



**Liberty Energy, Inc. and Liberty Oilfield Services LLC
v.
U.S. Well Services, LLC**

**IPR2024-01274
U.S. Patent No. 11,091,992**

**Patent Owner's Demonstrative Exhibits
January 22, 2026**

1

Introduction

2

Overview of the Proposed Claims

3

Patent Owner Met Its Burden

- **Introduction**
- **Overview of the Proposed Claims**
- **Patent Owner Met Its Burden**
 - **The Number of Substitute Claims is Reasonable**
 - Here, Patent Owner proposes Substitute Claims 41–59 for original claims 1–20, which constitutes a less than one-for-one substitution. Source: Paper 21 at 5.
 - **The Substitute Claims Have Written Description Support and Do Not Introduce New Matter**
 - Support for the Substitute Claims is provided with reference to:
 - Application No. 15/978,838 (the “838 application”). Exhibit 1002 at 409–458.
 - Application No. 14/884,363 (the “363 application”). Exhibit 2005.
 - Source: Paper 21 at 19–20.

- **The Substitute Claims Do Not Broaden the Claim Scope**
 - Here, “[b]ecause no subject matter is removed by the proposed amendments, and additional limitations have been added, [] the amendments [added by Substitute Claims 41–59] do not seek to enlarge the scope of the claims.” *Innoscence (Zhuhai) Technology Company, LTD. and Innoscence America, Inc., v. Efficient Power Conversion Corporation*, IPR2023-01381, Paper 29 at 4 (PTAB Oct. 1, 2024) (“*Innoscence*”) at 5.
 - Source: Paper 21 at 18.
- **The Substitute Claims Are Not Indefinite**
- **Limitations 44b, 44c, and 44d Do Not Lack Written Description Support**
- **Limitation 50a Does Not Lack Written Description Support**
- **The Substitute Claims Respond to Patentability Grounds in this Trial**
- **The Substitute Claims Are Not Obvious in View of Petitioners’ Asserted Prior Art**
- **Source: Paper 29 at 1-5; Paper 21 at 5.**

Claim 41. (Proposed substitute for original claim 1) [41p] A system for hydraulically fracturing an underground formation in an oil or gas well to extract oil or gas from the formation, the oil or gas well having a wellbore that permits passage of fluid from the wellbore into the formation, the system comprising:

[41a] an electric pump fluidly connected to the well, and configured to pump fluid into the wellbore; and

[41b] a centralized control unit coupled to the electric pump,

[41c] wherein the centralized control unit is configured to:

monitor the electric pump; and

[41d] a variable frequency drive that controls a speed of the electric pump;

[41e] the system further comprising a generator electrically connected to the electric pump to provide power to the electric pump,

[41f] wherein the generator is a natural gas generator,

[41g] the system further comprising a gas filtration skid,

[41h] wherein the centralized control unit is further configured to monitor operating characteristics of the gas filtration skid;

[41i] wherein the monitored operating characteristics of the gas filtration skid include at least water separator status, particulate filter status, gas pressures, gas temperatures, valve statuses, and filter bypass status;

[41j] wherein the centralized control unit is further configured to control operating characteristics of the gas filtration skid;

[41k] wherein the controllable operating characteristics of the gas filtration skid include at least inlet valves, outlet valves, bypass valves, and pressure release;

[41l] the system further comprising a gas compressor,

[41m] wherein the centralized control unit is further configured to monitor operating characteristics of the gas compressor;

[41n] wherein the monitored operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;

[41o] wherein the centralized control unit is coupled to the electric pump via one or more of cabling, Ethernet, or wirelessly; and

[41q] wherein the centralized control unit is further configured to reset a fault occurring in the variable frequency drive.

Claim 47. (Proposed substitute for original claim 8) [47a] A method, comprising:

pumping fracturing fluid into a well in a formation with an electrically powered pump, the fracturing fluid having at least a liquid component and a solid proppant, and inserting the solid proppant into the cracks to maintain the cracks open, thereby allowing passage of oil and gas through the cracks;

[47b] monitoring at a centralized control unit the electrically powered pump;

[47c] wherein the centralized control unit is coupled to the electrically powered pump via one or more of cabling, Ethernet, or wirelessly; and

[47d] controlling the speed of the pump with a variable frequency drive,

[47e] wherein the centralized control unit is configured to reset a fault occurring in the variable frequency drive;

[47f] the method further comprising powering the electrically powered pump with a generator,

[47g] wherein the generator is a turbine generator;

[47h] the method further comprising monitoring operating characteristics of the turbine generator; and

[47i] wherein the monitored operating characteristics of the turbine generator include at least turbine air inlet filter transmitter failure.

Claim 56. (Proposed substitute for original claim 17) [56p] A system for centralized monitoring and control of a hydraulic fracturing operation, comprising:

[56a] an electric powered fracturing fleet, the electric powered fracturing fleet comprising:

a combination of one or more of: electric powered pumps, electric motors, turbine generators, blenders, sand silos, chemical storage units, conveyor belts, manifold trailers, hydration units, variable frequency drives, switchgear, transformers, compressors;

[56b] a centralized control unit coupled to electric powered fracturing fleet; and

[56c] an emergency power off unit coupled to the centralized control unit, the electric powered pumps and the turbine generators, the emergency power off unit configured to substantially immediately cut power to the turbine generators when activated,

[56d] wherein the centralized control unit is configured to:

monitor one or more operating characteristics of the electric powered fracturing fleet; and control one or more operating characteristics of the electric powered fracturing fleet;

[56e] wherein the centralized control unit is coupled to the electric powered fracturing fleet via one or more of cabling, Ethernet, or wirelessly;

[56f] the system further comprising one or more generators electrically connected to the electric pump to provide power to the electric pump;

[56g] wherein the one or more generators are turbine generators, and

[56h] wherein the centralized control unit is further configured to monitor operating characteristics and control the one or more turbine generators, and

[56i] wherein the monitored operating characteristics of the one or more turbine generators include at least turbine air inlet filter transmitter failure.

Claim 42. (Proposed substitute for original claim 2) [42a] The system of [claim 1] claim 41, further comprising:
a generator electrically connected to the electric pump to provide power to the electric pump,
wherein the generator is powered by liquefied natural gas, and

[42b] wherein the centralized control unit is further configured to monitor and control compression of the natural gas.

Claim 43. (Proposed substitute for original claim 4) [43a] The system of [claim 1] claim 41, wherein the electric pump is a plurality of electric pumps,

[43b] the system further comprising a switch gear,

[43c] wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,

[43d] wherein the monitored operating characteristics of the switch gear include at least the status of a fire alarm.

Claim 44. (Proposed substitute for original claim 5) [44a] The system of [claim 4] claim 43, further comprising: a variable frequency drive that controls the plurality of electric pumps,

[44b] the system further comprising a hydraulic system,

[44c] wherein the system is configured to monitor operating characteristics of the hydraulic system,

[44d] wherein the monitored operating characteristics of the hydraulic system include at least system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

Claim 45. (Proposed substitute for original claim 6) [45a] The system of [claim 2] claim 42, further comprising an emergency power off unit coupled to the centralized control unit, the electric pump, and the generator,

[45b] wherein the emergency power off unit is configured to substantially immediately cut power from the generator when activated,

[45c] wherein the emergency power off unit is operated by a switch that sounds an audible alarm.

Claim 46. (Proposed substitute for original claim 7) [46a] The system of [claim 6] claim 45, the emergency power off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,

[46b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator,

[46c] wherein the signal is transmitted over armored shielded CAT5E cabling.

Claim 48. (Proposed substitute for original claim 9) [48a] The method of [claim 8] claim 47, further comprising: powering the electrically powered pump with a generator, wherein the generator is fueled by liquefied natural gas; and

[48b] monitoring compression of natural gas.

