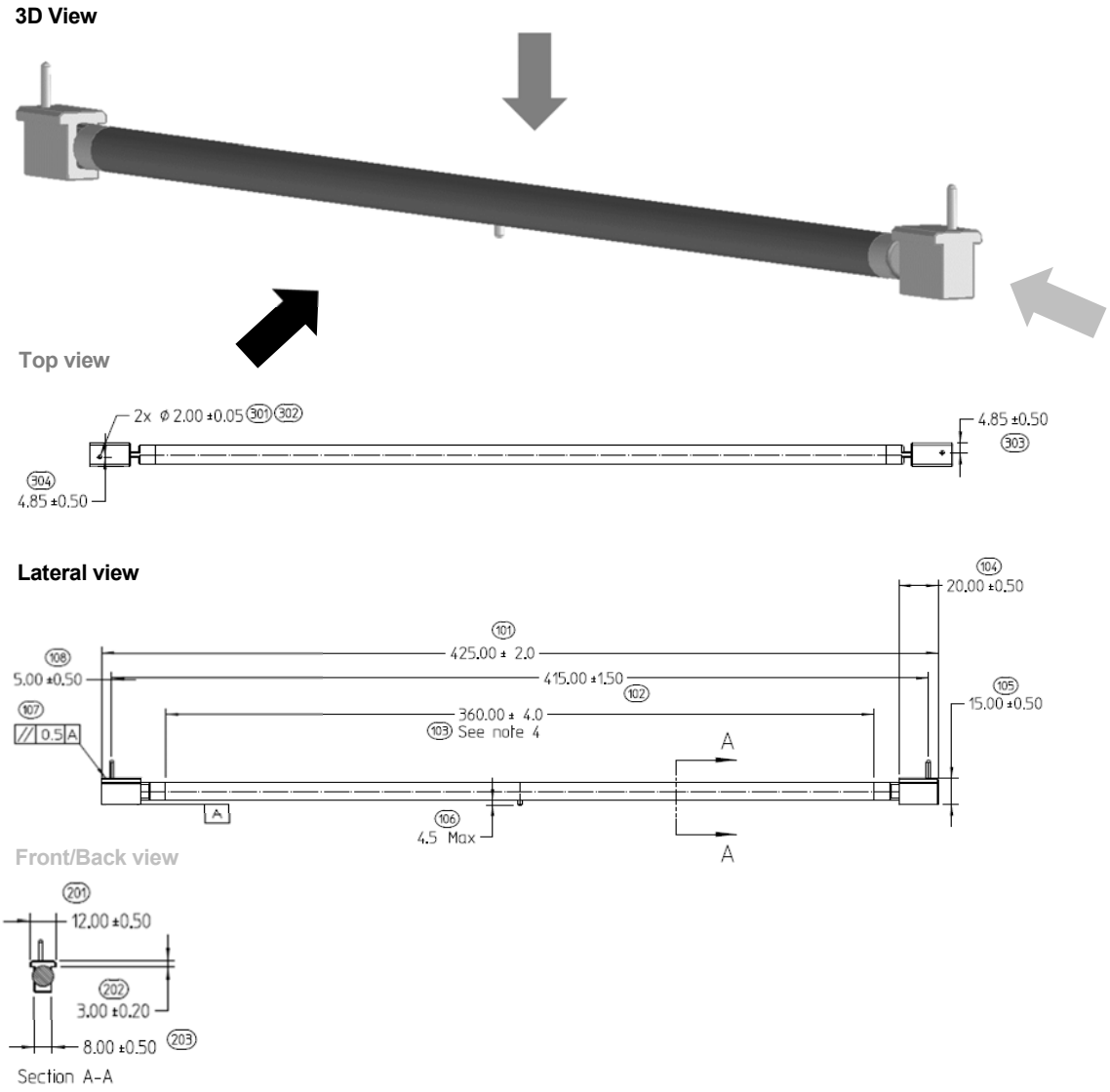
To assemble the connector and ensure that the correct orientation between the two connectors that are placed at each edge of the lamp, the design has the following elements:



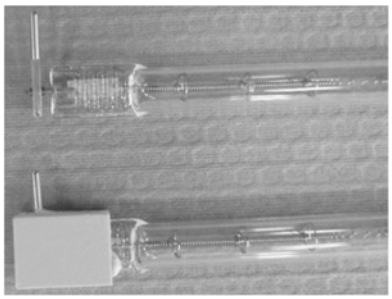
From the lamp side, the connection system is composed of a metallic rounded pin material that is giving the right electrical conductivity and mechanical resistance for a good connection.

