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Insertion girdle for dual in-line memory modules

N/A

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ABSTRACT

For mass manufacture of electronic goods, dual in-line memory modules (DIMMs) are most efficiently inserted into motherboard sockets using robots. However, robots have limited insertion accuracy, especially when simultaneously placing multiple DIMMs which often results in robot crashes. This disclosure describes DIMM insertion girdles that assist in aligning DIMMs to sockets during placement. Girdles are described that can be used for manual and/or automated placement of DIMMs. The techniques result in decreased misplacements (robot crashes) and increased throughput.

KEYWORDS

- Electronics manufacturing
- DIMM insertion
- Motherboard
- Socket
- Insertion girdle
- Industrial robot

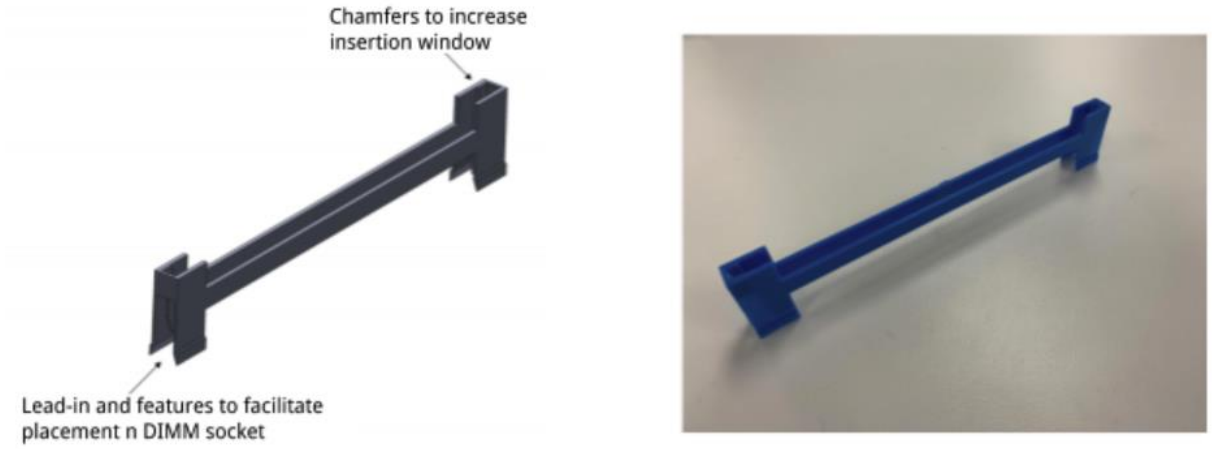
BACKGROUND

For mass manufacture of electronic goods, dual in-line memory modules (DIMMs) are most efficiently inserted into motherboard sockets using robots. However, robots have limited insertion accuracy, especially when simultaneously placing multiple DIMMs, often resulting in robot crashes.

DESCRIPTION

This disclosure describes DIMM insertion girdles that assist in aligning DIMMs to sockets during placement. This disclosure describes two types of DIMM insertion girdles for aligning DIMMs to their sockets. Type 1 is for manual insertion and type 2 is for robotic insertion.

Type 1 *(manual insertion)*



(a) (b)

Fig. 1 (a) Design of a type-1 insertion girdle; (b) A 3-D manufactured type-1 insertion girdle

Fig. 1(a) illustrates a type-1 DIMM insertion girdle, featuring chamfers and leads-in to increase the insertion window, e.g., to facilitate and make more robust DIMM insertion by hand. Fig. 1(b) illustrates a 3-D printed, type-1 insertion girdle.