Claim 49. (Proposed substitute for original claim 10) [49a] The method of [claim 9] claim 48, wherein the natural gas is selected from the group consisting of field natural gas, compressed natural gas, and liquid natural gas, the method further comprising monitoring, by the centralized control unit, operating characteristics of a switch gear, wherein:

[49b] the operating characteristics of the switch gear include the status of a fire alarm.

Claim 50. (Proposed substitute for original claim 11) [50a] The method of [claim 9] claim 48, further comprising controlling compression of the liquefied natural gas;

[50b] wherein the generator is fueled by liquefied natural gas,

[50c] the method further comprising monitoring operating characteristics of a hydraulic system,

[50d] wherein the monitored operating characteristics of the hydraulic system include system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

Claim 51. (Proposed substitute for original claim 12) [51a] The method of [claim 9] claim 48, wherein the generator is a turbine generator;

the method further comprising

[51b] monitoring operating characteristics of the turbine generator;

[51c] wherein the monitored operating characteristics of the turbine generator include at least fuel system air supply pressure transmitter failure, thermocouple input module thermistor failure, start VFD configuration failure, generator circuit breaker failure to open, gas fuel supply pressure transmitter failure, gas fuel control pressure transmitter failure, utility circuit breaker closed, generator frequency, and engine serial number.

Claim 52. (Proposed substitute for original claim 13) [52a] The method of [claim 9] claim 48, wherein the generator is a turbine generator; the method further comprising

controlling the turbine generator; and

[52b] monitoring operating characteristics of the turbine generator;

[52c] wherein the monitored operating characteristics of the turbine generator include gas fuel main valve discharge pressure transmitter failure, and backup system relay failure.

Claim 53. (Proposed substitute for original claim 14) [53a] The method of [claim 8] claim 47, further comprising resetting a fault occurring in the variable frequency drive from the centralized control unit,
[53b] the method further comprising monitoring operating characteristics of the variable frequency drive,
[53c] wherein the monitored operating characteristics of the variable frequency drive include motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).

Claim 54. (Proposed substitute for original claim 15) [54a] The method of [claim 9] claim 48, further comprising:
providing an emergency power off unit coupled to the centralized control unit, the electrically powered pump and the generator; and
substantially immediately cutting power to the generator by activating the emergency power off unit
[54b] wherein the emergency power off unit is operated by a switch that sounds an audible alarm.

Claim 55. (Proposed substitute for original claim 16) [55a] The method of [claim 15] claim 54, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the generator and the centralized control unit, the method further comprising

signaling the switchgear from the centralized control unit to open a breaker to substantially immediately cut power to the generator

[55b] wherein signaling is transmitted over armored shielded CAT5E cabling.

Claim 57. (Proposed substitute for original claim 18) [57a] The system of [claim 17] claim 56, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the one or more turbine generators and the centralized control unit, the switchgear responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the one or more turbine generators;

[57b] wherein the centralized control unit is further configured to monitor operating characteristics of the switch gear,

[57c] wherein the monitored operating characteristics of the switch gear include at least the status of a fire alarm.

Claim 58. (Proposed substitute for original claim 19) [58] The system of [claim 17] claim 56, wherein the centralized control unit is further configured to monitor and control all of the following: compression of natural gas, electric motors, switchgear, transformers, mobile turbines, rate and pressure of the overall system, vertical sand silos, and an electrical conveyor belt.

Claim 59. (Proposed substitute for original claim 20) [59a] The system of [claim 17] claim 56, wherein the centralized control unit is further configured to monitor and control the one or more turbine generators,

[59b] wherein the one or more turbine generators are fueled by liquefied natural gas.

- The “substantially immediately” *original* limitations in 45b and 46b

[45b] wherein the emergency power off unit is configured to substantially immediately cut power from the generator when activated,

[46b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator,

- The “substantially immediately” *original* limitation in 54a

[54a] The method of [claim 9] claim 48, further comprising:

providing an emergency power off unit coupled to the centralized control unit, the electrically powered pump and the generator; and substantially immediately cutting power to the generator by activating the emergency power off unit

- The “substantially immediately” *original* limitation in 55a

[55a] The method of [claim 15] claim 54, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the generator and the centralized control unit, the method further comprising

signaling the switchgear from the centralized control unit to open a

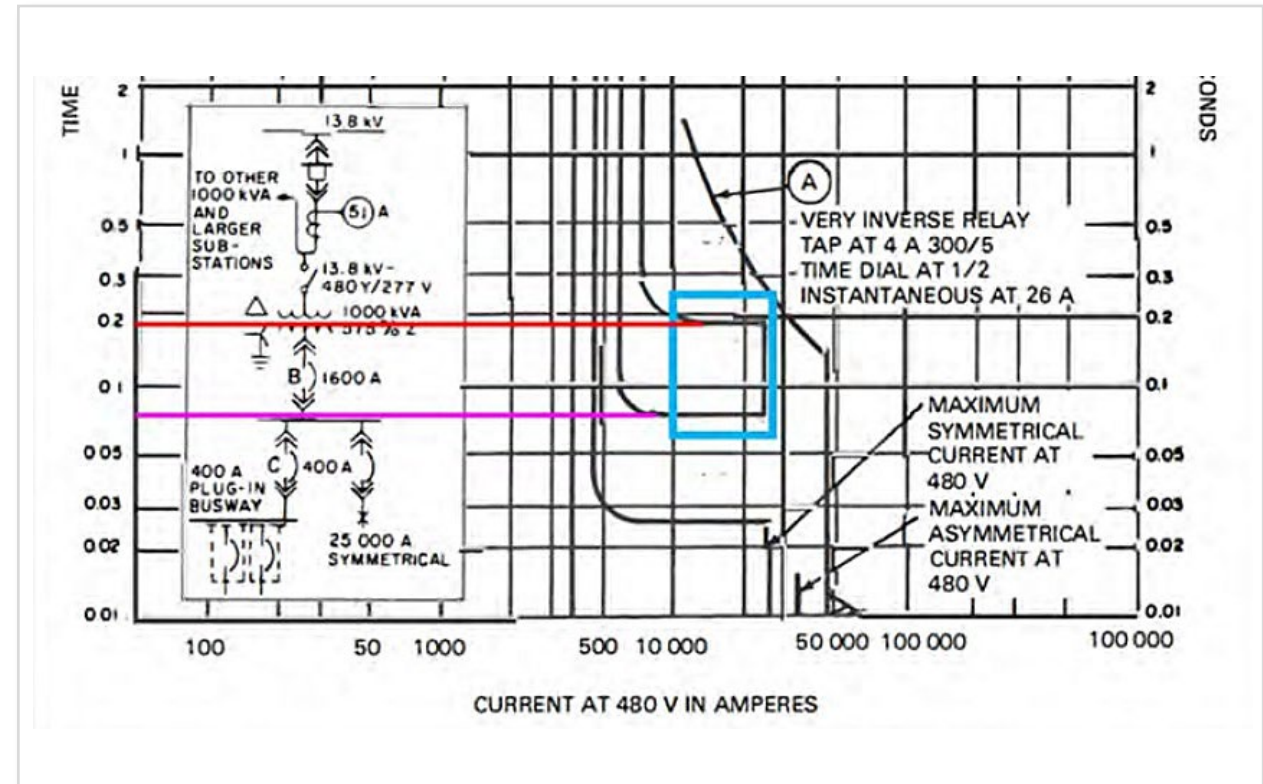
breaker to substantially immediately cut power to the generator

- The “substantially immediately” *original* limitations in 56c and 57a

[56c] an emergency power off unit coupled to the centralized control unit, the electric powered pumps and the turbine generators, the emergency power off unit configured to substantially immediately cut power to the turbine generators when activated,

[57a] The system of [claim 17] claim 56, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the one or more turbine generators and the centralized control unit, the switchgear responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the one or more turbine generators;

- Dr. Durham calculates the “substantially immediately” trip time for switchgears to be between “~0.06 seconds” and “~0.16 seconds.”
- Dr. Durham uses the “tripping time” curve for switchgear, IEEE Standard 141-1986 (“Red Book”), Figure 73 (annotated) (reproduced on right), to calculate “substantially immediately” trip times “between ~0.06 seconds (minimum tripping time, magenta line) and ~0.16 seconds (maximum tripping time, red line)” using the “instantaneous trip portion of the curve (area annotated in blue).”



