

## CLAIMS

1. A drive system for a liquefied natural gas (LNG) in a liquefaction plant LNG refrigeration compressor, the drive system comprising first, second and third refrigeration compression strings, each refrigeration compression string comprising: one or more refrigeration compressors; a multi-shaft gas turbine capable of asynchronous operation; Wherein the multi-shaft gas turbine is operatively connected to and configured to drive the one or more refrigeration compressors, and wherein the multi-shaft gas turbine uses its natural velocity turn down range to: Starting the one or more refrigeration compressors from a stationary state, bringing the one or more refrigeration compressors up to an operational rotational speed and adjusting the compressor operating point to maximize the efficiency of the one or more refrigeration compressors, without assistance from an electric motor having a drive through function and a variable frequency drive; Wherein the first refrigeration compression string is configured to provide compression to a propane refrigerant, the second refrigeration compression string is configured to provide compression to a mixed refrigerant, and the third refrigeration compression string is configured to provide compression to a nitrogen refrigerant.
2. The drive system of claim 1, further comprising a waste heat recovery unit to extract heat from exhaust gas of the multi-shaft gas turbine of at least one of the first, second, and third refrigeration and compression strings, thereby increasing the overall energy efficiency of the LNG liquefaction plant.
3. Cooling air entering the multi-shaft gas turbine inlet of at least one of the first, second, and third refrigeration compression strings, thereby cooling the LNG liquefaction plant's natural gas throughput and/ Or an inlet air cooler configured to maximize efficiency.
4. The drive system of claim 3 wherein the inlet air chiller comprises a mechanical refrigeration system that is independent of the first, second, or third refrigeration and compression strings.
5. Wherein the inlet air chiller comprises a mechanical refrigeration system integrated with at least one of the first, second, or third refrigeration compression strings, and wherein the air entering the inlet of the multi-shaft gas turbine of at least one of the first, second, and third refrigeration compression strings comprises: Cooled using a refrigerant compressed by one or more of the refrigeration compressors of the first, second or third compression strings.
6. The drive system of any of claims 1-5 wherein operation of all of the multi-shaft gas turbines of the first, second, and third refrigeration and compression strings is required for natural gas liquefaction.
7. The drive system of any of claims 1-5 wherein operation of only two of the multi-shaft gas turbines of the first, second, and third refrigeration compression strings is required for natural gas liquefaction.
8. Wherein the first refrigeration compression string is further configured to provide compression to a mixed refrigerant and the second refrigeration compression string is further configured to provide compression to the propane refrigerant; The drive system of claim 7 wherein operation of only one of the multi-shaft gas turbines of the first refrigeration compression string and the second refrigeration compression string and of the third refrigeration compression string is required for natural gas liquefaction.
9. Wherein the first refrigeration compression string is further configured to provide compression to the mixed refrigerant and the second refrigeration compression string is further configured to provide compression to the propane refrigerant, the method comprising: 2 The drive system of any one of the preceding claims, wherein only one actuation is required for natural gas liquefaction.

10. The drive system of any one of claims 1-9, wherein refrigerant compressed by at least one of the refrigeration compressors of at least one of the first, second or third refrigeration and compression strings is cooled by air.
11. The drive system of any one of claims 1 to 10 wherein refrigerant compressed by at least one of the refrigeration compressors of at least one of the first, second or third refrigeration and compression strings is cooled by water.
12. The drive system of any of claims 1 to 11 wherein at least one of the first, second, and third refrigeration and compression strings includes a generator for converting excess turbine mechanical power to electricity and transferring the electricity to a distribution network.
13. The drive system of any of claims 1 to 12 wherein each multi-shaft gas turbine of the first, second, and third refrigeration compression strings has a rated output capacity of at least 70 megawatts.
14. The drive system of claim 1 wherein one or more refrigeration compressors of one of the first, second, and third compression strings support compression work of another one of the first, second, and third compression strings.
15. A method of producing liquefied natural gas (LNG), comprising: positioning each of first, second, and third refrigeration compression strings to include one or more refrigeration compressors and a multi-shaft gas turbine operatively connected to the one or more refrigeration compressors; Driving the respective one or more refrigeration compressors using the multi-shaft gas turbine in each of a third refrigeration compression string using asynchronous operation; providing compression to propane refrigerant using the first refrigeration compression string; providing compression to mixed refrigerant using the second refrigeration compression string; Providing compression to nitrogen refrigerant using the third refrigeration compression string; and using a natural velocity turn down range of at least one of the multi-shaft gas turbines of the first, second, and third refrigeration compression strings without assistance from an electric motor having a drive through function or a variable frequency drive to: Starting the one or more refrigeration compressors from a stationary state, bringing the one or more refrigeration compressors up to an operational rotational speed and modulating the compressor operating point to maximize the efficiency of the one or more refrigeration compressors.
16. The method of claim 15, further comprising extracting heat from an exhaust gas of the multi-shaft gas turbine of at least one of first, second, and third refrigeration and compression strings using a waste heat recovery unit.
17. The method of claim 15 or claim 16, further comprising cooling air entering the multi-shaft gas turbine inlet of at least one of the first, second, and third refrigeration compression strings.
18. The method of claim 17 wherein an inlet air chiller comprises a mechanical refrigeration system that is independent of said first, second or third refrigeration and compression strings.
19. The method of claim 1, wherein cooling the air comprises cooling the first, second, or third refrigeration/compression string using refrigerant compressed by one or more of the refrigeration compressors of the first, second, or third refrigeration/compression string Cooling the air entering the inlet of the multi-shaft gas turbine of at least one of: and a third refrigeration compression string.
20. The method of any of claims 15 to 19, wherein operation of all of the multi-shaft gas turbines of the first, second, and third refrigeration compression strings is required for natural gas liquefaction.

21. The method of any one of claims 15 to 19, wherein operation of only two of the multi-shaft gas turbines of the first, second, and third refrigeration compression strings is required for natural gas liquefaction.

22. Providing compression to the propane refrigerant and the mixed refrigerant using the first refrigeration compression string and providing compression to the propane refrigerant and the mixed refrigerant using the second refrigeration compression string; Wherein the multi-shaft gas turbines of the first and second refrigeration compression strings and the third refrigeration compression string2The method of claim 21, wherein only activation is required for natural gas liquefaction.

23. The method of claim 1, further comprising providing compression to the propane refrigerant and the mixed refrigerant using the first refrigeration compression string and providing compression to the propane refrigerant and the mixed refrigerant using the second refrigeration compression string, wherein2The method as recited in one of claims 15 to 19, wherein only activation is required for natural gas liquefaction.

24. The method of any one of claims 15 to 23, further comprising air cooling refrigerant compressed by at least one of the refrigeration compressors of at least one of the first, second or third refrigeration compression strings.

25. The method according to any one of claims 15 to 24, further comprising the step of: water cooling a refrigerant compressed by at least one of the refrigeration compressors of at least one of the first, second or third refrigeration compression strings.

26. The method of any of claims 15 to 25, further comprising converting excess turbine electrical power of the multi-shaft gas turbine of at least one of the first, second, and third refrigeration and compression strings to electricity using a generator, and transferring the electricity to a distribution network.

27. Transferring one or more compression stages of a refrigeration compressor in one of the first, second or third compression strings to another one of the first, second or third compression strings; The method as recited in any of claims 15 to 26, further comprising the step of supporting the compression work of the one of the first, second or third compression strings.