Department Audit Summaries

Facilities involved with the fabrication of A354 Grade BD anchor rods – SAS Contract

Caltrans

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Anchor Rod Facility Audits

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program
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August 24, 2007

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-000487

Michael Flowers
Project Executive
American Bridge/Fluor Enterprises, a JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Department Audit of Dyson Corporation

The Department has reviewed ABF letter 257, dated August 14, 2007, and the "Corrective Action Request" from the Dyson Corporation, dated August 09, 2007. Based upon the information provided and in accordance with Special Provisions section 8-4, "Audits," the Dyson Corporation receives a "Pass" for the Department audit. This "Pass" applies only to the Dyson Corporation. Suppliers and subcontractors to the Dyson Corporation are subject to separate MFSQA reviews and audits. The following table summarizes the current status of associated audits:

Company	Letter No.	Date of Notice	MFSQA	AUDIT
AAA Galvanizing	321	06-18-2007	Approved	
Art Galvanizing	336	06-22-2007	Approved	
	403	07-25-2007		Contingent Pass
Central Testing Lab	320	06-18-2007	Approved	
	413	07-26-2007		Fail
Custom Industrial Processing	325	06-18-2007	Not Approved	
Industrial Coatings Inc	444	08-06-2007	Approved	
Mechanical Galv-Plating Corp	361	07-05-2007	Approved	
	432	08-02-2007		Pass
North American Galvanizing	337	06-22-2007	Approved	
	421	07-31-2007		Fail
Stork Herron Testing Lab	297	06-06-2007	Approved	
	417	07-30-2007		Contingent Pass
TC Industries	367	07-09-2007	Approved	
Tensile Testing Metallurgical Lab	296	06-06-2007	Approved	
	409	07-26-2007		Pass
Universal Galvanizing	338	06-25-2007	Approved	

The Contractor is reminded that work may not proceed at the facilities receiving a "Contingent Pass," until the outstanding issues detailed in the Department's letters have been addressed.

If you have any further questions, please contact Gary Lai at the Working Drawing Campus.

Sincerely,

GARY PURSELL
Resident Engineer

cc: Rick Morrow
Mazen Wahbeh

file: 05.03.01, 55.0097

July 23, 2007

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

Office of Structural Materials (OSM) Audit of Dyson Company.

OVERVIEW

The Dyson Company successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on April 13, 2007, per Special Provisions section 8-4.01. The Department audited Dyson facilities on July 10, 2007. Present during the audit were representatives of OSM: Mr. John Kinsey, CALTRANS Senior Level III, and Mr. Markian Petrina, Structural Materials Representative; and representatives of American Bridge/Fluor, a Joint Venture (ABF): Mr. Dan Radu, ABF Steel Fabrication Manager and Mr. Charles Kanipicki, P.E., ABF Quality Control Manager. Representing the fabricator was Mr. Steve Marsh, Dyson Quality Assurance Manager.

DISCUSSION

The audit opened with opening remarks by Mr. Kinsey, who explained the function of OSM and the purpose of the audit. Mr. Marsh then provided a brief history of the Dyson Company. For more than a century (founded in 1884, according to Dyson promotional materials), Dyson Company has been producing fasteners for various purposes. Following a 1992 bankruptcy, Mr. Ted Wolfe, Sr., became the principal owner; various family members now occupy important positions within the company, including Mr. Ted Wolfe, Jr., General Manager; Ms. Kristin Wolfe, Sales Manager.

As constituted today, Dyson is comprised of four divisions:

1. Dyson Rod, the division of primary interest for this audit, which produces large-diameter anchor rods, primarily for the wind turbine market;
2. Dyson Fork, which produces lift truck forks;
3. Dyson, the division of secondary interest for this audit, which produces forgings and large fasteners;
4. Dyson Dependable, which fabricates ASME-certified fasteners and materials for stringent-specification military and nuclear applications.

According to Mr. Marsh, the distinction between the four Dyson divisions is largely administrative: equipment and the approximately 100 employees are shared between the four divisions interchangeably.

Apart from these divisions, Dyson purchased Texas Bolt & Nut out of bankruptcy. Texas Bolt is currently a distribution point for fasteners, particularly nuts, as well as stud production. Texas Bolt deals heavily with overseas business.

Following his historical and organizational summaries, Mr. Marsh described the process for material handling. He stated that material is often prequalified through mill certification (mill cert) review, eliminating the need for receiving inspectors to verify the suitability of raw material, primarily rod, for intended purpose. Mr. Marsh clarified by stating that only the mill certifications were pre-qualified for appropriate chemical and mechanical characteristics. Certifications are kept on record between one and seven years, typically leaning toward the longer period. Mr. Marsh explained that retention of records is to assist with Dyson's internal traceability.

Mr. Marsh also elaborated on the fact that records are maintained for longer periods in association with what he called "semi-finished" products, particularly A 325 bolts. A variety of material is forged and heat treated, then sent into stock as blanks. It is kept in storage, after which it is wheel abraded and finished. OSM auditors saw this material in storage bins during the tour. A significant proportion of such "semi-finished" product was heavily corroded (Picture 1) and covered with large amounts of rust; Mr. Marsh stated that the rust would be made irrelevant by machining down heavily-corroded bolt shafts and wheel-abrading corroded bolt heads. OSM did not observe any such operations.

Orders of raw materials are based on ASTM requirements, and any special requirements from a given contract. When those are determined, the manufacturing sequence is adapted to satisfy each situation. The customer is then provided the manufacturing sequence and any customer hold points are included in the process.

According to Mr. Marsh, ASTM A 354 BC and BD fasteners undergo full-size testing, i.e., full-diameter cross-section, as opposed to coupons machined from sampled fasteners and rods, as well as coating certification. Although Dyson does not have certified nondestructive testing (NDT) personnel, when the customer requests, Dyson personnel perform informal MT, particularly on the outside elbows of bent rods.

Mr. Marsh informed OSM auditors that NDT where it is part of the specification, such as for A 490 bolts, is sent to outside laboratories with qualified NDT personnel. For A 490 bolts, Dyson's preference is magnetic particle testing (MT). Stork-Herron laboratories, which was also audited on this trip (mechanical testing: pass; NDT: contingent pass; please see relevant report), was specified as the NDT laboratory with full capabilities for MT and liquid penetrant testing (PT). Mr. Marsh also mentioned Ultralabs, Inc., which he states are NADCAP-qualified and are capable of MT, PT, and radiographic testing (RT; RT is not relevant to Dyson's work for ABF).

Mr. Kinsey informed Mr. Marsh that if Dyson wishes to have NDT performed at Ultralabs, they must submit an MFSQA and be audited by the Department before being acceptable on the project; Mr. Marsh indicated that he would consider this, although he believed that Stork-Herron would be capable of handling any NDT by themselves, as NDT requirements are expected to be minor for relatively small orders of A 490 bolts,.

Rotational capacity (ro-cap) testing was also discussed. Mr. Marsh indicated that Dyson was seriously considering the purchase of a large, automated ro-cap machine manufactured by Skidmore, the primary manufacturer of ro-cap equipment. According to Mr. Marsh, this machine is superior to human testing on a standard, manual Skidmore because the automated machine holds a constant force and there is no start-and-stop associated with manual machines.

However, according to Mr. Marsh, apart from hardness, threading, and rotational capacity, all other tests, such as wedge testing, are farmed out to laboratories. Mr. Marsh mentioned laboratories in Pittsburgh (name not provided) that is capable of testing large A 354 BD rods whose testing requirements exceed the 400 kip capacity that Mr. Marsh says is possessed by Stork-Herron. However, Mr. Marsh believed that it will not be necessary to employ the Pittsburgh laboratory. It is believed by Dyson that facilities in the Cleveland area will be adequate for fasteners and shorter rods.

For galvanizing, North American Galvanizing (audited on this trip: Fail) and The Art Galvanizing (also audited on this trip: Conditional Pass). North American was characterized as Dyson's large-capacity galvanizer, while The Art is for smaller orders, and Mr. Marsh spoke positively about The Art's capabilities.

Mr. Kinsey discussed special requirements for galvanizing with Mr. Marsh, including the Department's prohibition of stripping/re-dipping material with inadequate galvanizing, as well as the requirements for blasting A 354 BD material as opposed to pickling, prior to galvanizing. Mr. Marsh expressed familiarity with the A 354 BD requirements, and indicated that this would be part of Dyson's purchase order for galvanizing. He also indicated that galvanizers would be informed that stripping/re-dipping would not be permitted.

In response to Mr. Kinsey's question about Dyson's ability to verify the work of galvanizers, Mr. Marsh indicated that Dyson has no capability for testing galvanizing thickness. Dyson was not anticipating such a requirement, and Mr. Marsh indicated that it would be something examined by Dyson management in light of OSM's emphasis that Dyson, not the subcontractor, was accountable for the proper thickness of coating on all fasteners.

In addition, OSM and ABF discussed the possibility of anchor rods being painted. Mr. Kinsey indicated that should this course of action be chosen, Dyson would be responsible for ensuring that whoever paints the rods must be certified.

Mr. Marsh expressed willingness to work with CALTRANS to perform sampling. He stated that Dyson is accustomed to such practices from what Mr. Marsh characterized as frequent previous work with the Pennsylvania and Missouri Departments of Transportation.

The necessity for ensuring lot and heat segregation was emphasized by Mr. Kinsey. Mr. Marsh indicated that his inspectors are not aware of "preapproved" mill certs, and that only Mr. Marsh and his Assistant QA manager, Ms. Diane Smith, are aware of this fact. Mr. Marsh also indicated that lots are physically separated to prevent mixing, and Dyson understands segregation to maintain integrity. Dyson's tracking system has a randomly-generated three-letter code for each separate purchase order. If more than one container is needed for an order, a number is added to the three-letter identifier, as shown in Picture 1.