Ex. 1021 (Red Book) Fig. 73 (annotated)

- Dr. Durham admits that

“such short periods of time as those identified in Red Book are faster than an operator could notice a problem and then take action,” and that “such short times are at least one example of what would qualify as ‘substantially immediately.’”

Source: Paper 29 at 1–2; EX-1003 at ¶¶ 290–291; EX-1021 at Fig. 73.

- Petitioners and Dr. Durham admit that one example of “substantially immediately” is when “switchgear ... is tripped in ***less than one second (i.e., “substantially immediately”).***”
- Dr. Durham, discussing Hunt (EX-1008):

“It is my opinion that a ***POSITA would have understood*** this [Hunt] disclosure to teach that the emergency power off unit (switchgear) is configured to ***substantially immediately (less than 1 second) cut power from the generator when activated.***”

Source: Paper 29 at 2–3; Paper 1 at 60, EX-1003 at ¶ 293.

The “substantially immediately” term as recited in the SCs is thus readily understandable to a POSITA and not indefinite, as admitted by Petitioners and Dr. Durham and as illustrated by Dr. Durham’s ability to calculate “substantially immediately” as between “~0.06 seconds” and “~0.16 seconds.”

Ironburg Inventions Ltd. v. Valve Corp., 64 F.4th 1274, 1287-88 (Fed. Cir. 2023) (finding “substantially the full distance” “not invalid as indefinite”).

Source: Paper 29 at 3; EX 1003 at ¶¶ 290–291.

- The “hydraulic system” limitations in 44b, 44c, and 44d.

[44b] the system further comprising a hydraulic system,

[44c] wherein the system is configured to monitor operating characteristics of the hydraulic system,

[44d] wherein the monitored operating characteristics of the hydraulic system include at least system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

- **Patent Owner submits that these limitations are supported in the specification**

Source: Paper 21 at A-3, A-4; Paper 29 at 3, 4.

- The Specification Incorporates by Reference U.S. Pat. No. 9,410,410 titled “**System for Pumping Hydraulic Fracturing Fluid Using Electric Pumps**”
- **992 Patent Specification:** “Disclosed herein is a system for hydraulically fracturing an underground formation”

“[C]laimed subject matter need not be described in haec verba in the specification in order for the specification to satisfy the description requirement.”

In re Smith, 481 F.2d 910, 914 (CCPA 1973).

Source: Paper 29 at 4.

- Dr. Durham admits that the term “hydraulic system” was known to a POSITA at the time of invention.
- Dr. Durham admits to “known techniques [e.g.,] (hydraulic systems)” and “known systems [e.g.,] (hydraulic fracturing systems)”
- Petitioners also admit that the term “hydraulic system” was known to a POSITA at the time of invention.
- A POSITA would thus have understood the term “hydraulic system” as recited in Substitute Claim 44 and found sufficient support in the specification for it.

Source: Paper 29 at 4; EX 2109 at 29:19–30:4; EX 1052 at ¶ 600.

19 Q So at least in your example here in
20 Paragraph 600 the term "hydraulic system"
21 was known by a POSITA?

22 MS. MUENKS: Objection to form.

23 A As described by Clancy, yes.

24 BY MR. QUARLES:

25 Q And it's your opinion that Clancy
1 was known, right?

2 A Yeah. Clancy was published some
3 eight years before '992, so, yes, it would
4 have been known.

Robert Allan Durham Tr. at 29:19-30:4

- The “controlling compression” limitation in 50a.
- **[50a]** The method of [claim 9] claim 48, further comprising controlling compression of the liquefied natural gas;
- Patent Owner submits that these limitations are supported in the specification.

Claim 50. (Proposed substitute for original claim 11) [50a] The method of [claim 9] claim 48, further comprising controlling compression of the liquefied natural gas;

[50b] wherein the generator is fueled by liquefied natural gas;

[50c] the method further comprising monitoring operating characteristics of a hydraulic system.

Source: Paper 21 at A-6.

