WHAT IS CLAIMED IS:

1. A portable acoustic inspection device (100) for inspecting a component (102), the acoustic inspection device (100) comprising:

an acoustic transmitter (104) comprising a plurality of acoustic transducers, each acoustic transducer of the acoustic transmitter being for generating an acoustic wave (130) that travels along a surface (132) of the component (102);

an acoustic receiver (106) comprising a plurality of acoustic transducers positioned opposite from the acoustic transmitter (104) and spaced apart from the acoustic transmitter (104) by a transducer gap (160), each of the acoustic transducers of the acoustic receiver(106) being configured for receiving the acoustic wave (130); and

a controller (126) in operative communication with the acoustic receiver (106), the controller (126) being configured for:

obtaining data indicative of the acoustic wave (130) from the acoustic receiver (106);

determining at least one surface (132) characteristic of the component (102) based at least in part on the data indicative of the acoustic wave (130); and

stitching together a plurality of images of the surface (132), the plurality of images being obtained as an operator sequentially moves the acoustic transmitter (104) and acoustic receiver (106) in tandem around the surface (132) of the component (102).

2. The acoustic inspection device (100) of claim 1, wherein the acoustic transducers (140) are operable in a transmitting mode and a receiving mode.

3. The acoustic inspection device (100) of any preceding claim, wherein at least one of the acoustic transmitters (104) or the acoustic receivers (106) comprises:

a plurality of acoustic transducers (140), each of the plurality of transducers (140) being spaced apart from one another by a transducer spacing (154).

4. The acoustic inspection device (100) of claim 3, wherein the plurality of acoustic transducers (140) comprises between 20 and 100 transducers (140) positioned along a substantially straight line.

5. The acoustic inspection device (100) of claim 3 or 4, wherein the transducer spacing (154) is between 1.27 and 3.81 mm, wherein the controller (126) is configured for acquiring a full matrix capture of a plurality of acoustic waves (130) generated by the plurality of acoustic transducers (140).

6. The acoustic inspection device (100) of any preceding claim, wherein the acoustic transducers of the acoustic transmitters (104) have a scan width (152) of between 12.7 to 50.8 mm, and wherein the data indicative of the acoustic wave (130) forms a two-dimensional image (156) of the surface (132) of the component (102).

7. The acoustic inspection device (100) of any preceding claim, wherein scan length (150) of the acoustic transducers of the acoustic transmitter (104) and the acoustic receiver (106) is between 127 and 1016 mm.

8. The acoustic inspection device (100) of any preceding claim, wherein the acoustic wave (130) has a frequency of between 0.5 and 20 MHz.

9. The acoustic inspection device (100) of any preceding claim, wherein the at least one surface (132) characteristic comprises a crystalline structure or an average grain size of the surface (132) of the component (102).

10. The acoustic inspection device (100) of any preceding claim, wherein the acoustic transmitter (104), the acoustic receiver (106), and the controller (126) are stored in a portable device.

11. The acoustic inspection device (100) of any preceding claim, wherein the component (102) is metal.

12. A method (200) of inspecting a component (102) using a portable acoustic inspection device (100), the method (200) comprising:

directing, by an acoustic transmitter comprising a plurality of acoustic transducers, an acoustic wave (130) along a surface (132) of the component (102) from a first location;

receiving, by an acoustic receiver comprising a plurality of acoustic transducers positioned opposite from the acoustic transmitter (104) and spaced apart from the acoustic transmitter (104) by a transducer gap (160), the acoustic wave (130) at a second location spaced apart from the first location; and

determining, by a controller in operative communication with the acoustic receiver, at least one surface (132) characteristic of the component (102) based on the received acoustic wave (130); and

sequentially moving the acoustic transmitter (104) and acoustic receiver (106) in tandem around the surface (132) of the component (102) to obtain a plurality of images of the surface (132).

13. The method (200) of claim 12, wherein directing an acoustic wave (130) comprises:

generating a plurality of acoustic waves (130) from the acoustic transducers (140) of the acoustic transmitter, wherein each of the plurality of transducers (140) are spaced apart from one another by a transducer spacing (154).

14. The method (200) of claim 12 or 13, further comprising:

acquiring a full matrix capture of the plurality of acoustic waves (130) generated by the plurality of acoustic transducers (140) of the acoustic transmitter.

15. The method (200) of any of claims 12-14, further comprising:

forming a two-dimensional image (156) of the surface (132) of the component (102) from the received acoustic wave (130).