Heat treatment was also discussed. Mr. Marsh indicated that Dyson is capable of heat treating rods up to approximately 12 feet in length; the longer rods required for the contract, some of them 30 to 40 feet long, will be shipped to T.C. Industries in the Chicago area. Mr. Marsh indicated that T.C. Industries will be capable of handling such lengths of rod.

As for shipment of product, Mr. Marsh indicated that this is a function of the product itself, taking into account fragility and coatings. Long rods will be burlap-wrapped and banded with metal strapping and sent on flatbed trucks. Dyson does possess shrink wrap capacity. Fasteners will be in cardboard half-keg boxes attached to pallets with nylon webbing. Mr. Marsh stated that no problems were encountered with shipment of fasteners to the Tacoma Narrows project in Washington. Preassembly of parts may be done if indicated in the contract, although Mr. Radu and Mr. Marsh pointed out that it is not standard practice to assemble mechanically-galvanized parts.

Mr. Radu indicated that ABF will not permit winter shipment, and that most products will be contained in enclosed trailers, and his confidence in Dyson's good record for shipping. Mr. Kinsey emphasized that Dyson is responsible for its vendors' methods.

Dyson is reports normal production capability of attaining hardness within ±2 on the Rockwell C scale. If a closer tolerance than ±2 is required, smaller lots and more careful monitoring is required. Mr. Marsh indicated that the maximum limit is generally on tensile strength, not hardness, and that the tensile requirements are generally adequate if the proper hardness is met. According to Mr. Marsh, subcontractors are held to the same standards that Dyson applies to itself.

When inspection was discussed, Mr. Marsh indicated that all required testing will be documented, including mechanical testing from suppliers, who will have to prove conformance to contract requirements as ordered by Dyson.

Mr. Marsh also indicated that Dyson has three inspectors. None of these inspectors are qualified to SNT-TC-1A standards for visual inspection. Mr. Marsh expressed a high degree of

confidence in his chief inspector, who performs calibrations and has been with Dyson for more than 20 years. The chief inspector's assistant has been with Dyson for approximately 6 months, and has previous forging experience and OSM was told also has a solid understanding of the process. The floor inspector is still learning his duties, and performs "spot" inspections at various places in the shop; Mr. Marsh indicated that although he is tested and qualified to Dyson's internal standards, the floor inspector's skills are in a state of being improved.

Ms. Debbie Smith, Mr. Marsh's personal assistant, holds the title of Assistant QA Manager and is not an inspector. Ms. Smith's functions are administrative in support of Mr. Marsh's duties as QA Manager, and she also reportedly handles some of the mill cert prequalification for incoming material. On the day of the audit, Ms. Smith was on scheduled vacation.

Mr. Kinsey discussed the METS green tag and orange tag processes for releasing material. It was emphasized to Dyson that METS must be given the opportunity to inspect material before it is released between facilities for various parts of the work.

During the course of the conversation Mr. Marsh stated that he is a part-owner of the Dyson Company. He expressed no concern about this possibly affecting his judgment as QA Manager. Mr. Marsh stated that he believed his part-ownership strengthened his desire for quality as someone directly concerned with the company's reputation.

During a tour of the Dyson Company facilities, the following areas were seen:

- Receiving
- Holding Area
- Forging and Bolt Production
- Heat Treatment
- Machining
- Inspection
- Nut Lubrication
- Shipping

Receiving

In the receiving area (Picture 2), it was noted that many pieces of rod and steel ingot stock rested on the ground (Picture 3), and a number of pieces had no traceability (Picture 3). The receiving clerk appeared unfamiliar with the concept of traceability, and indicated that the unmarked random pieces of stock were "never thrown away" and had "been here forever." He was not able to provide a link between this material and documentation. There was also no checklist, chart, or book for the receiving inspector to examine the material to certain specifications.

In response to Mr. Kinsey's question, the receiving inspector remarked that he had never seen the need to reject material. Both he and Mr. Marsh spoke repeatedly of "hardware" review, of the actual product, as opposed to "software" review, of the computerized certifications; the link between the two appeared tenuous at best on the material receiving end.

The receiving inspector remarked that if the heat number is mismarked or illegible, it is not a reason to reject. If the chemsistry and steel grade are correct, the material is accepted. Customer (Picture 4) and Dyson (Picture 5) tags on stock material identify most material.

Stock material, which OSM was told could be kept for many years, is kept in an area separate from immediate-use (1-2 weeks) material. The Dyson standard for straightness is one-eighth (1/8) inch distortion per five (5) feet of length, although numerous bundles were observed with visible "snaking" distortion, as well as large bends (Picture 6).

The receiving inspection is part of the forge shop, and not a QC function. QC appears to have little day-to-day contact with receiving and material actually stored in the stock yard.

Mr. Kinsey requested to verify the documentation on a randomly-selected bundle of rods (Picture 7). Dyson personnel were able to produce satisfactory records in a reasonable amount of time.

Holding Area

In the holding area, numerous bins of material were observed. One bin had no identification tag. Mr. Marsh was unable to identify this material. The bolts appeared to be ASTM F 568M. Mr. Marsh questioned one of the forge workers in the area; this individual identified the material to Mr. Marsh with what appeared to be a high level of confidence.

All other bins observed in this area by OSM, many of which contained similar F 568M bolts awaiting threading, were properly marked. However, many of the travelers appeared to be dirty and in some cases illegible. Mr. Marsh pointed out that there were duplicates in each envelope for such an eventuality. However, the second (clean) copy was not necessarily the version that was updated by production personnel.

Forging and Bolt Production

OSM observed forged materials, particularly large nuts. The forging ovens are depicted in Picture 8. Mr. Marsh initially stated that large nuts were completely identified by heat number; however, none such was found. Mr. Marsh later amended his statement to say that there will be no heat number added until after heat treatment. A picture of the nuts appears in Picture 9.

In addition, OSM observed the manual process of producing A 325 bolts (Picture 10). The bolt shafts were heated three at a time in an oven. A worker manually removed each shaft, inserted it into a press, and the head was forged on the shaft by four impacts. The bolts were then placed into a large holding bin. They subsequently move on to machining for threading.

The foreman's office is in the middle of the forging and bolt production area. There are no standards or specifications kept in the office. These are maintained in the inspection office.

In the outdoor storage area for what Dyson classifies “semi-finished” product, headed but unthreaded bolts await finishing. As previously mentioned, it was noted that many of these products (Picture 11) are heavily corroded, and Mr. Marsh indicated that the corrosion would be machined or abraded away,

Heat Treatment

The heat treatment area is one of the largest at Dyson. Dyson states that they have four temperature-surveyed, calibrated ovens in operation, along with a 12,000 gallon oil quench bath, and a 6,000 gallon water and synthetic oil quench bath.

Dimensional verification before heat treating is carried out by heat treating production personnel. The method for tracking verifications is apparently on a written record (Picture 12). It appears that Dyson does not have a method for marking tubs or buckets that have been checked. Mr. Kinsey remarked that soapstone is frequently employed by other facilities for such checks, but Mr. Marsh did not seem to regard the effort required for such tracking as worthwhile.

OSM observed ovens in operation, and inspected temperature records. It appears that temperature recording paper is not placed in the strip-chart recording thermometer at any consistent time. They are not replaced at midnight for the “next day,” but sometime between the end of the third (overnight) shift, which ends at 6 AM, and the first few hours of the first (day) shift (Picture 13).

OSM auditors observed that one of the strip charts appeared to be for the previous day. It transpired that the oven for which it was recording was down for maintenance, although this was not clearly indicated anywhere (Picture 13). In addition, the short-term “filing system” for recent graphs, some as old as two weeks, was under the desk blotter on the shift supervisor’s desk. Older graphs were filed in a drawer of the desk.

Mr. Kinsey pointed out these shortcomings in oven record keeping to Mr. Marsh. Mr. Marsh readily acknowledged these shortcomings and expressed willingness to correct them.

In the heat treatment area, OSM auditors observed a bin of nuts with no traceability paperwork. Neither Mr. Marsh nor the workers in the heat treatment area were able to identify these items, and no records were produced to explain their traceability by the end of the OSM tour approximately two hours later.

Except for the above instances, the heat treatment appeared to be organized and systematically run. The workers appeared to know their duties, and took care to insert and remove fastener components at the proper time from ovens (Picture 14). Picture 15 shows the heat treatment tracking method for various fastener lots.

Machining

In the machining area, OSM auditors observed numerous machine operators at lathes milling, threading, and tapping fasteners in various stages of completion. Mr. Marsh made a point of informing the auditors of the machine operators' numerous "in process" checks to ensure that the material was being properly made. However, upon closer examination, it appeared that many of the machine operators were relying exclusively on personally-owned calipers, which are not calibrated by Dyson. Dyson did indicate on their MFSQA that such personally-owned measurement equipment was used on the floor. On the audit, it was discovered that this was virtually the only in process measuring equipment for bolt manufacturing.

In one instance, OSM auditors found threaded rod where each piece was not marked. Identification of the group would have been obliterated by machining, because the bars were marked where thread would be cut.

With the process currently in place, there is no formal check on fasteners as they are machined, except by the production personnel. Dimensional problems would not be discovered until after heat treatment. However, Mr. Marsh stated that since it had never been a problem previously, he did not regard it as an item of major concern.