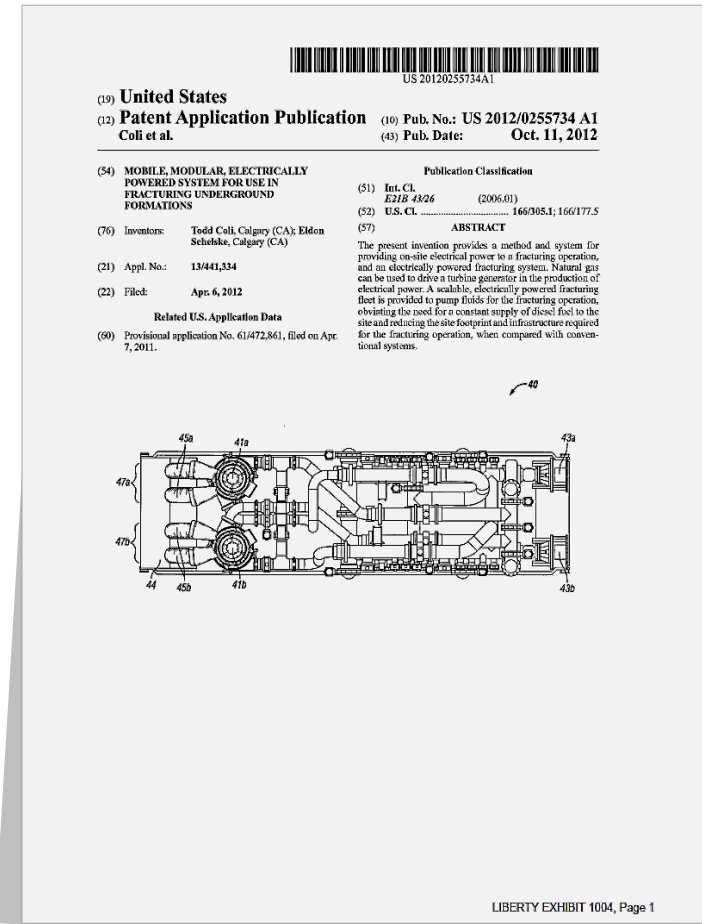
- | | | | |
|---|--|--|--|
| (12) United States Patent
Brousseau et al. | | (19) Patent No.: US 11,091,992 B2
(45) Date of Patent: *Aug. 17, 2021 | |
| (54) SYSTEM FOR CENTRALIZED MONITORING AND CONTROL OF ELECTRIC POWDER BYDRAULIC FRACTURING FLUID | | (58) Field of Classification
Int. Class.
E04B 1/00 | |
| (71) Applicant: U.S. Well Services, LLC , Houston, TX (US) | | (51) Int. Cl.
E04B 1/00 | |
| (72) Inventor: Joel N. Brousseau , Lafayette, LA (US);
Jeff McPherson , Fairport, NY (US);
Robert Kates , Fairport, NY (US);
David Eberling , Houston, TX (US);
Brianne Hinderliter , Houston, TX (US) | | (52) U.S. Class.
150/105.1
157/145.1
CA
FOREIGN
INT
207/145.1
34 | |
| (73) Assignee: U.S. WELL SERVICES, LLC , Houston, TX (US) | | (56) References Cited
U.S. Patent Documents
2016/0105146 A1
2016/0105147 A1
2016/0105148 A1
2016/0105149 A1
2016/0105150 A1
2016/0105151 A1
2016/0105152 A1
2016/0105153 A1
2016/0105154 A1
2016/0105155 A1
2016/0105156 A1
2016/0105157 A1
2016/0105158 A1
2016/0105159 A1
2016/0105160 A1
2016/0105161 A1
2016/0105162 A1
2016/0105163 A1
2016/0105164 A1
2016/0105165 A1
2016/0105166 A1
2016/0105167 A1
2016/0105168 A1
2016/0105169 A1
2016/0105170 A1
2016/0105171 A1
2016/0105172 A1
2016/0105173 A1
2016/0105174 A1
2016/0105175 A1
2016/0105176 A1
2016/0105177 A1
2016/0105178 A1
2016/0105179 A1
2016/0105180 A1
2016/0105181 A1
2016/0105182 A1
2016/0105183 A1
2016/0105184 A1
2016/0105185 A1
2016/0105186 A1
2016/0105187 A1
2016/0105188 A1
2016/0105189 A1
2016/0105190 A1
2016/0105191 A1
2016/0105192 A1
2016/0105193 A1
2016/0105194 A1
2016/0105195 A1
2016/0105196 A1
2016/0105197 A1
2016/0105198 A1
2016/0105199 A1
2016/0105200 A1
2016/0105201 A1
2016/0105202 A1
2016/0105203 A1
2016/0105204 A1
2016/0105205 A1
2016/0105206 A1
2016/0105207 A1
2016/0105208 A1
2016/0105209 A1
2016/0105210 A1
2016/0105211 A1
2016/0105212 A1
2016/0105213 A1
2016/0105214 A1
2016/0105215 A1
2016/0105216 A1
2016/0105217 A1
2016/0105218 A1
2016/0105219 A1
2016/0105220 A1
2016/0105221 A1
2016/0105222 A1
2016/0105223 A1
2016/0105224 A1
2016/0105225 A1
2016/0105226 A1
2016/0105227 A1
2016/0105228 A1
2016/0105229 A1
2016/0105230 A1
2016/0105231 A1
2016/0105232 A1
2016/0105233 A1
2016/0105234 A1
2016/0105235 A1
2016/0105236 A1
2016/0105237 A1
2016/0105238 A1
2016/0105239 A1
2016/0105240 A1
2016/0105241 A1
2016/0105242 A1
2016/0105243 A1
2016/0105244 A1
2016/0105245 A1
2016/0105246 A1
2016/0105247 A1
2016/0105248 A1
2016/0105249 A1
2016/0105250 A1
2016/0105251 A1
2016/0105252 A1
2016/0105253 A1
2016/0105254 A1
2016/0105255 A1
2016/0105256 A1
2016/0105257 A1
2016/0105258 A1
2016/0105259 A1
2016/0105260 A1
2016/0105261 A1
2016/0105262 A1
2016/0105263 A1
2016/0105264 A1
2016/0105265 A1
2016/0105266 A1
2016/0105267 A1
2016/0105268 A1
2016/0105269 A1
2016/0105270 A1
2016/0105271 A1
2016/0105272 A1
2016/0105273 A1
2016/0105274 A1
2016/0105275 A1
2016/0105276 A1
2016/0105277 A1
2016/0105278 A1
2016/0105279 A1
2016/0105280 A1
2016/0105281 A1
2016/0105282 A1
2016/0105283 A1
2016/0105284 A1
2016/0105285 A1
2016/0105286 A1
2016/0105287 A1
2016/0105288 A1
2016/0105289 A1
2016/0105290 A1
2016/0105291 A1
2016/0105292 A1
2016/0105293 A1
2016/0105294 A1
2016/0105295 A1
2016/0105296 A1
2016/0105297 A1
2016/0105298 A1
2016/0105299 A1
2016/0105300 A1
2016/0105301 A1
2016/0105302 A1
2016/0105303 A1
2016/0105304 A1
2016/0105305 A1
2016/0105306 A1
2016/0105307 A1
2016/0105308 A1
2016/0105309 A1
2016/0105310 A1
2016/0105311 A1
2016/0105312 A1
2016/0105313 A1
2016/0105314 A1
2016/0105315 A1
2016/0105316 A1
2016/0105317 A1
2016/0105318 A1
2016/0105319 A1
2016/0105320 A1
2016/0105321 A1
2016/0105322 A1
2016/0105323 A1
2016/0105324 A1
2016/0105325 A1
2016/0105326 A1
2016/0105327 A1
2016/0105328 A1
2016/0105329 A1
2016/0105330 A1
2016/0105331 A1
2016/0105332 A1
2016/0105333 A1
2016/0105334 A1
2016/0105335 A1
2016/0105336 A1
2016/0105337 A1
2016/0105338 A1
2016/0105339 A1
2016/0105340 A1
2016/0105341 A1
2016/0105342 A1
2016/0105343 A1
2016/0105344 A1
2016/0105345 A1
2016/0105346 A1
2016/0105347 A1
2016/0105348 A1
2016/0105349 A1
2016/0105350 A1
2016/0105351 A1
2016/0105352 A1
2016/0105353 A1
2016/0105354 A1
2016/0105355 A1
2016/0105356 A1
2016/0105357 A1
2016/0105358 A1
2016/0105359 A1
2016/0105360 A1
2016/0105361 A1
2016/0105362 A1
2016/0105363 A1
2016/0105364 A1
2016/0105365 A1
2016/0105366 A1
2016/01 | |

can be powered by natural gas. For example, the generators can be powered by liquefied natural gas. The liquefied natural gas can be converted into a gaseous form in a vaporizer prior to use in the generators. The use of natural

turbine generators, and doing so applies known techniques (controlling LNG compression) to a known system (turbine generator fueled by LNG in hydraulic fracturing system), ready for improvement (ensuring LNG supply). EX1052, ¶¶479-489; EX1004, [0036]. [50c]-[50d] are obvious. *Infra*, §I.C.9 ([44b]-[44d]); *supra*,

30

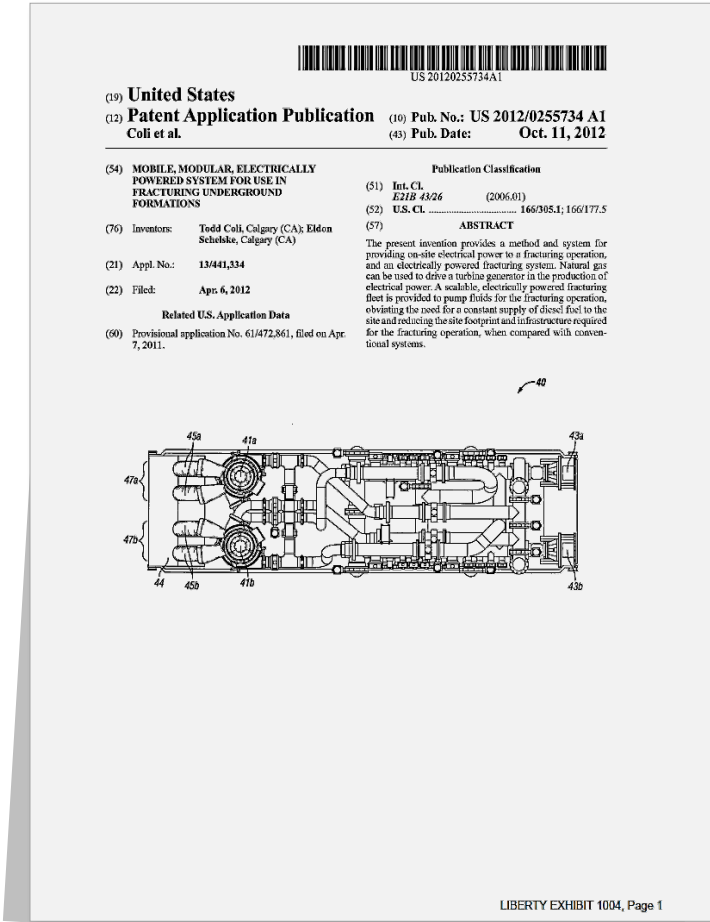
The Substitute Claims Are Not Obvious in View of Petitioners' Asserted Prior Art



Coli (EX-1004)

Source: Paper 21 at 10.