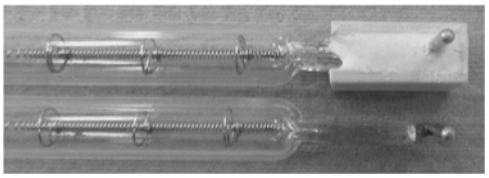
The lamps are pinched at the edge to keep noble gas inside. The pin connector is perpendicularly welded just after the pinched zone forming and angle of 90º. After the welding, the zone is protected by a rectangular empty ceramic bloc and later filled with cement to provide better electrical isolation and robustness (this last step is commonly used in the Halogen lamp industry, but the present design has defined a new ceramic parts shape).

Below, the ceramic and pin specification in the lamp side:



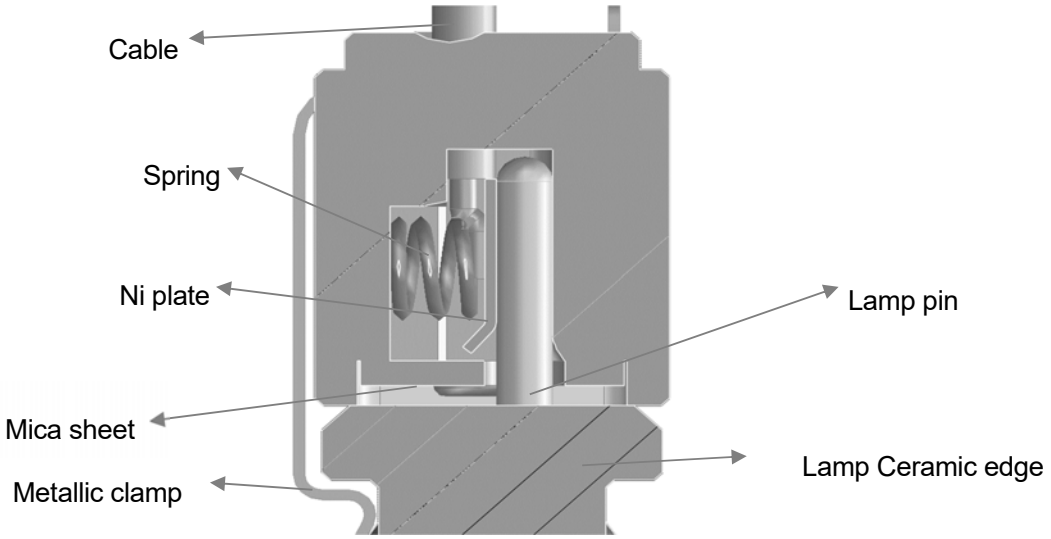
Below, an example of how is the connector from the lamp side once manufactured:





Although the ceramic edged filled with cement is commonly used, the present design defines a new ceramic form to add more retainig force to the system. The ceramic portion has a “T” shape to be wrapped by a metallic clamp. As explained before, the main purpose of adding the clamp is to guarantee a better fixing once the lamps are assembled on the printer. The vibrations in printing conditions are not very significant. However, during transport vibrations and drops are likley to happen and the clamp is expected to prevent the lamp falling down even during harsh transport conditions. For lamp replacement, the clamp can be easily opened to remove the lamp from the connector.

The holder part is also ceramic based composed by *Steatite C221* to provide sufficient electrical isolation whilst preserving the mechanical resistance. There is a hole where the lamp pin is inserted. The pin is retained by a spring that has a metallic Ni plate welded at its end, which does the electrical connection between the two elements. Below, an image to explain how the connection between both elements is made:



This invention presents the following advances:

- **New solution**: The presented disclosure defines new solution to easyily replace the lamps whilst maintaining good retaining force, fitting in a small space and passing the regulations and environmental specifications required.

- **Optimal:** The defined solution is much more compact than existing solutions and easy fits to the fusing module without having any space constraint. It also has good retaining force with lamps facing down.

- **Robustness**: This solution can hold and retain the lamps facing down while it also lets the user to easy remove it without high force needed.

- **Security**: The solution helps to avoid parts and user damage due to less disassembly steps, easier process and easier access. Also, regulatory specifications and working field of the connector is clearly defined and validated.

- **Flexible**: The new holder/connector can be proprietary and allow the user to switch to other lamps suppliers without having to do major hardware changes.

- **Cost**: The defined solution will reduce service time and avoid damaged parts.

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