Inspection

The Dyson inspection team has an office near the shop floor. The chief inspector and assistant inspector have fasteners brought to them, although they often perform shop floor inspections as well. A third inspector does not sit in the office; he walks on the shop floor, randomly checking various processes. It was not clear where this individual sits, and where he prepares his reports, if any; OSM auditors did not meet this individual.

Threading "go/no-go" gauges are the most commonly-used (Picture 16). These are calibrated every year, although Dyson has an in-house one-month "grace period." This means that a six-month cycle is in reality seven months. The inspectors assured OSM auditors that the more frequently needed threading gauges are spot checked quite often, although this is not necessarily logged. However, this left open the issue of other measuring devices, such as calipers. Mr. Marsh remarked that standards do not prohibit a 30-day grace period, and that no one has ever questioned this practice before.

Calibration cycles are tracked on a spreadsheet, and printed out monthly. The printout indicated that a piece of equipment was due for calibration on June 5. This was moved to August 5 by the assistant inspector because the June 5 date was an error. Other than his own knowledge of the situation, there appeared to be no documentation to support this change.

Representative samples are drawn from production material. Dyson personnel are aware of, and have access to, ASTM F 1470 for sampling. According to Mr. Marsh and his inspectors, however, the number of samples is always provided by the client.

Standard final inspection procedure is to deburr, wash, sample, and inspect fasteners. Sample testing records are maintained for each lot on a sheet filled in by hand. Either the chief inspector or her assistant enter the ASTM or other specifications required for each lot of bolts. They then inspect bolts for dimensions and threading either on the shop floor or in their office. When they are in their office, the samples are apparently pulled and brought in by production personnel.

Mr. Marsh also demonstrated the optical comparator (Picture 17) and standard Brinnell hardness machine, as well as magnetic particle testing (MT) equipment (Picture 18). Although no one is qualified to ASNT standards for MT, Mr. Marsh indicated that he believes that Dyson personnel have sufficient knowledge of the procedures to satisfy Dyson and customers that the elbows of bent rods are acceptable.

Dyson has a standard Skidmore rocap testing machine (Picture 19). As previously discussed, Dyson intends to buy an automated, computerized rocap machine (brochure, enclosure). Dyson intends to perform all rocaps for SAS project A 325 galvanized bolts in-house.

Mr. Marsh also stated that any testing that his personnel are not qualified to perform for the record are sent to local laboratories. Turnaround is reportedly two to three days in most cases.

Nut Lubrication
In the nut lubrication area, OSM auditors viewed baths and baskets of nuts (Picture 20a). The baths consist of what Dyson describes as standard nut lubrication base fluid (Picture 20b) and admixtures. The fluid is periodically and automatically agitated.

Dyson Company is one of the few nut manufacturers who are able to lubricate just the inside face and threads of a nut. OSM auditors were shown the machine.

Shipping
OSM auditors reviewed shipping methods and procedures. Material was stacked in an orderly fashion, and appeared to have necessary accompanying paperwork (Picture 21).

Related Observation
Of note, OSM auditors visited three testing laboratories and three galvanizing facilities associated with Dyson during the trip that began at Dyson. Most of the facilities reported limited contact with Dyson, and Dyson had not actually audited any of these facilities. Mechanical Galv-Plating (MGP), submitted as a potential mechanical galvanizer, reported that Dyson had essentially severed their business relationship for upwards of a year, apparently due to cost decisions on Dyson's part, before asking MGP to fill out an MFSQA. MGP reports that during their extended association with Dyson, no one from the bolt manufacturer has visited their facility.

Information and requirements specific to the contract were not relayed to subcontractors by Dyson. Dyson answered "No" to Section M, item 10, "Did the manufacturer verify that all the

Secondary Processors have detailed QC plans and that they are certified to the QS 9000 standard?" Dyson's response implies that the only shortfall expected is in the area of QS 9000.

Dyson stated that suppliers are "well experienced and well-qualified" and that Caltrans visits and audits at "selected suppliers" have assured Dyson that "[Dyson is] capable of qualifying only those suppliers who can satisfy our and Caltrans quality expectations." Of the six Dyson subcontractors visited to date, only two received an unqualified passing grade: Tensile Testing Laboratories, and Mechanical Galv-Plating, which, as mentioned, has had no business contact with the latter for more than a year.

Dyson answered also responded "Yes" to Section M, item 11, "Have all the Secondary Processors (including zinc coating processors and heat treaters) been audited by the fastener manufacturer to verify compliance with Quality Control requirements?" The OSM audit of these facilities showed that this was not the case. Few of these facilities had the necessary Contract Documents (Standard Specifications and Special Provisions) and none were conversant with the requirements.

Two of the six Dyson subcontractors, North American Galvanizing (a major supplier), and Central Testing Laboratory have failed their audits for significant quality shortfalls. North American for material traceability, Central Testing for inadequate QC controls. Two others have received only a Contingent Pass: The Art Galvanizing for deficient QC, and Dyson's NDT laboratory, Stork-Herron, for significant NDT program shortfalls. This means that only two of six Dyson-submitted facilities satisfied contract requirements.

Exit Briefing
Several items were discussed with Dyson as items of concern that would be specifically mentioned in the audit report. MFSQA sections:
N, item 1. Receiving inspection is not adequate for reasons noted above.
N, item 6. Unidentified material in the storage yard requires guesswork as to origin and provenance; this must be corrected.
N, item 7. Material is in contact with the ground in the storage yard.
D, item 3. Written procedures are not put into practice.
Q, item 3. Strip charts are not well-organized and stored, and dates are inconsistent.
R, item 3. Calibration procedures are not consistent with industry standards, particularly with the 30-day "grace period."

In addition, during this time Dyson informed OSM and ABF that Technical Stamping will be the supplier for hardened F 436 washers. OSM indicated that Dyson should expect this facility to be audited.

FINDINGS

Dyson has not audited their subcontractors; in fact, Dyson's contact was arm's length. At least one facility reported no formal business association with Dyson for more than a year prior to the SAS project.

OBSERVATIONS

- Traceability is not completely reliable. Instances of material with questionable or no traceability were found both in the stock yard and on the shop floor.
- The receiving inspection is more check-in than inspection, and the receiving inspector is not well-versed in traceability. The receiving inspector indicated that in his four months in that position, he had never rejected any material because "it all complies."
- Material storage and handling shortfalls include: rod material without marking or documentation, rods twisted in storage piles, and substantial bending/bowing of material during storage and handling.
- Temperature record graphs for heat treating ovens are not consistently maintained.
- Machine operators rely almost exclusively on personal measuring equipment that is not calibrated or audited by Dyson.
- Dyson testing equipment is formally calibrated once per year, albeit with a 30-day "grace period," both of which (particularly the grace period) OSM finds questionable.
- Determination of production success in attaining necessary specifications is deferred until after heat treatment; in some cases, absence of negative customer feedback about product dimensional quality was cited as justification.
- Mr. Marsh, the Dyson Quality Assurance Manager, indicated that he is a part-owner of the Dyson Company.

RECOMMENDATIONS

- High-strength fasteners (A 325 and A 490) should be made fresh, not out of stored material, to ensure soundness. The "semi-finished" material was stored outdoors and was observed by OSM auditors to be, in many instances, heavily corroded.
- Require approval, in the form of a submittal, for the automated rotational capacity testing machine that Dyson intends to procure for this project.
- Dyson should ensure that all Dyson suppliers have necessary SAS documents and that they are conversant with requirements set forth by the contract.
- Dyson should have contingency plans for ensuring that product is supplied in a timely fashion should Dyson rely on galvanizers' certificates of compliance, if the galvanizing falls short of requirements.

ACTION ITEMS NOT OTHERWISE MENTIONED

- ABF should provide Dyson with Standard Specifications, Conformed Special Provisions, and (at ABF's discretion) contract drawings.

- Dyson should submit an MFSQA for Technical Stamping, Chesterfield Township, MI, the F 436 washer supplier, to ABF. OSM will schedule an audit when this MFSQA has been reviewed and accepted.

CONCLUSION

In the event that Dyson Company is considered for high-volume production of A 325 and A 490 bolts, Dyson's capacity for producing high-strength bolts should be closely reviewed in relation to that of larger manufacturers. Non-automated production methods in some areas may limit Dyson volume capabilities.

OSM recommends that the Dyson Company should be considered a **Contingent Pass.** The following issues need to be addressed to receive a passing grade:

- Traceability;
- Receiving procedures;
- Material storage and handling deficiencies;
- Calibration and improvement of record-keeping for calibrated instruments and process documents;
- Demonstration of proper tracking and auditing of requirements for subcontractors in accordance with Section M of the MFSQA.

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

Document Number CAL 00

ILLUSTRATIONS (Pictures 1-21)

Picture 1. Unique, randomly-generated Dyson three-letter codes identify jobs; a numerical suffix as shown indicates a job consisting of more than one bin.

Picture 2. The Dyson Company storage yard has several aisles. Stock consists mainly of rods of various lengths and thicknesses, along with ingots for forging.

Picture 3. Numerous pieces of raw material were found on the ground in the Dyson Company storage yard.

Picture 4. Customer material tags provide information for receiving.

Picture 5. Dyson material tags are attached to stock material awaiting disposition. No 3-letter order identifier is assigned until material is associated with an order.

Picture 6. Closeup of the Dyson Storage Yard shows twisted (a) and bent (b) rod stock.

Picture 7. Randomly-selected material was chosen for record verification.

Picture 8. Dyson Company forging ovens are in the main facility.

Picture 9a. One of Dyson's specialties is large forged nuts.