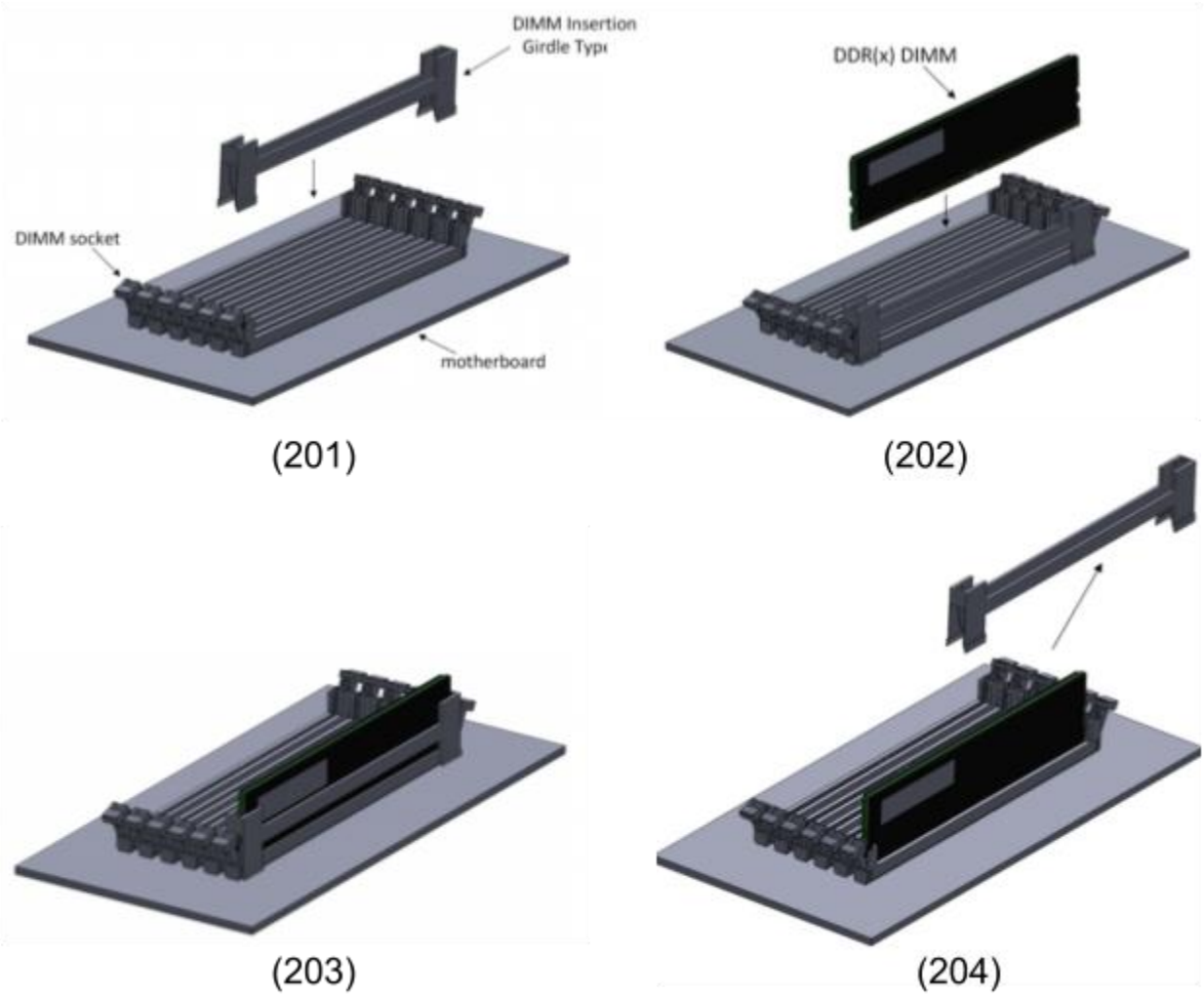


Fig. 2: Inserting a DIMM using a type-1 DIMM insertion girdle

Fig. 2 illustrates inserting a DIMM using a type-1 DIMM insertion girdle, per techniques of this disclosure. The girdle is placed onto a DIMM socket by hand (201). The DIMM is placed into the girdle (202). The DIMM is inserted into the socket (203). The girdle is removed from the socket by hand (204).

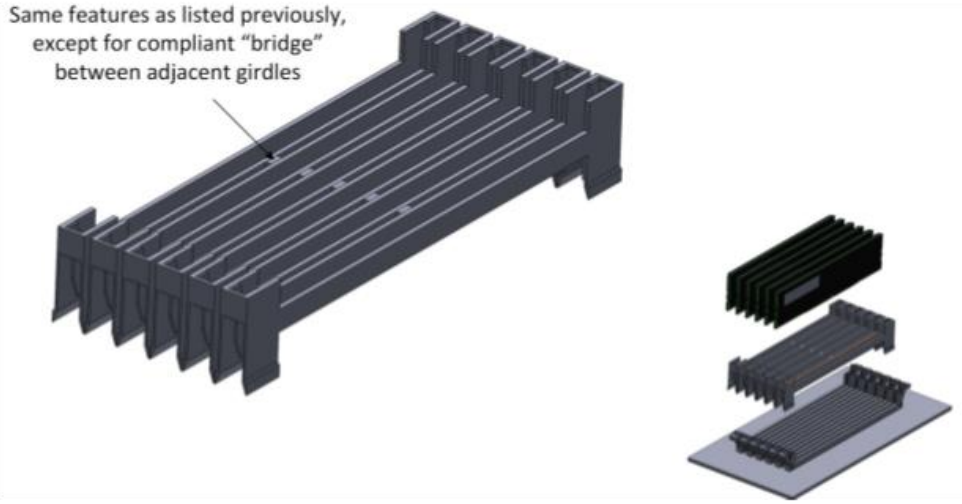


Fig. 3: A type-1 DIMM insertion girdle extended to enable multiple simultaneous DIMM placements.