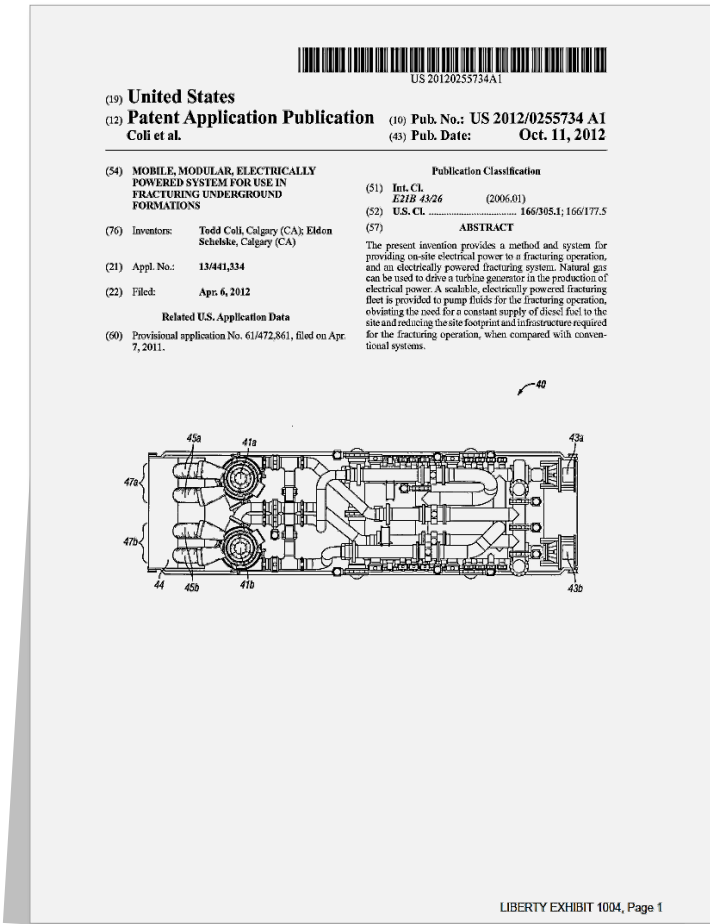
- Coli does not teach, suggest, motivate, or render obvious comprehensive failure diagnostics.
- Coli does not disclose monitoring for any failures.
- Coli does not provide any direction or blueprint for failure monitoring and detection.
- Coli provides no direction or guidance for which parameters **should be** monitored out of potentially thousands of parameters that **could be** monitored in a fracturing operation. EX-2107, ¶¶ 98–102.



Coli (EX-1004)

Source: Paper 21 at 10.

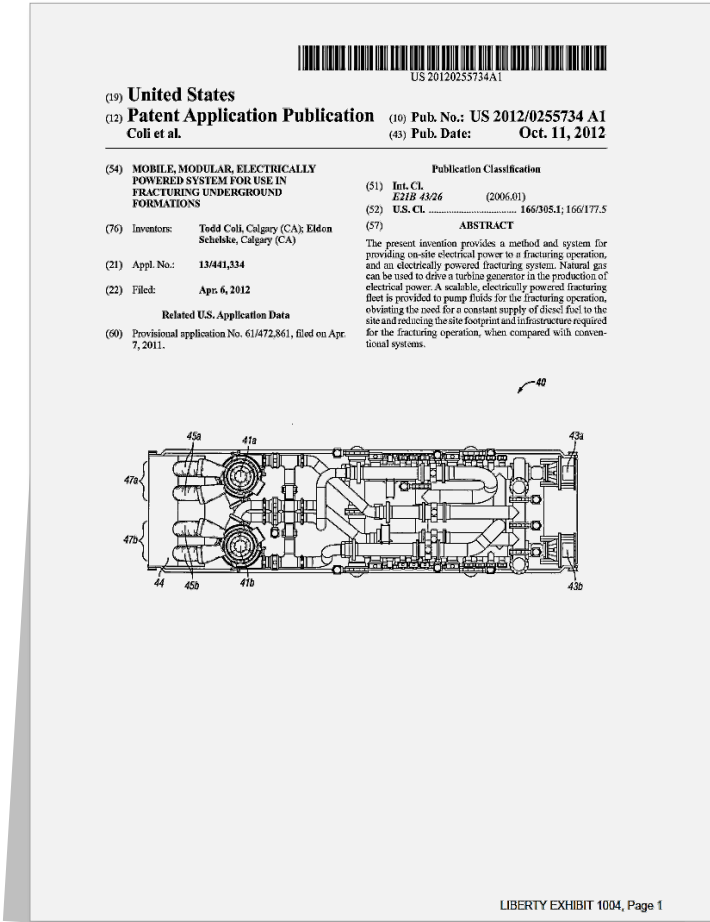
- Coli fails to teach a diagnostic and failure detection system
- Coli instead teaches a system where “all equipment can be synced or slaved to each other” such that “a change at one single point will be carried out by all pieces of equipment.” EX-1004, ¶¶ [0070], [0071]; EX-2107, ¶ 98.



Coli (EX-1004)

Source: Paper 21 at 11.

- Coli does not teach a comprehensive failure detection and failure isolation system.
- Coli mentions the term “failure” only twice, neither of which is regarding monitoring for failure conditions. See EX-1004, ¶ [0067]. EX-2107, ¶ 99.



Coli (EX-1004)

- Coli does not teach or suggest monitoring for error codes.
- Coli mentions the term “error” only once—unrelated to error codes. EX-1004, ¶ [0067]. EX-2107, ¶ 99.

Source: Paper 21 at 11.

101. I also note that Coli teaches that its system could include “*suitable* controls and computer monitoring for the entire fracturing operation” (EX-1004, ¶ [0072] (emphasis added)), but Coli does not teach or suggest monitoring all equipment on the fracturing site. A POSITA reading Coli would not understand Coli to provide a blueprint or indication of which operating characteristics are “suitable” versus which ones are not worth adding.

EX-2107

- Coli provides no indication of which operating characteristics are “suitable” (i.e., worth adding) EX-2107, ¶ 101.

Source: Paper 21 at 11-12.

101. I also note that Coli teaches that its system could include “*suitable* controls and computer monitoring for the entire fracturing operation” (EX-1004, ¶ [0072] (emphasis added)), but Coli does not teach or suggest monitoring all equipment on the fracturing site. A POSITA reading Coli would not understand Coli to provide a blueprint or indication of which operating characteristics are “suitable” versus which ones are not worth adding.

EX-2107

- Coli discloses that its system may include “*suitable* controls and computer monitoring”
- Coli **does not** disclose or suggest that its control system monitors **all** equipment of a hydraulic fracturing site. EX-2107, ¶ 101.

Source: Paper 21 at 11-12.