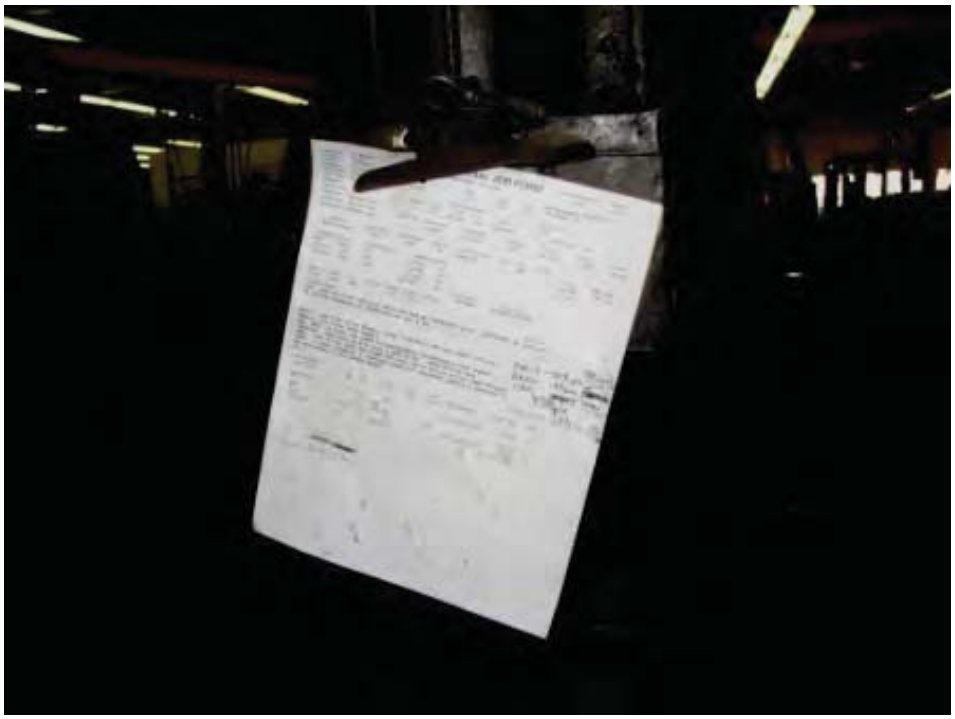
Picture 9b. Closeup of a large forged nut shows the unique three-letter job identifier and The Dyson marking. Heat numbers are added after heat treatment.

Picture 10a. A worker produces A 325 high-strength bolts at Dyson Company. Note the shaft heating oven (circled). After the shaft reaches the necessary temperature, the worker manually holds each shaft in a press, where a hex head is attached to the shaft.

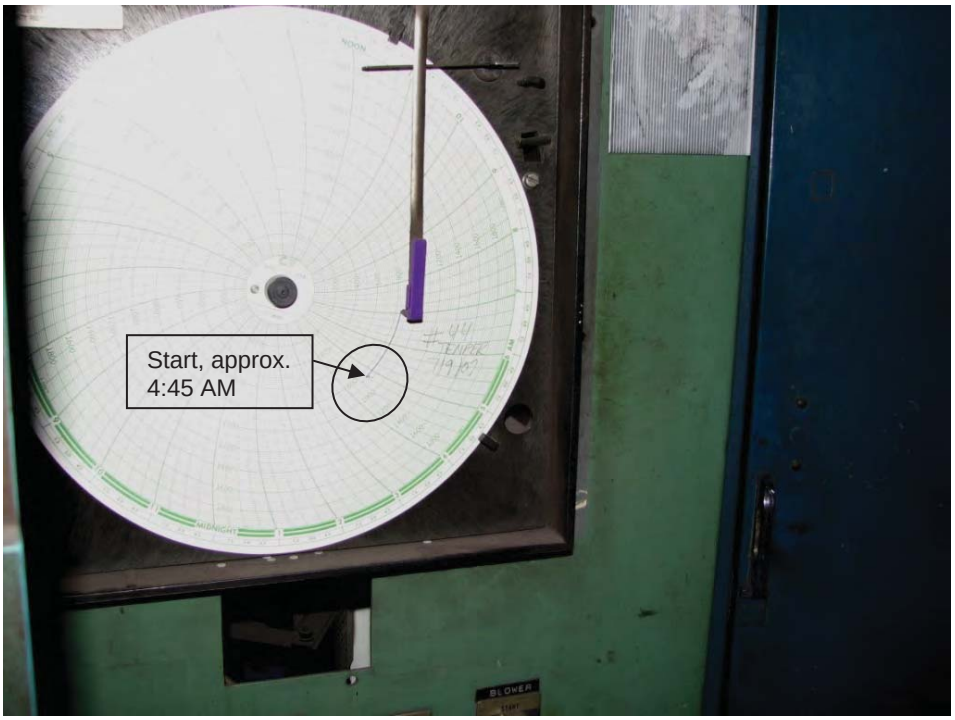
Picture 10b. A 325 bolts with heads attached await milling and threading.

Picture 11a. “Semi-finished” material that is stored outdoors at Dyson Company.

Picture 11b. A close-up view of 11a, showing heavy corrosion (circled).

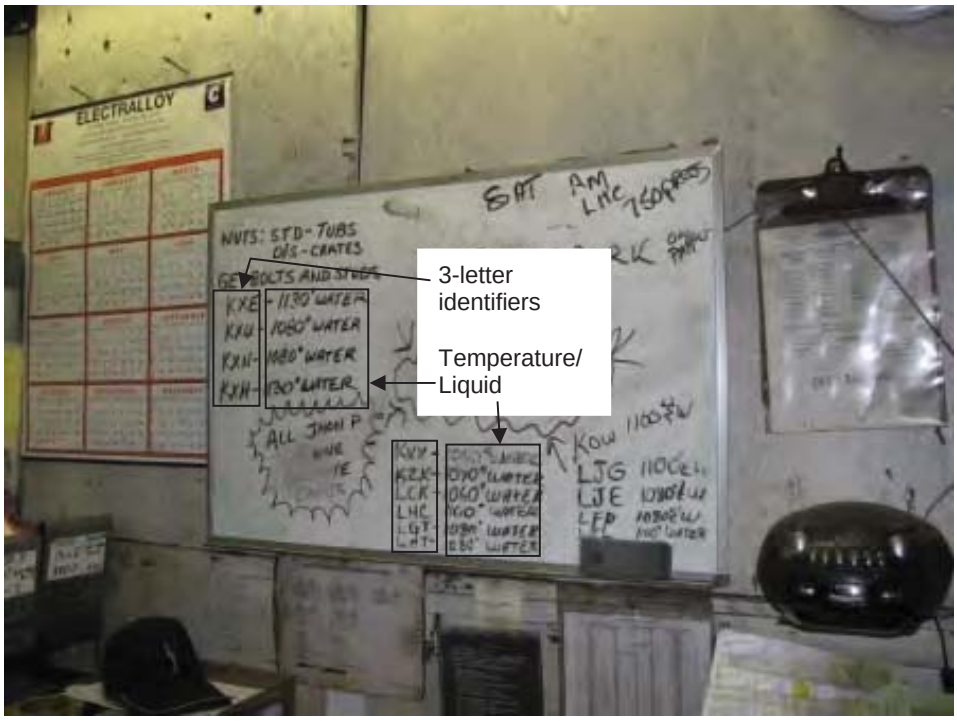


Picture 12. A tracking chart in the Dyson Company heat treating area shows various production operations.



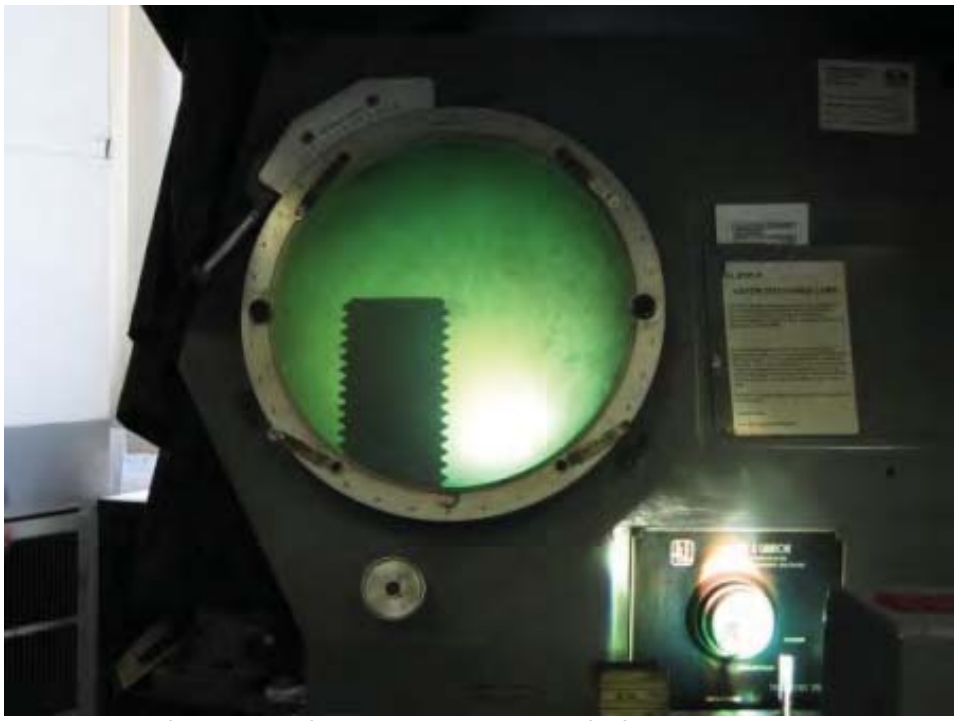
Picture 13. This strip chart is one day behind the actual date. Chart recording was stopped because the oven it monitored was shut down for maintenance, which is not clearly indicated. Recording for 7/9/07 starts at approximately 4:45 AM on 7/9/07(circled), not at midnight.