A type-1 DIMM insertion girdle can be extended to enable multiple simultaneous DIMM placements, as illustrated in Fig. 3(a). Bridges are placed between constituent girdles to maintain adjacent girdles at a distance compliant with the inter-socket distance on the motherboard. Fig. 3(b) illustrates the simultaneous placement of multiple DIMMs using the extended type-1 DIMM girdle.

Type 2 (robotic insertion)

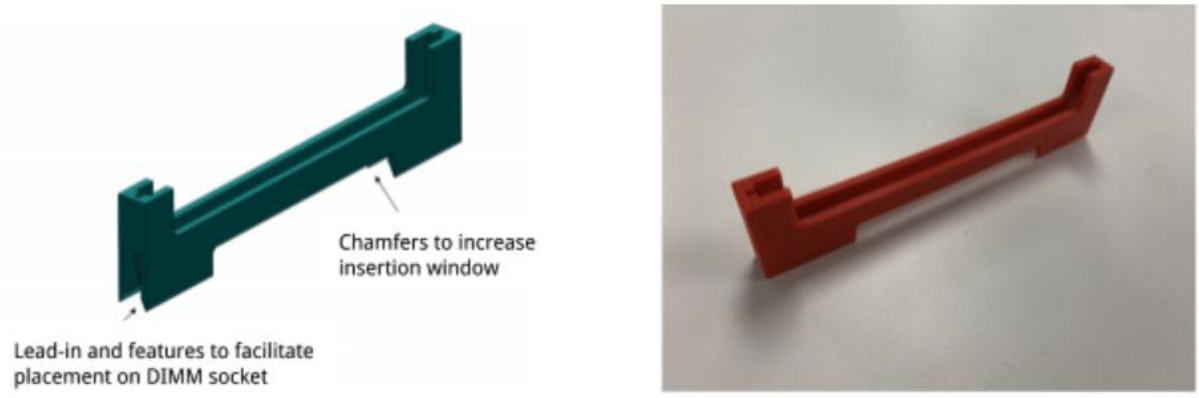


Fig. 4: (a) Design of a type-2 insertion girdle; (b) A 3-D manufactured type-2 insertion girdle

Fig. 4(a) illustrates a type-2 DIMM insertion girdle, featuring chamfers and leads-in to increase the insertion window, e.g., to facilitate and make more robust DIMM insertion by robot. Fig. 4(b) illustrates a 3-D printed, type-2 insertion girdle.