- Thus, it would not have been obvious to a POSITA to monitor the claimed operating characteristics based on the Coli disclosure—without the blueprint provided by the 992 Patent.
- The proposed modifications are driven by hindsight using the 992 Patent as a blueprint.
- *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143, (Fed.Cir.1985) (holding that it is insufficient to select from the prior art the separate components of the inventor's combination, using the blueprint supplied by the inventor).

Source: Paper 21 at 12.

- **Petitioners' reliance on combining the asserted references with Coli's operational control center thus fails.**

KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398, 418 (2007) (“[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.”).

Source: Paper 21 at 12; Paper 29 at 5.

- Limitation **[41n]** requires monitoring operating characteristics of the claimed gas compressor, including the enclosure exhaust fan run status.

[41n] wherein the monitored operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;

Source: Paper 21 at A-2; Paper 29 at 5.

- Clancy’s “**cooler fan**” does not disclose or render obvious the claimed monitoring of the “enclosure **exhaust fan** run status” for numerous reasons.
- **First**, Clancy’s cooler fan is, as the name confirms, a “cooling fan” and not an “enclosure exhaust fan” as the claim requires. EX-1055, ¶ 39 (“cooler fan (37)”).
 - Clancy explains that the purpose of its “cooler fan” is to provide **cooling** to maintain a user-defined temperature set point, instead of an exhaust fan to remove undesirable air as the claim requires.
 - “A fifth temperature sensor ... **communicates the temperature** to the DCS which can use this information to **speed up or slow down the cooler fan based on the desired set point.**” EX-1055, ¶ 41.

Source: Paper 29 at 5–6; EX-1055, ¶ 41.

- **Second**, Clancy does not disclose or render obvious monitoring cooling fan run status.
- Dr. Durham admits Clancy does not discuss monitoring the cooler fan. EX-2109, 46:6–10.

6 Q And here in Paragraph 39, Clancy
7 does not explicitly discuss monitoring the
8 cooler fan, right?
9 MS. MUENKS: Objection to form.
10 A I agree with that.

Robert Allan Durham Tr. at 46:6-10

Source: Paper 29 at 6; EX-2109 at 46:6–10.

- Limitation **[41i]** requires monitoring operating characteristics of the claimed gas filtration skid, including valve statuses.

[41n] wherein the monitored operating characteristics of the gas compressor include at least compressor motor run status, oil pump run status, enclosure exhaust fan run status, compressor inlet pressure, compressor discharge pressure, and oil pump discharge pressure;

Source: Paper 21 at A-2.

- Armstrong does not discuss monitoring “valve statuses.”

6 Q And here in Paragraph 39, Clancy
7 does not explicitly discuss monitoring the
8 cooler fan, right?
9 MS. MUENKS: Objection to form.
10 A I agree with that.

Robert Allan Durham Tr. at 46:6-10

Source: Paper 29 at 6; EX-2109 at 46:6–10.

- **Proposed Claim 42** is not obvious, at least because it depends from **Proposed Claim 41**, which is not obvious.

Source: Paper 29 at 5.

- Proposed Claim 43 depends from Proposed Claim 41.

Claim 43. (Proposed substitute for original claim 4) [43a] The system of
[claim 1] claim 41, wherein the electric pump is a plurality of electric
pumps₂

- Proposed Claim 43 is not obvious, at least because it depends from Proposed Claim 41, which is not obvious.

Source: Paper 21 at A-3; Paper 29 at 6.

- Proposed Claim 45 depends from Proposed Claim 42, which depends from Proposed Claim 41.

Claim 45. (Proposed substitute for original claim 6) [45a] The system of [claim 2] claim 42, further comprising an emergency power off unit coupled to the centralized control unit, the electric pump, and the generator,

- Proposed Claim 45 is not obvious, at least because it depends from Proposed Claim 42, which is not obvious.

Source: Paper 21 at A-4; Paper 29 at 6.

- Proposed Claim 46 depends from Proposed Claim 45.

Claim 46. (Proposed substitute for original claim 7) [46a] The system of [claim 6] claim 45, the emergency power off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,

- Proposed Claim 46 is not obvious, at least because it depends from Proposed Claim 45, which is not obvious.

Source: Paper 21 at A-4; Paper 29 at 6.

- Proposed Claim 46 requires a switchgear that is responsive to a signal from the centralized control unit, wherein the signal is transmitted over armored shielded CAT5E cabling.

Claim 46. (Proposed substitute for original claim 7) [46a] The system of [claim 6] claim 45, the emergency power off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,

[46b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator,

[46c] wherein the signal is transmitted over armored shielded CAT5E cabling.

Source: Paper 21 at A-4.

- Proposed Claim 46 requires a switchgear that is responsive to a signal from the centralized control unit, wherein the signal is transmitted over armored shielded CAT5E cabling.
- A POSITA would not have been motivated to look to Thompson for details of Ethernet cables, at least because:
 - a POSITA would not have been motivated to look for additional communications options—absent the blueprint provided by the '992 Patent—because Hunt discloses five communications options, “PSTN, DSL, CATV, BPL, and/or wireless services,” with ***no mention of Ethernet communications***. EX-1008, ¶ [0076].

Source: Paper 21 at A-2; Paper 29 at 6–7.

Claim 46. (Proposed substitute for original claim 7) [46a] The system of [claim 6] claim 45, the emergency power off unit comprising an auxiliary power and a switchgear, each coupled to the generator and the centralized control unit,

[46b] wherein the switchgear is responsive to a signal from the centralized control unit to open a breaker to substantially immediately cut power to the generator,

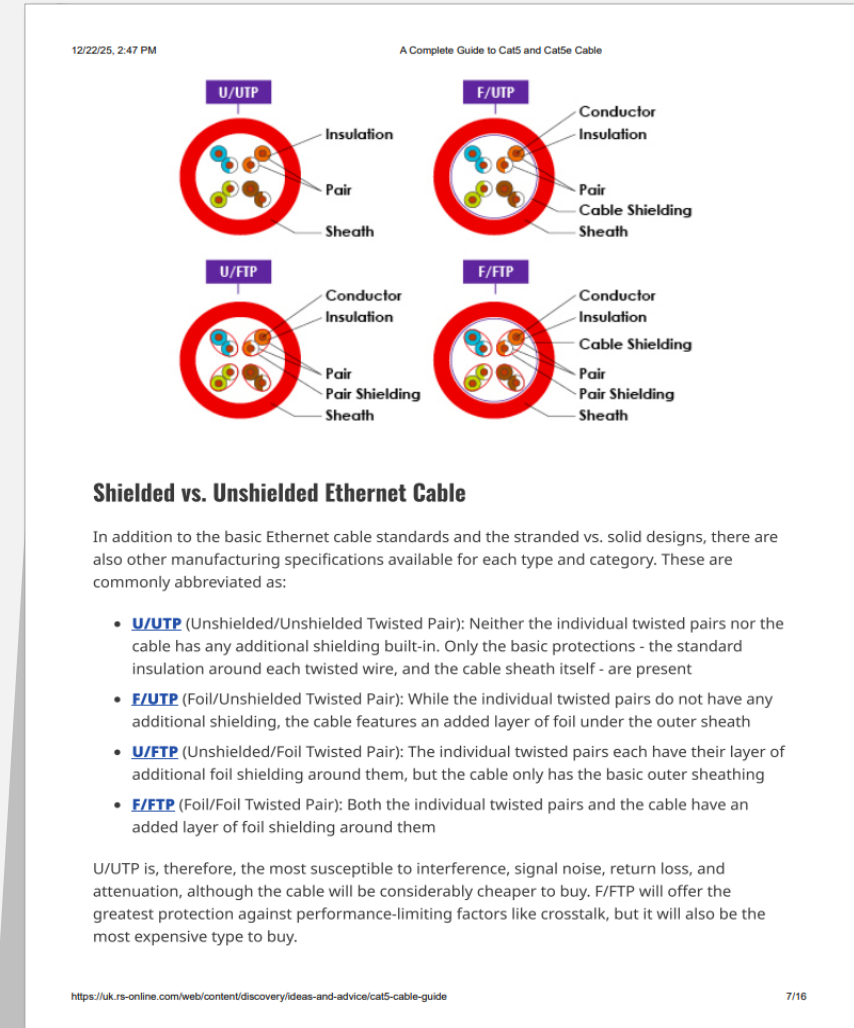
[46c] wherein the signal is transmitted over armored shielded CAT5E cabling.