Picture 14. Dyson Company heat treating ovens operate on three shifts.



Picture 15. Dyson Company heat treatment tracking board shows 3-letter job codes and temperatures/liquids for heat treatment.

Picture 16. Dyson Company “go/no-go” gauges hang in the inspection office.



Picture 17. The Dyson Company optical comparometer displays bolt profiles for measurement.

Picture 18. Dyson Company wet magnetic particle testing (MT) equipment, including black light, is primarily to spot-check bent-rod elbows for cracks.

Picture 19. The Dyson Company Skidmore rocap testing machine may soon be replaced by a computerized, automated version.

Picture 20a. The Dyson Company lubricates most nuts by dipping them into a bath.

Picture 20b. Dyson's lubricant bath consists of an industry standard base fluid produced by Castrol, combined with admixtures.

Picture 21. Labels and packing lists appear on boxes in the Dyson Company shipping area.

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program
333 Burma Rd.
Oakland, CA 94607
(510) 622-5660, (510) 286-0550 fax

Flex your power
Be energy efficient!

October 18, 2007

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-000706

Michael Flowers
Project Executive
American Bridge/Fluor Enterprises, a JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Department Audit - Art Galvanizing Works

The Department is in receipt of ABF-CAL-LTR-000271, dated August 29, 2007, responding to the Department's review of Submittal ABF-SUB-000160R00, MFSQA for Art Galvanizing Works. Based upon the information provided, Art Galvanizing Works is receiving a Pass. The following issues must be satisfactorily addressed in writing prior to the start of fabrication:

1. The previous response to MFSQA response R6 indicated positively that there is a separation between Quality Control and Production. Currently, the same individual is managing both Production and Quality Control. Please confirm whether or not a third party will be used for Quality Control.

2. Regarding the Observations:
   a. **Observation 1:** This matter is closed as it does not relate directly to production.

   b. **Observation 2:** This matter is closed. The Department notes and accepts the Contractor's explanation.

   c. **Observation 3:** This item was meant to convey that Art Galvanizing Works did not have facilities to handle blasting independently. Maximum capacity is 3 feet in length, while rods for this Contract are up to 15 feet long. The Department notes and accepts the Contractor's explanation. This matter will be closed pending submission of procedures detailing the blasting and inspection of the material.

   d. **Observation 4-8:** These issues can be resolved by addressing the previous comment regarding the separation between Quality Control and Production.

The Department requests that notification be provided prior to the start of any work at this facility for this Contract.

If you have further questions, please contact Dr. Venkatesh Iyer at 858.967.6363.

Sincerely,

GARY PURSELL
Resident Engineer

cc: Rick Morrow, Brian Boal, Mazen Wahbeh, Vankatesh Iyer
file: 05.03.01, 55.0160

July 23, 2007

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

Office of Structural Materials (OSM) Audit of Art Galvanizing Works.

OVERVIEW

Art Galvanizing Works, in Cleveland, Ohio, a subcontractor for the Dyson Company, successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on June 12, 2007, per Special Provisions section 8-4.01.

The Department audited Art Galvanizing Works facilities on July 11, 2007. Present during the audit were representatives of OSM: Mr. John Kinsey, CALTRANS Senior Level III, and Mr. Markian Petrina, Structural Materials Representative; and representatives of American Bridge/Fluor, a Joint Venture (ABF): Mr. Dan Radu, ABF Steel Fabrication Manager and Mr. Charles Kanipicki, P.E., ABF Quality Control Manager. Representing the fabricator was Ms. Adrienne Klein, Vice President of Art Galvanizing Works.

DISCUSSION

The audit opened with opening remarks by Mr. Kinsey, who explained the function of OSM and the purpose of the audit. Ms. Klein then gave a brief history of the company.

Art Galvanizing Works (Picture 1) is a small family-owned company that performs hot-dip galvanizing. Art has been active in the Cleveland area for over 50 years; many employees have over 20 years of service with the company, and the night foreman has been with Art for 51 years. Ms. Klein, the Vice President, acts as both the production manager and the quality control (QC) manager, and is also the daughter of the owner.

Art's main work is small items for the electrical and fastening industries, as well as freight trailer latches. Structural galvanizing is limited to 15 feet in length due to kettle length, although Ms. Klein indicated that double-dipping is possible. Dyson apparently intends to send A 325M bolts and shorter rods to this facility.

There is no QC department as such; according to Ms. Klein, all production employees are trained to inspect galvanizing. Ms. Klein stated that galvanized material is randomly tested.

Ms. Klein indicated that products with excessive galvanizing are stripped and re-coated. Mr. Kinsey pointed out that the SAS contract prohibits this; Ms. Klein replied that in the case of overcoating, new components would have to be dipped.

Art has the ability to centrifuge components up to 3 feet long; anything longer than 3 feet is brushed with a natural-bristle brush while the galvanizing is hot, then allowed to air-dry. For galvanizing A 354 BD rods, Art does not have blasting capability. Any material for blasting must be sent to another facility, and Ms. Klein was apprised of the strict time limits and inspection criteria for such blast-and-dip operations.

OSM auditors were told that no standard written procedure exists for galvanizing. In general, a 2 to 5 minute galvanizing bath is usually considered sufficient, and according to Ms. Klein is often a matter of instinct on the part of the operators. In the event of large lots with stringent requirements, Art may perform trial coatings with small numbers of product to perfect procedures.

Ms. Klein discussed some of her QC procedures. She indicated that she calibrates the galvanizing thickness gage once per day, but that this is not recorded. She also showed auditors "Hold" slips for material that required additional attention or had unsatisfactory coating.

The auditors took a tour of The Art facilities. Auditors were asked to get permission to take pictures, as Ms. Klein stated that she was protecting trade secrets, in particular the centrifuging process. The following areas were seen:

- Shipping/Receiving
- Galvanizing
- Shipping Storage Area

Receiving
Inbound material appeared to be reasonably well segregated and traceability appeared adequate.

Galvanizing (Pictures 2-4)
OSM auditors viewed the galvanizing process, contained in a single bay at the rear of the Art facility. The acid bath (Picture 2) and buckets for hot-dip galvanizing (Picture 3) were in close proximity to each other and the molten zinc bath.

Although it had been indicated that galvanizing operators followed approximate time guidelines for duration in the galvanizing bath, no clock was visible from the hot-dipping station (Picture 4). When questioned about this, Ms. Klein stated that timing was a matter of adding additional baskets.

Apparently, the rationale is that another basket or two requires additional handling time, which causes an increase in the amount of time that each basket spends submerged in the zinc bath. However, Ms. Klein was not forthcoming when it was asked how galvanizing operators judge the actual time.

The hot-dipping process was observed for several baskets of components. The procedure appears to function purely by "seat of the pants" judgment by galvanizing operators, who follow the "first in, first out" method when dipping multiple buckets into the zinc bath. Following water quenching, components are placed in a bin. While OSM auditors were present, it appeared that components, which were cylinders with rounded ends weighing several pounds each, were dumped into the bins without any particular care being taken to prevent damage to the zinc coating.

Mr. Kinsey asked Ms. Klein about the thickness readings for components that had completed the galvanizing process. Ms. Klein went into the production office behind the hot-dip station and retrieved the thickness meter. She found numerous instances of inadequate thickness. Until Mr. Kinsey's inquiry, none of the production personnel were observed measuring thickness.

When galvanizing was completed on a second batch of components from the same lot, they were found to have adequate coating thickness. However, before these newly-dipped, acceptable components were even measured, they were placed in the same bin as the insufficiently-coated components.

There was no move by Ms. Klein or production personnel to segregate the non-conforming material. No "Hold" tag was placed in the bin containing the parts with insufficient galvanizing thickness.

Shipping Area

Outbound material was clearly identified and tagged. However, QC control for material suitability appears virtually nonexistent.

Components similar to those recently viewed in the galvanizing area were found in the bin marked "OK to ship." Mr. Kinsey inquired about the coating thickness; Ms. Klein indicated that these had not yet been tested for coating thickness, and stated that she had to return to the production area to retrieve her coating thickness gauge.

After an unexpectedly long absence, Ms. Klein returned and measured the components. The thickness readings were approximately 3 times higher than for those recently observed on the galvanizing line. Ms. Klein explained that there was no maximum limit for these components.

There did not appear to be any procedure in place for visual inspection or repair of non-compliant coatings. It was noted that several pieces marked as ready to ship had minor

blemishes that should have been corrected. No holding area for nonconforming material was observed, contrary to what was expected from previous Art representations.

Outbrief
Mr. Kinsey indicated to Ms. Klein that although Art Galvanizing Works appears capable of performing the hot-dip zinc coating as required, the apparent absence of QC would be noted on the audit. The fact that production schedule overrode quality control principles was a major shortfall, namely that low-coating thickness items were not segregated from acceptable items because Ms. Klein told auditors that the material needed to be kept moving for schedule purposes. It was also noted that uninspected material had been marked "OK to ship."

In order for Art to be recommended for acceptance, Mr. Kinsey indicated that third-party QC would have to oversee operations and inspections. Ms. Klein indicated that she was accustomed to third-party inspections through experience with the Pennsylvania and New York Departments of Transportation.