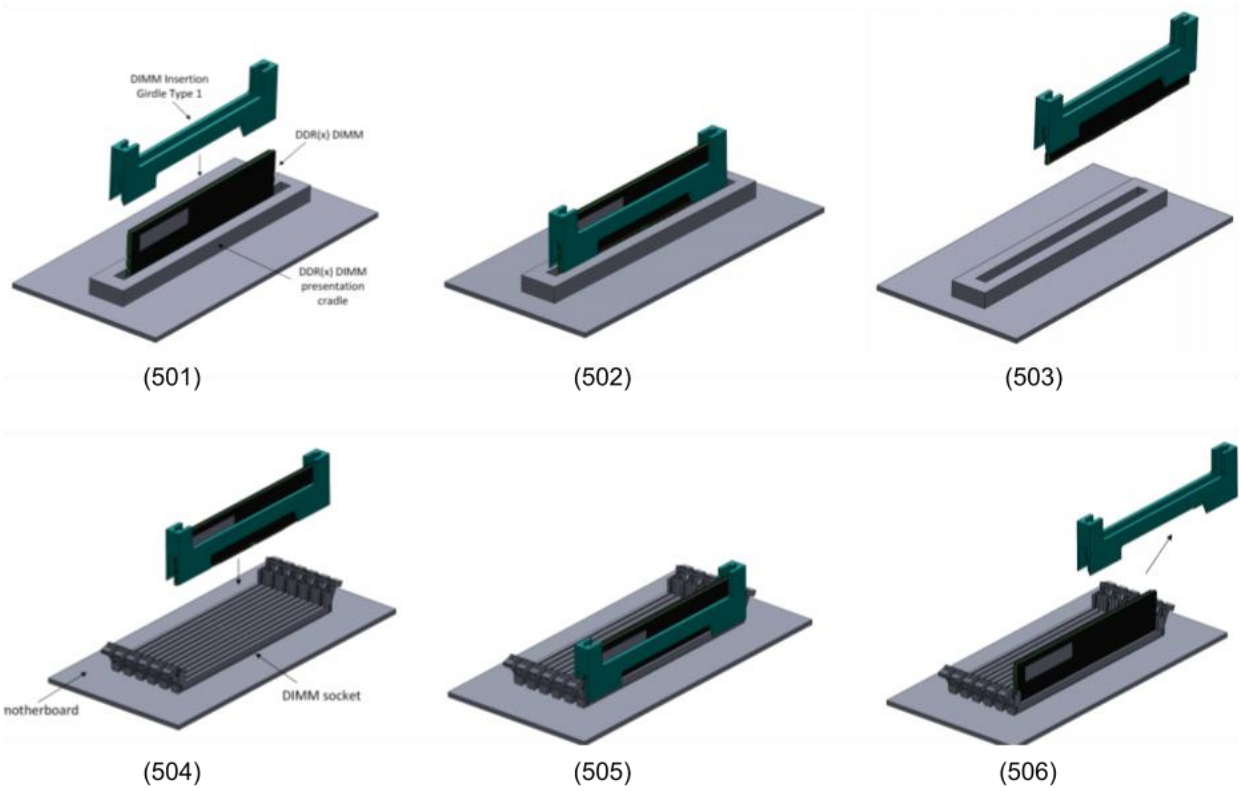


Fig. 5: Inserting a DIMM using a type-2 DIMM insertion girdle

Fig. 5 illustrates inserting a DIMM using a type-2 DIMM insertion girdle, per techniques of this disclosure. The girdle is placed onto a DIMM in a presentation crib by a robot (501). The DIMM is secured in the girdle (502). The girdle, with the DIMM inside, is removed by robot (503). The girdle and DIMM are placed into a DIMM socket (504). The DIMM is inserted into the socket (505). The girdle is removed from the DIMM socket by robot (506).

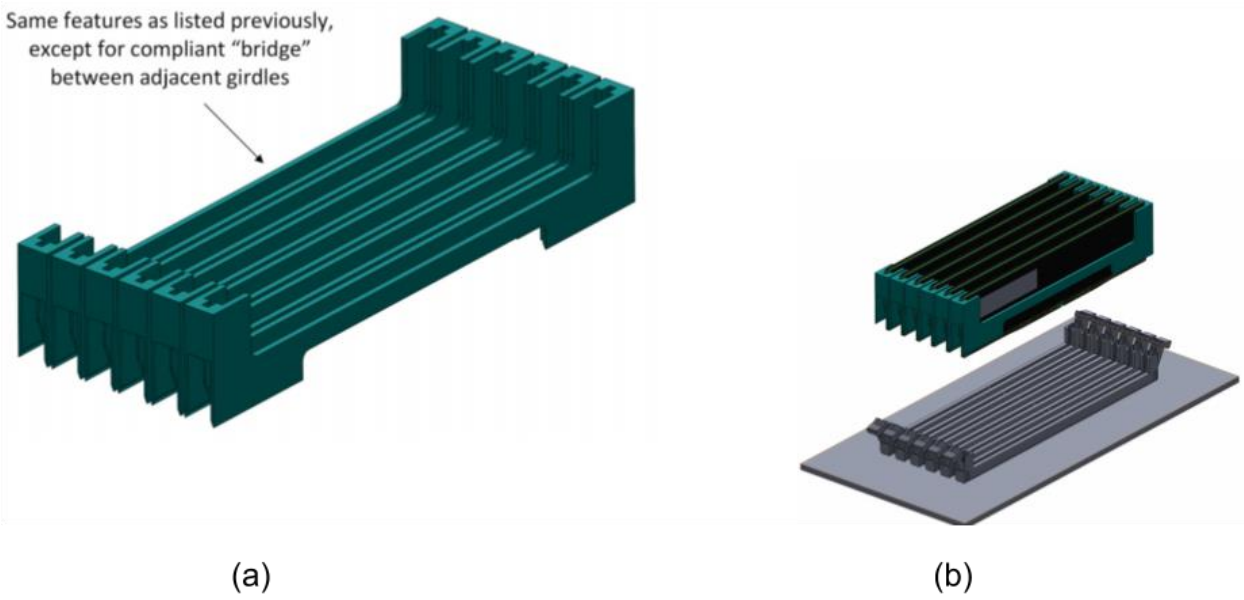


Fig. 6: A type-2 DIMM insertion girdle extended to enable multiple simultaneous DIMM placements