- Further, Ethernet cabling, including CAT5E cabling—of itself—***does not solve the problem*** Petitioners allege a POSITA would be trying to solve in seeking out Thompson.
- **Petitioners allege:** “A POSITA would have been motivated to look to Thompson for details of Ethernet cables, such as shielded CAT5E cabling, ***to protect the cable from damage and prevent interference.***” Paper 24 at 14.

Source: Paper 24 at 14.

- Ethernet (e.g., CAT5E) cabling may be shielded or unshielded.
- EX-2110, “A Complete Guide to Cat5 & Cat5e Cable,” Explains that Ethernet cable may be unshielded (e.g., “U/UTP (Unshielded / Unshielded Twisted Pair)”) where “[n]either the individual twisted pairs nor the cable has any additional shielding built-in”)

Source: Paper 29 at 7; EX-2110 at 1-2.



- **Petitioners' alleged motivation for a POSITA to “look to Thompson” thus fails.**

Source: Paper 29 at 7.

- Proposed Claims 47 and 56 require monitoring operating characteristics of the turbine generator including at least turbine air inlet filter transmitter failure.

Claim 47

[47h] the method further comprising monitoring operating characteristics of the turbine generator; and

[47i] wherein the monitored operating characteristics of the turbine generator include at least turbine air inlet filter transmitter failure.

Claim 56

[56i] wherein the monitored operating characteristics of the one or more turbine generators include at least turbine air inlet filter transmitter failure.

Source: Paper 21 at A-5, A-10; Paper 29 at 7.

- In the Board’s preliminary guidance (Paper 20), ***the Board agreed with Patent Owner*** that the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman—the only combination Petitioners proffered in their Opposition regarding the “turbine air inlet filter transmitter failure” limitation, alone or in combination—***fails to disclose or render obvious*** this claimed limitation.

Source: Paper 20 at 21, 22; Paper 29 at 7.

Here, in contrast to the argument presented in regard to the pressure transmitter failure limitations, the detection of the “fouled” filters does not mean that there is a detection of a transmitter failure. Stated differently, if the filters have a “foul” odor or are defective in any way, the transmitter that transmits such data is still operational and there is no “filter transmission failure.” Petitioner does not explain sufficiently otherwise.

Accordingly, on this record, Petitioner has not shown sufficiently that the limitations of proposed substitute claims 23 and 32 are taught or suggested by the combination of Coli, Birch, Rusnak, Hunt, Broussard079, Broussard601, Kohlenberger, Ekanayake, Weiher, and Newman. Thus, on this record, Petitioner has not shown a reasonable likelihood of establishing that substitute claims 23 and 32 are unpatentable as obvious under 35 U.S.C. § 103.

- Petitioners additionally rely on U.S. Pat. No. 6,576,849 (“Bliss”) in their opposition for the claimed turbine air inlet filter transmitter failure limitation.
- Petitioners’ reliance on Bliss fails for multiple reasons.

Source: Paper 29 at 8; Paper 24 at 14–15.

- Bliss is non-analogous art.
- Bliss relates to a “**weighing apparatus**” that “**has designs and methods for load cell failure prediction.**” EX-1058, 1:19-21.
- But Proposed Claims 47 and 56 ***do not recite or require load cells***, and a POSITA would thus not be motivated to look to Bliss—nor any other references directed to load cell failure detection.

Source: Paper 29 at 8.

- **Proposed Claims 47 and 56** are directed to monitoring turbine air inlet filter transmitter failure using pressure sensors that are ***unrelated to load cells***, as illustrated by the ability to monitor differential pressure values.

- **The '992 patent discloses:**
 - “**turbine air inlet filter DP** [i.e., differential pressure] high” EX-1001 at 15:42–53.
 - “**turbine air inlet filter DP** [i.e., differential pressure]” *Id.* at 19:15-47
 - “**turbine air inlet filter** [pressure] **high**” *Id.* at 14:16-42

Source: Paper 29 at 8.

- Dr. Durham admits that a POSITA would understand turbine air inlet filter “DP” to mean “differential pressure.”

22	Q	A POSITA would understand a turbine
23		air inlet filter DP to mean turbine air
24		inlet differential pressure, right?
25	A	I think so. Those would be normal
1		things to monitor on turbine, on a gas
2		turbine like this.

EX-2109, 55:22-56:2

Source: Paper 29 at 8.

- Bliss does not disclose or render obvious detection of a transmitter failure, let alone a turbine air inlet filter transmitter failure.
- Instead, Bliss is directed to detecting and ***predicting load cell failures***, not detection of transmitters relaying the information load cells provide.

An object of the present invention is to provide a better and more efficient method to predict potential load cell failures and meet ISO 9000 requirements for weighing apparatus.

EX-2109, 55:22-56:2

Source: Paper 29 at 8–9.

- Bliss explains that its “weighing apparatus makes periodic tests to determine the ***health of the load cells*** in the system.”

This weighing apparatus makes periodic tests to determine the health of the load cells in the system, producing a log file to record events such as any detected failure, suspicious reading, overload condition, or any user defined parameter, and is network enabled to be connected through a LAN via an Ethernet to the Internet.

EX-2109, 55:22-56:2

Source: Paper 29 at 9.

- Petitioners' mistake load cell failure detection and prediction (i.e., measuring component failures) for transmitter failures (i.e., failure of equipment relaying the measured information).
- Petitioners' error regarding Bliss is akin to Petitioners' error—as the Board identified in its Guidance— mistaking Ekanayake's fouling detection (i.e., measurement of fouling) for the required monitoring for transmitter failures (i.e., monitoring for failure of transmitters or communication devices relaying fouling information).

Source: Paper 29 at 9.

- Even combining Bliss and Ekanayake, a POSITA at best may arrive at an invention predicting failures of fouling detection components (e.g., load cells), and not detection of transmitter failures relaying load cell information.
- Bliss and Ekanayake, alone or in combination with each other and all other ARs, fail to disclose or render obvious monitoring turbine air inlet filter transmitter failures as Proposed Claims 47 and 56 require.

Source: Paper 29 at 9.

- **Proposed Claims 48–55** are not obvious, at least because they depend, either directly or indirectly, from Proposed Claim 47, which is not obvious.
- **Proposed Claims 57–59** are not obvious, at least because they depend, either directly or indirectly, from Proposed Claim 56, which is not obvious

Source: Paper 29 at 9; Paper 21 at A-5–A-12.

- **Proposed Claim 52** requires monitoring for a “gas fuel main valve discharge pressure transmitter failure.”
- Birch fails to disclose or render obvious this characteristic for multiple reasons.

Source: Paper 29 at 9-10.

- **First**, a POSITA would have understood Birch's under-pressure and over-pressure sensors as sensing an under/over pressure condition, ***not detecting the failure of a transmitter*** that transmits the actual pressure value as the limitation requires.