FINDING
Art Galvanizing Works does not have necessary quality control. The company's Vice President, who is the owner's daughter, primarily oversees production but is also the sole quality inspector; auditors observed an instance when production overrode quality control.

OBSERVATIONS
- The Dyson Company appears not to have provided guidance and auditing as required by contract documents.
- Art Galvanizing was not familiar with contract requirements prohibiting stripping and re-dipping.
- Art Galvanizing has no blasting facilities for ASTM A 354 BD components and appears to have limited resources to properly evaluate blast finish prior to galvanizing.
- Despite assurances that all personnel are trained in quality and measure galvanizing thickness, only the Vice President was observed measuring thickness of galvanized material and the only apparent gage was maintained in an office.
- Newly-galvanized components weighing several pounds each were dumped into a bin without apparent concern for protecting zinc coating.
- Material with acceptable galvanizing thickness was placed in the same container as material with known insufficient galvanizing thickness.
- OSM auditors were told that production schedule can override QC concerns, here in the context of not segregating compliant from non-compliant materials of different hot-dip batches from the same lot.
- Material that the Vice President indicated had not yet been inspected was marked "OK to ship" and apparently awaiting pickup by the customer.

CONCLUSION

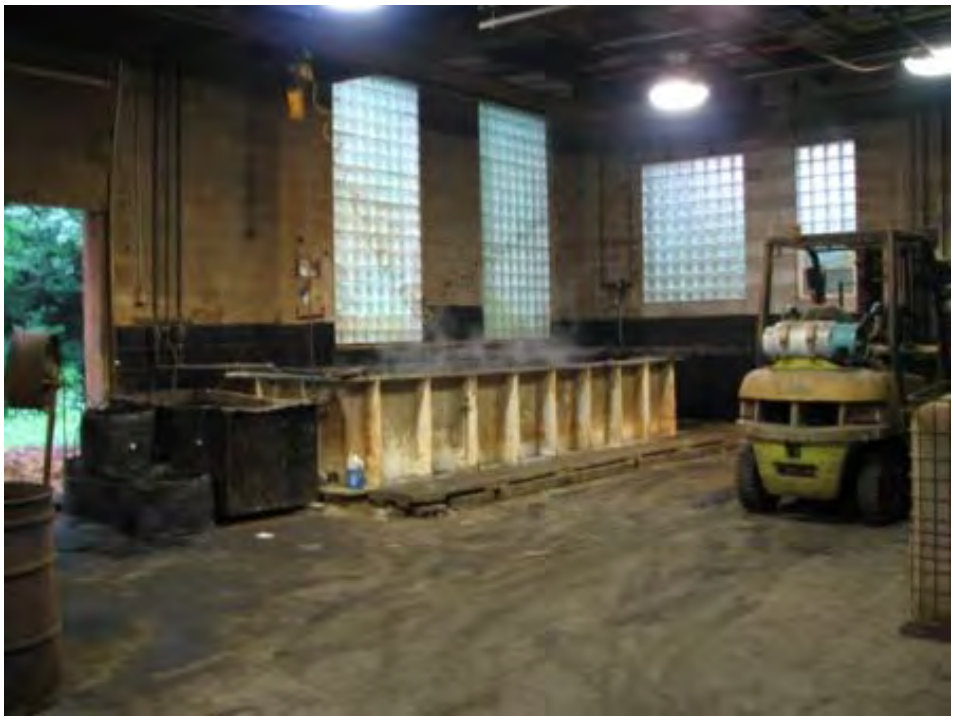
OSM recommends that Art Galvanizing Works should be considered a **Contingent Pass.** To receive a passing grade, Dyson Company and Art must ensure that independent third-party quality control for processing, handling, and coating measurement, is in place for all galvanizing performed for the SAS project.

Art Galvanizing Works appears capable of performing small-volume galvanizing of fasteners and small rods to an acceptable level of quality, provided the above controls are instituted.

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

ILLUSTRATIONS (Pictures 1-4)

Picture 1. Art Galvanizing Works, the Dyson Company's primary small-component galvanizer, is located in Cleveland, Ohio.



Picture 2. The acid pickling bath at Art Galvanizing Works can accommodate components up to 15 feet long.

Picture 3. Components are usually small, and hot-dipped in the buckets shown, up to 3 buckets at once.

Picture 4. Hot dip galvanizing at Art Galvanizing Works is nominally time-controlled, but no clock is visible from the galvanizing line.

REQUEST FOR INFORMATION (RFI)

RFI No.: ABF-RFI-002513R00 **Submitted By:** Baltzer, Karsten **Pages:** 8
Pages Attached: 7

RFI Date: 14-July-2011 **Contact Name:** Baltzer, Karsten **Phone No.** 510-808-4598

Subject:	**Cable: PWS Anchor Rods - Turning at Bertin Steel Processing**
References:	
Sub/Sup:	**DYS** **Sub RFI #:**
Response Required by:	**21-July-2011** **Response affects critical path activity?** **Yes**

Description:

Dyson is requesting the use of Bertin Steel Processing to convert the PWS Anchor Rod stock to PD bar. Dyson has a long standing relationship with Bertin Steel Processing. All machining will be witnessed by Dyson Quality Control department.

Bertin Steel Processing will turn the PWS Anchor Rod to a diameter from 3.332" to 3.334".

1) Dyson QC Approval Letter. Please see the attached letter dated 9/17/2010 for this data. Dyson have maintained Bertin on our Approved Supplier List since August 2007.

2) Quality Manual. Dyson was unsuccessful in obtain a copy of the current Bertin QA/QC Manual. Due to the voluminous nature of the three-part quality system manual, Bertin's policy is to allow on-site review of the entire program. Dyson was able to obtain the documents which are attached which Bertin provided in order to demonstrate their process control and to provide an overview of the content of their quality programs.

3) ISO Cert. Bertin's current ISO certificate is attached.

4) Bertin Brochure. Bertin does not currently have a brochure to hand out and instead refer to their website for more information about their facility, capabilities, and personnel. http://www.bertinsteel.com/

Please review and approve.

Contractor Disposition:

This RFI is being submitted for:

The Cost and Time Impact from this RFI is: Not selected

Response: **Agreed Ext. Due Date:**

Pages: 2
Pages Attached: 0

Per Working Drawing Campus (WDC) discussions, it is understood that this RFI has been submitted to request an audit waiver for the Bertin Steel Processing (BSP) facility. Dyson Corporation will use the B.S.P. facility to machine the PWS Rods to a diameter suitable for machining rolled threads.

Pursuant to section 8-4 "Audits" of the Contract Special Provisions, the Department waives the MFSQA and Audit requirements for B.S.P. to machine the PWS Rods based on the details provided above, the site visit by the Engineer's representative verifying these details and the limited scope of the operation.

REQUEST FOR INFORMATION (RFI)

Administrative Action:

This response resolves the RFI.

Date: 21-July-2011	**Respondent:** Collins, Warren	**Phone No.:** 510-622-5661

THE DYSON CORPORATION

53 Freedom Road
Painesville, OH 44077

440.946.3500
800.680.3600
Fax 440.352.2700

www.dysoncorp.com

September 17, 2010

Bertin Steel Processing, Inc
1271 E. 289th St
Wickliffe, OH 44092

Attn: William Posey

Subject: Quality Assurance Survey of your plant conducted September 15, 2010

Dear Bill,

As a result of the audit performed at your facility on this date, Bertin Steel Processing, Inc has been retained on Dyson's approved vendor list as a supplier of bar processing services for commercial, military, and nuclear applications. This approval is applicable for the following Q.A. programs: MIL-I-45208, ISO 9001, 10CFR50 Appendix B, and ASME NCA 3800. Please note that all services required of your company must be performed in-house, no subcontracting to another supplier is allowed.

Re-audit of your facilities will be triennially, unless we find that you are performing in a sub-standard fashion, at which time you will be immediately re-audited. Note that in between the interval for re-audit, Dyson will maintain performance assessments & historical data of your facilities for compliance to the applicable requirements of Dyson's purchase orders.

Where required by the Dyson purchase order, certification for work performed must include a statement substantially conforming to the following: "This material was processed in accordance with the Bertin Steel Processing, Inc. Quality Program Revision#2 dated 6/1/09"

There were no findings as a result of the audit. Thank you for your cooperation in making your facilities and records available for the audit.

Sincerely,

Steve Marsh
Quality Assurance Manager

cc: Bertin Steel Processing, Inc. Audit File

BERTIN STEEL PROCESSING, INC.

QUALITY ASSURANCE MANUAL

SECTION: QAM 001 CONTROLLED COPY
DATE: 06/01/2009

REVISION NUMBER: **2**
SUBJECT: TABLE OF CONTENTS

Approved by: James Connolly, Q.A. Manager

BERTIN STEEL PROCESSING, INC.