A type-2 DIMM insertion girdle can be extended to enable multiple simultaneous DIMM placements, as illustrated in Fig. 6(a). Bridges are placed between constituent girdles to maintain adjacent girdles at a distance compliant with the inter-socket distance on the motherboard. Fig. 6(b) illustrates the simultaneous placement of multiple DIMMs using the extended type-2 DIMM girdle.

Fig. 7 (below) illustrates top views of DIMM insertion girdles, per the techniques of this disclosure. Dimensions d1-d7, and specifically, critical dimensions d2 and d5 can be chosen suitably, per the insertion context.

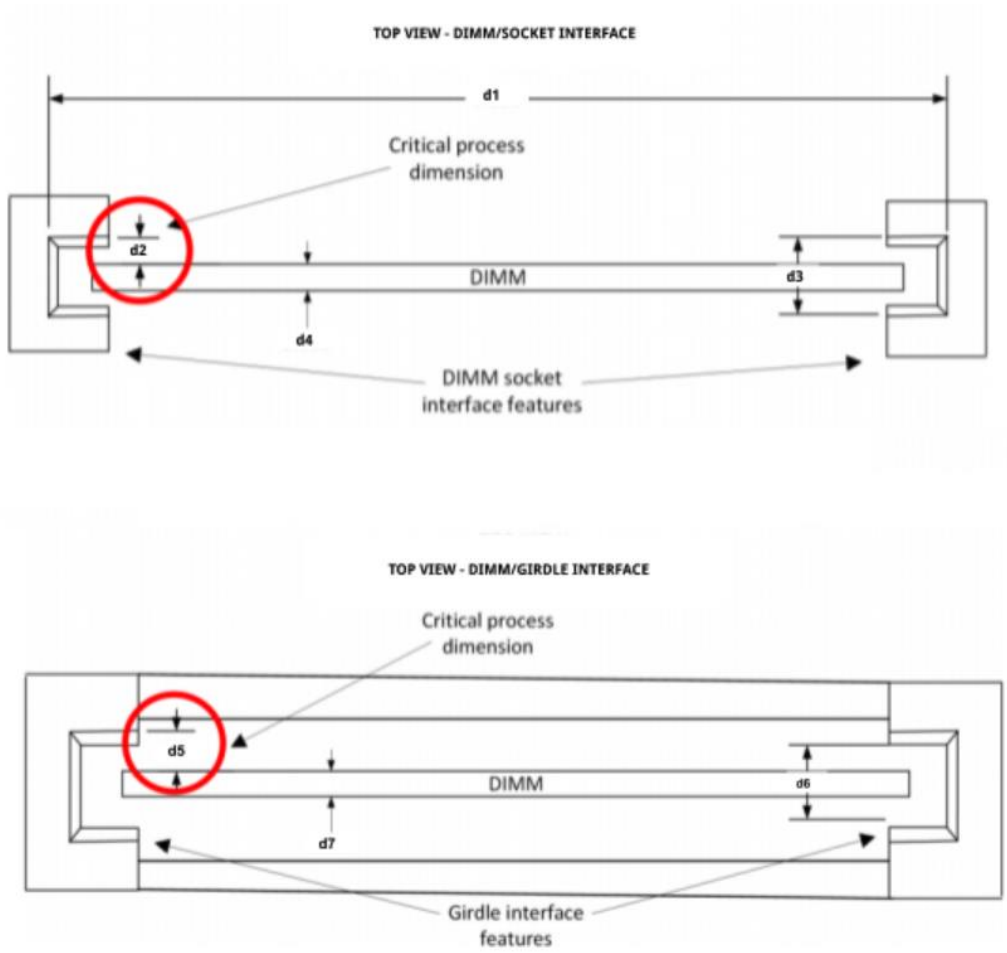


Fig. 7: Top view of DIMM insertion girdles

CONCLUSION

This disclosure describes DIMM insertion girdles that assist in aligning DIMMs to their sockets during placement. Girdles are described that can be used for manual and/or automated placement of DIMMs. The techniques result in decreased misplacements (robot crashes) and increased throughput.

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