- SC 52 requires monitoring for failure of a transmitter that transmits gas fuel main valve discharge pressure, but Birch's sensors merely detect an under-pressure or over-pressure condition that:
 - 1) does not transmit a pressure value and
 - 2) does not expressly discuss transmitting ***any value*** to another subsystem or control center.

Source: Paper 29 at 10.

- **Second**, Birch does not discuss monitoring for under-pressure or over-pressure sensor failures.
- Thus, Birch, alone or in combination with any or all other asserted references, fails to disclose or render obvious the claimed monitoring of “gas fuel main valve discharge pressure transmitter failure.”

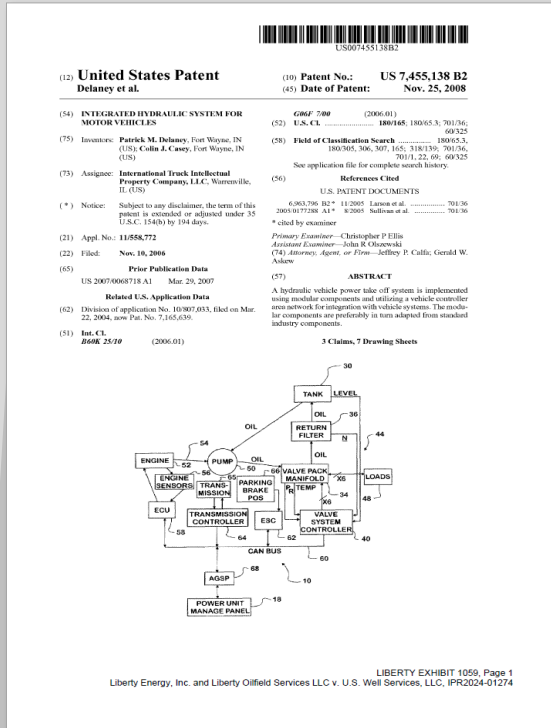
Source: Paper 29 at 10.

- **Proposed Claim 50** requires monitoring operating characteristics of the hydraulic system, including “hydraulic oil level.”

[50d] wherein the monitored operating characteristics of the hydraulic system include system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

- Petitioners rely on Delaney for monitoring “hydraulic oil level,” but this argument fails because Delaney is non-analogous art.

Source: Paper 21 at A-7, Paper 29 at 10, 12.



EX-1059

- Delaney is directed to a “hydraulic vehicle power take off [“PTO”] system”

PTO systems are auxiliary systems, such as hoists, lifts, and pumps that are directly or indirectly powered by the vehicle’s engine.

EX-1059, Abstract, 1:16-18.

- Delaney is thus not related to oil fracking systems or subsystems such as those of the '992 Patent.
- A POSITA would not be motivated to consult Delaney.
- Delaney thus fails to disclose or render obvious Proposed Claim 50.

Source: Paper 29 at 12.

- **Proposed Claim 51** requires monitoring operating characteristics of the turbine generator, including “gas fuel control pressure transmitter failure.”

[51c] wherein the monitored operating characteristics of the turbine generator include at least fuel system air supply pressure transmitter failure, thermocouple input module thermistor failure, start VFD configuration failure, generator circuit breaker failure to open, gas fuel supply pressure transmitter failure, gas fuel control pressure transmitter failure, utility circuit breaker closed, generator frequency, and engine serial number.

Source: Paper 21 at A-7.

- Birch fails to disclose or render obvious monitoring for a “gas fuel control pressure transmitter failure.”
- A POSITA would have understood Birch’s pressure sensor as sensing a ***pressure condition, not monitoring for a transmitter failure condition*** as Limitation 51c requires.
- Birch thus fails to disclose or render obvious monitoring for a “gas fuel control pressure transmitter failure.”

Source: Paper 29 at 11.

- **Proposed Claim 53** requires monitoring operating characteristics of the variable frequency drive, including monitoring “the torque.”

Claim 53. (Proposed substitute for original claim 14) [53a] The method of [claim 8] claim 47, further comprising resetting a fault occurring in the variable frequency drive from the centralized control unit,

[53b] the method further comprising monitoring operating characteristics of the variable frequency drive,

[53c] wherein the monitored operating characteristics of the variable frequency drive include motor winding temperatures, the motor RPM, the voltage, the torque, and the current (amperage).

- Rusnak fails to disclose or render obvious monitoring “the torque.”
- Rusnak ***teaches against*** monitoring “the torque.”
- Instead, Rusnak teaches

“internally monitoring automatically output current and voltage of the VFD to the AC motor ***without the need for an external [torque] sensor.***”

EX-1007, ¶ [0005]; EX-2107, ¶ 126.

Source: Paper 29 at 11.

- Dr. Durham concedes that Rusnak's method does not require measuring the torque value.
- Rusnak thus teaches away from monitoring the torque.
- Rusnak thus does not disclose or render obvious monitoring "the torque."

19 So while Rusnak discusses selecting power
20 limits, in its embodiment it is not expressly
21 discussing measuring the torque value, as opposed
22 to setting power limits. Correct?

1 MR. WALTERS: Objection. Form.

2 A Correct. I can -- I can agree that
3 Rusnak's method does not require measuring the
4 torque value. It monitors it from the standard
5 performance curves and the Affinity relationships
6 based on speed.

EX-2108, 65:19-66:6

Source: Paper 29 at 11.

- **Proposed Claim 55** requires signaling switchgear from the centralized control unit, wherein signaling is transmitted over armored shielded CAT5E cabling.

Claim 55. (Proposed substitute for original claim 16) [55a] The method of [claim 15] claim 54, the emergency power off unit comprising an auxiliary power and switchgear, each coupled to the generator and the centralized control unit, the method further comprising

signaling the switchgear from the centralized control unit to open a breaker to substantially immediately cut power to the generator

[55b] wherein signaling is transmitted over armored shielded CAT5E

cabling.

Source: Paper 21 at A-9.

- Thompson fails to disclose or render obvious signaling the switchgear “wherein signaling is transmitted over armored shielded CAT5E cabling” for the same reasons discussed regarding Proposed Claim 46.

Source: Paper 29 at 6–7, 12.

- **Proposed Claim 44** requires monitoring operating characteristics of the hydraulic system, including “hydraulic oil level.”

[44d] wherein the monitored operating characteristics of the hydraulic system include at least system pressure, charge pressure, temperature, hydraulic oil level, and filter status.

Source: Paper 21 at A-4.

- Delaney fails to disclose or render obvious monitoring “hydraulic oil level” because Delaney is non-analogous art as discussed regarding Proposed Claim 50.

Source: Paper 29 at 6–7, 12.

- **Proposed Claim 58** requires monitoring and control of “transformers.”

Claim 58. (Proposed substitute for original claim 19) [58] The system of [claim 17] claim 56, wherein the centralized control unit is further configured to monitor and control all of the following: compression of natural gas, electric motors, switchgear, transformers, mobile turbines, rate and pressure of the overall system, vertical sand silos, and an electrical conveyor belt.

Source: Paper 21 at A-11.

- **Proposed Claim 58** requires monitoring and control of “transformers.”

Claim 58. (Proposed substitute for original claim 19) [58] The system of [claim 17] claim 56, wherein the centralized control unit is further configured to monitor and control all of the following: compression of natural gas, electric motors, switchgear, transformers, mobile turbines, rate and pressure of the overall system, vertical sand silos, and an electrical conveyor belt.

Source: Paper 21 at A-11.

- Coli does not disclose or render obvious monitoring transformers.
- Coli does not expressly discuss monitoring transformers.
- It would not have been obvious for Coli's system to monitor "the transformers" based on Coli or any ARs. EX-2107, ¶¶ 128–131.

Source: Paper 29 at 12.