QUALITY CONTROL PROCEDURE

SECTION: QCP 001 CONTROLLED COPY
DATE: 06/01/2009

REVISION NUMBER: **5**
SUBJECT: TABLE OF CONTENTS

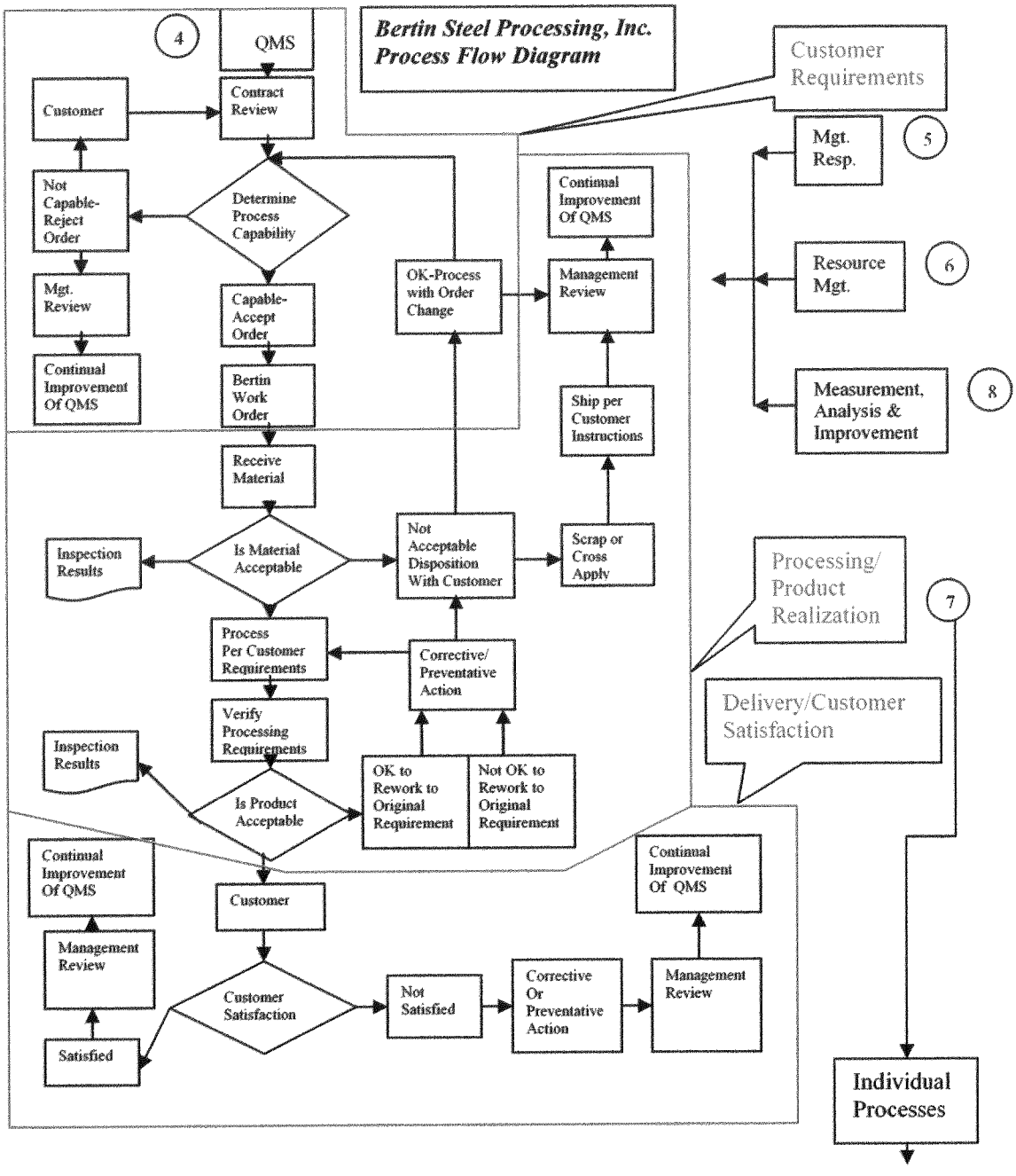
Approved by: James Connolly, Q.A. Manager

BERTIN STEEL PROCESSING, INC.

STANDARD OPERATING PROCEDURES

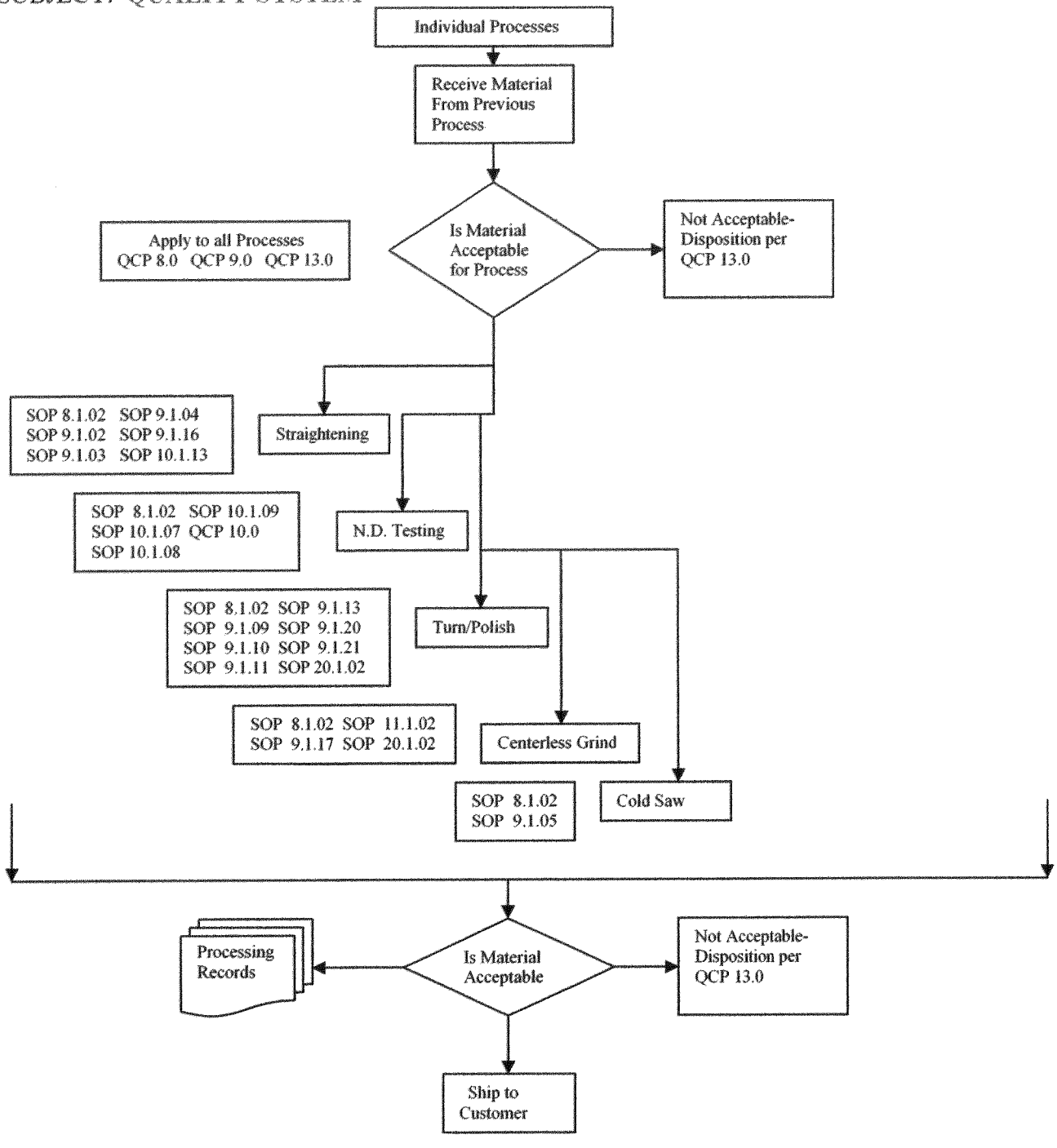
SECTION: SOP 001 CONTROLLED COPY
DATE: 01/14/2009
PAGE NUMBER: Page 1 of 1
REVISION NUMBER: **12**
SUBJECT: TABLE OF CONTENTS

Approved by: *James Connolly, Q.A. Manager*



Approved by: James Connolly,

Q.A. Manager



Approved by: James Connolly,
Q.A. Manager

CERTIFICATE OF REGISTRATION

SRI Quality System Registrar

ANAB ACCREDITED

Having been audited in accordance with requirements of

ISO 9001:2008 – ANSI/ISO/ASQ Q9001-2008

SRI Quality System Registrar, Seven Fields, Pennsylvania, USA, hereby grants to:

Bertin Steel Processing, Inc.

Registration of the management system at its location:

1271 East 289th Street
Wickliffe, Ohio, USA

The conditions for maintaining this certificate of registration are set forth in the SRI registration agreements R20.3 and R20.4. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organization.

Scope of ISO 9001:2008 registration:	"Processing and distribution of steel products."
Exclusions:	Design and Development
Initial SRI registration date:	October 3, 2006
Current registration period:	October 2, 2009 through October 1, 2012

Signed for SRI:

Christopher H. Lake, President & COO

Certificate Date: October 2, 2009
Certificate Number: 008329
Registration Number: 2507-01

ISO 9001 SRI CERTIFIED

Bertin Steel Processing, Inc. is now... Bar Processing - Wickliffe

Bar Processing Corporation Acquires Bertin Steel Processing

October 7th, 2011, (Cleveland),
Bar Processing Corporation announces the acquisition of Bertin Steel Processing, Inc.
The facility has been renamed Bar Processing - Wickliffe.

Based in Wickliffe (Cleveland), Ohio. Similar to BPC, Bertin provides SBQ finishing services. This purchase strategically enhances Bar Processing Corporation's position as the Midwest's premier toll processor of SBQ bars. Primary services include straightening, cutting, turning, polishing, grinding and decoiling. The expanded product size range of 1/2"-11", along with the addition of rail services, allows us to provide unmatched service to our customers. Additionally, we offer surface and internal non-destructive testing of both bar lengths and formed parts.

Bar Processing Corporation, with corporate headquarters in Flat Rock, Michigan remains committed to meeting the needs of our customers. Visit www.barprocessing.com for detailed information on our capabilities and plants in your area.

