

|   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|---|-----|-------------|-----|-----------------|--------------------------|---------------|-----|---------------------|-----|-------------------------------------|------|-------------------------|-------|--------------------|---------------------------|----------------|------|------------------|-------|---------------|-------|--|--|
| <b>JOHN DEERE</b>   |     |             |     |                 |                          |               |     |                     |     | Format No:- AP04:460:10J            |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| <b>MATERIAL LABORATORY REPORT</b>   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Report No:- IF31902012  |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Part No/Part ID:  |     |             |     | 2065 / R 134979 |                          |               |     | Part Name           |     |                                     |      | Shaft Outer             |       |                    |                           | Date:          |      | 2019-02-04       |       |               |       |  |  |
| Qty   |     |             |     | 390             |                          |               |     | Customer:           |     |                                     |      | JOHN DEERE              |       |                    |                           | Batch Code     |      | E2B19054         |       |               |       |  |  |
| Furnace ID  |     |             |     | IF3             |                          |               |     | Quench Media/Grade: |     |                                     |      | HIGH QUENCH SA          |       |                    |                           |                |      |                  |       |               |       |  |  |
| Process Parameter   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| PARAMETRS   |     | CARBURIZING |     | DIFFUSION 1/2   |                          | HARDENING     |     | QUENCH OIL          |     | TEMPERING                           |      | Remark                  |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     | SET         |     | ACTUAL          |                          | SET           |     | ACTUAL              |     | SET                                 |      | ACTUAL                  |       | SET                |                           | ACTUAL         |      |                  |       |               |       |  |  |
| TEMP°C  |     |             |     | 920             |                          |               |     | 920                 |     |                                     |      | 840                     |       |                    |                           | 50             |      | 160              |       |               |       |  |  |
| TIME1 (Minute)  |     |             |     | 120             |                          |               |     | 100                 |     |                                     |      |                         |       |                    |                           |                |      | 120              |       |               |       |  |  |
| CP  |     |             |     | 1.05            |                          |               |     | 0.80                |     |                                     |      | 0.80                    |       |                    |                           |                |      |                  |       |               |       |  |  |
| 1) Raw Material:  |     |             |     | SAE8620         |                          |               |     | Steel Code:         |     |                                     |      | NA                      |       |                    |                           |                |      |                  |       |               |       |  |  |
| 1.1 Chemistry   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Elements (%) →  |     |             |     |                 |                          |               |     |                     |     | C                                   | Mn   | S                       | P     | Si                 | Ni                        | Cr             | Mo   | V                | Al    | B             | Cu    |  |  |
| Min   |     |             |     |                 |                          |               |     |                     |     | 0.18                                | 0.70 | -                       | -     | 0.15               | 0.40                      | 0.40           | 0.15 | -                | --    | -             | -     |  |  |
| Max   |     |             |     |                 |                          |               |     |                     |     | 0.23                                | 0.90 | 0.04                    | 0.035 | 0.35               | 0.70                      | 0.60           | 0.25 | -                | -     | -             | 0.35  |  |  |
| Observation   |     |             |     |                 |                          |               |     |                     |     | 0.19                                | 0.85 | 0.014                   | 0.016 | 0.26               | 0.41                      | 0.56           | 0.15 |                  | 0.027 |               | 0.020 |  |  |
| 1.2 Inclusion Rating :<br>(Worst Field Rating)  |     |             |     |                 |                          | Specification |     |                     |     | Type →                              |      |                         |       | A                  |                           | B              |      | C                |       | D             |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | T/H                                 |      |                         |       | Max                |                           | 3/2            |      | 3/2              |       | 1/1           |       |  |  |
|   |     |             |     |                 |                          | Observation   |     |                     |     |                                     |      |                         |       |                    |                           | 1.50/-         |      | 1.0/-            |       | 1.0/-         |       |  |  |
| 2) Heat Treatment: JDV2 HT10T per JDV 21-Case carburised, hardened & tempered                       |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | 2.1 Hardness                        |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | Location                            |      |                         |       | Specification      |                           |                |      | Observation      |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | SURFACE                             |      |                         |       | 58-62 HRC          |                           |                |      | 60/61            |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | Core at RCD                         |      |                         |       | 30-42 HRC          |                           |                |      | 40               |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | At machine area                     |      |                         |       | 79 min,HRA         |                           |                |      | NA               |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | 2.2 Effective Case Depth at 515 HV1 |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | Location                            |      |                         |       | Specification (mm) |                           |                |      | Observation (mm) |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | Spline at RCD                       |      |                         |       | 0.30 Min.          |                           |                |      | 0.84             |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     | At machine area                     |      |                         |       | 0.50 min.          |                           |                |      | 0.82 B/G         |       |               |       |  |  |
| 2.3 Hardness traverse in Hv (Distance from surface)   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| in mm   | 0.1 | 0.2         | 0.3 | 0.4             | 0.5                      | 0.6           | 0.7 | 0.8                 | 0.9 | 1.0                                 | 1.1  | 1.2                     | 1.3   | 1.4                | 1.5                       | 1.6            | 1.7  | 1.8              | 1.9   | 2.0           |       |  |  |
| →   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| PCD   | 728 | 720         |     |                 |                          |               |     | 529                 | 494 |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| RCD   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| 2.4 Microstructure: Inspect as per JDV21  |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Microstructure Photographs  |     |             |     |                 | Location                 |               |     |                     |     | Specification                       |      |                         |       |                    | Observation               |                |      |                  |       |               |       |  |  |
| 500x  |     |             |     |                 | Case                     |               |     |                     |     | Fully Tempered Martensite R.A       |      |                         |       |                    | Fully Tempered Martensite |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 | Case                     |               |     |                     |     | T.M.R.A.<25%                        |      |                         |       |                    | T.M+R.A.5-10%             |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 | Carbides Network         |               |     |                     |     | Nil                                 |      |                         |       |                    | Nil                       |                |      |                  |       |               |       |  |  |
| 200x  |     |             |     |                 | % ITP at Surface         |               |     |                     |     | Nil                                 |      |                         |       |                    | Nil                       |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 | 5% Depth of ITP at PCD = |               |     |                     |     | ECD/2                               |      |                         |       |                    | NA                        |                |      |                  |       |               |       |  |  |
|   |     |             |     |                 | RCD                      |               |     |                     |     | 0.15 MIN,                           |      |                         |       |                    | 0.24                      |                |      |                  |       |               |       |  |  |
| 500x  |     |             |     |                 | RCD                      |               |     |                     |     | <25                                 |      |                         |       |                    | 16                        |                |      |                  |       |               |       |  |  |
| 500x  |     |             |     |                 | Core                     |               |     |                     |     | L.C.M,+BAINITE                      |      |                         |       |                    | L.C.M+Bainite             |                |      |                  |       |               |       |  |  |
| Magnetic Particle Inspection  |     |             |     |                 | No Crack Allowed         |               |     |                     |     | 5 part/lot                          |      |                         |       |                    | No Crack Found            |                |      |                  |       |               |       |  |  |
| *- In case RA is more than 25%, check Hardness(with 100 gm load) at 0.1 mm it should be 58 HRC Min. |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Disposition:- ACCEPTED  |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Remarks :- OK   |     |             |     |                 |                          |               |     |                     |     |                                     |      |                         |       |                    |                           |                |      |                  |       |               |       |  |  |
| Checked by :-   |     |             |     | Anuj Kumar      |                          |               |     | Verified by :-      |     |                                     |      | Chandrpal singh ranawat |       |                    |                           | Approved by :- |      |                  |       | Ravindra kale |       |  |  |