BAR
PROCESSING
CORPORATION

=

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program
333 Burma Rd.
Oakland, CA 94607
(510) 622-5660, (510) 286-0550 fax

Flex your power
Be energy efficient!

July 05, 2007

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-000361

Michael Flowers
Project Executive
American Bridge/Fluor Enterprises, a JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Submittal 181 - MFSQA for Mechanical Galv-Plating Corporation

The Department has completed review of Submittal ABF-SUB-000181R00, "MFSQA for Mechanical Galv-Plating Corporation, subcontractor to The Dyson Corporation," dated June 22, 2007. The submittal is returned "Approved" and will be discussed further at the pre-audit meeting. Upon approval of the MFSQA documents for the remaining Dyson subcontractors, the Contractor may schedule a Department audit as required by Special Provisions, Section 8-4, "Audits."

If you have any further questions, please contact Dr. Mazen Wahbeh at (818) 292-0659.

Sincerely,

Gary Pursell

GARY PURSELL
Resident Engineer

cc: Rick Morrow
file: 05.03.01, 55.0181

July 30, 2007

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

OSM Department Audit of Mechanical Galv-Plating Corporation facilities based on the Manufacturing and Fabrication Self Qualification Audit (MFSQA) dated June 22, 2007.

OVERVIEW

Mechanical Galv-Plating Corporation (MGP), in Sidney, Ohio, a subcontractor for the Dyson Corporation, successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on June 22, 2007, per Special Provisions section 8-4.01. The Office of Structural Materials (OSM) performed a department audit at MGP facilities in Sidney, Ohio, on July 18, 2007. The audit team included Mr. John Kinsey and Mr. Markian Petrina.

On July 18, 2007, the audit team visited the MGP facility and met with Mr. Tim (TJ) Baker, President; and Mr. Russ Baker, Quality Control Manager (QCM). Mr. Charles Kanapicki, P.E., Quality Control Manager from American Bridge/Fluor, a Joint Venture (ABF), was present during the audit as well.

The overall scope of work to be provided by MGP facilities was discussed. MGP is to perform mechanical galvanizing for Dyson Corporation.

AUDIT SUMMARY

The main objective of the department audit was to evaluate the overall capability of MGP to perform mechanical galvanizing of fasteners for the Self-Anchored Suspension (SAS) Bridge and to verify the accuracy of the responses to the MFSQA. MGP understanding of the contract documents was also discussed.

Of note, Mr. TJ Baker indicated several times that the SAS audit process was his first contact with Dyson Corporation in more than a year. He indicated that Dyson had not provided detailed guidance for the audit or necessary documents to prepare for the Caltrans audit.

Discussions of MFSQA
All sections of the completed MFSQA were reviewed with MGP during the audit, and MGP was given the opportunity to expand on their written responses. Only those sections with significant discussion are discussed below.

Section N, Item 1. Responses in the MFSQA were found to be lacking in sufficient detail: they referred only to Control Plans, without elaboration or explanation. Mr. TJ Baker explained that MGP provided cautious responses to protect trade secrets. Mr. TJ Baker was forthcoming during the audit discussion, and provided policy documents for Caltrans review.

MGP has approximately 30 generic Control Plans. When a customer provides specifications, one of these 30 is tailored to that particular order. This includes a procedure for receiving specific orders.

During receiving inspection, packing slips are compared to the bill of lading, and all paperwork is audited in the office. If problems are found, Sales reconciles them. There are three stages of inspection to ensure that the packing slip matches the product.

Section N, Items 6-7. Each bin has a lot tag with lot identification number. The shop traveler stays with the bin throughout the process. In this way, lots are kept separated. In the event that the customer does not provide a work order number, the items are put on hold until the matter is resolved.

Observations during Facility Tour
Mr. TJ Baker conducted a tour of the MGP facilities. Mr. Russ Baker accompanied the audit group.

In the receiving area (Photograph 1), a shop traveler is made up (Photograph 2). A work order number, internal to MGP, is assigned to each lot, and entered on the traveler; each lot also receives a different-colored round sticker. Each customer bin receives a white tag (Photograph 3); MGP bins for coating receive a blue tag (Photograph 4). One more work order document than the number of coating bins is printed, to provide a tracking record.

There are three galvanizing lines: one is for specialty coatings of small lots or special handling, and is the smallest of the three. The other two are larger scale for large lots of fasteners. OSM auditors were told that very small quantities of bar up to 4 feet long can be mechanically galvanized.

OSM auditors observed large quantities of fasteners, often a single lot in several galvanizing bins, clearly marked and tracked, awaiting galvanizing in an organized system (Photograph 5). The assembly line order is typically organized one or two shifts before the material is actually galvanized.

At a galvanizing station, OSM auditors observed that travelers and other tracking paperwork describing the processes was maintained in orderly fashion for traceability. Material is galvanized in 55-gallon drums, with glass beads and various additives. The original bin is placed at the end of the galvanizing line to receive the completed material. No pictures were taken of the galvanizing process, in deference to MGP sensitivity about numerous proprietary processes.

Sampling and testing is done by both production and QC personnel. Production personnel may bring samples to the QC office, although QC inspectors sample on the shop floor, as well.

Gages are calibrated at varying intervals. Galvanizing thickness gages are calibrated annually, while pH gages for acid are calibrated biweekly. All gages have stickers and are also tracked on a database that indicates equipment due for calibration.

OSM auditors observed an automated rotational capacity (rocap) testing machine of the type that Dyson Corporation wishes to purchase. MGP provided positive feedback about the machine. MGP does not anticipate performing rocap testing for Dyson.

In the event of a nonconformance, a rejected material tag is attached to the lot. The customer is contacted, and a determination is made whether to accept as-is, repair, or discard. Mr. Kinsey informed MGP that stripping and re-galvanizing is not acceptable.

MGP places an automatic 48-hour hold on fasteners with geometry that may prevent galvanizing from drying and lead to corrosion. This ensures that galvanizing is dry and satisfactory. OSM auditors observed several such bins in a separate holding area.

When the process is complete, a final inspection is performed to verify all preceding inspections, the material is stamped with an “OK to ship” and shipped back to the customer with the original purchase order, along with MGP tracking paperwork that was with the material (Photograph 6).

The overall impression of MGP was of cleanliness, order, and planning. Mr. TJ Baker stated that he places a high priority on organization and traceability. There was considerable pride about being a principal provider to major clients such as Nucor, and an apparent strong sense of responsibility to ensure high-quality processes to maintain these relationships.

SUMMARY OF FINDINGS

Overall, the audit team generally found MGP facilities capable of performing mechanical galvanizing of fastener components as required by the contract.

In summary, the facility was able to demonstrate their capabilities are satisfactory to the contract requirements for performing mechanical galvanizing. No Department Items of Concern (IOC) were noted for this facility.

CONCLUSION

Based on the Office of Structural Materials Department audit of SHTL facilities, OSM recommends a **Pass** audit for Mechanical Galv-Plating.

If you have any questions, please call Venkatesh Iyer, Structure Materials Representative at (858) 967-6363, or Keith Hoffman at (510) 450-7765.

Signature on file

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

APPENDIX

Photograph 1. The reception area ensures customer paperwork is in order and enters components into a color-coded MGP system.

Photograph 2. The MGP shop traveler, this one ready to ship; components include a lot-identifying colored dot, and sign-off for various processes, including shipping.

Photograph 3. Bins provided by customers are marked with white tags.

Photograph 4. A blue tag, showing the galvanizing lot at MGP,
is either wired to or placed inside every bin headed for galvanizing.

Photograph 5. Fasteners in a holding area await galvanizing.

Photograph 6. Fasteners that have been galvanized and inspected numerous times, approved and ready to ship.

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March 23, 2009

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-003683

Michael Flowers
Project Executive
American Bridge/Fluor, A JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Department Audit - Modern Industries, Inc.

In accordance with Section 8-4.01, "Audits," of the Contract Special Provisions, the Department completed an audit of Modern Industries, Inc. on March 11, 2009. Modern Industries, Inc. is a heat treatment subcontractor for the Dyson Corporation. The facility has demonstrated the capability to perform heat treatment and accordingly has passed the Department Audit.

If you have any questions, please contact Mohammad Fatemi at 916-813-3677.

Sincerely,

GARY PURSELL
Resident Engineer

cc: Rick Morrow
Brian Boal
Gary Lai
Mohammad Fatemi
file: 05.03.01, 55.0975

March 11th, 2009

PROJECT INFORMATION
04-0120F4

SFOBB Self Anchored Suspension Bridge

Submittal # 975
Modern Industries, MFSQA and Audit of Erie, Pennsylvania Facility

Bid Item Numbers/Description: 66, Heat Treat Anchor Rods (Furnish PWS Cable System)

SUBJECT

Materials Engineering and Testing Services (METS) Department Audit of Modern Industries facility based on the submitted Manufacturing and Fabrication Self Qualification Audit (MFSQA) dated 1/16/2009.

OVERVIEW

Modern Industries (MI) successfully completed the MFSQA per Special Provisions, Section 8-4.01. METS performed a Department Audit of MI's facility on March 11, 2009 to verify the MFSQA item requirements addressed in Submittal number 975 dated January 16, 2009. The Audit team included Mohammed Shamol and Jim Devey.

On March 11, 2009, the Audit team visited the Erie facility in Pennsylvania and met with the following management team from MI:

Mr. Wayne Samuelson	General Manager
Mr. Shawn Sova	Manufacturing Supervisor
Mr. Gary McMahon	Sales Engineer
Ms. Elizabeth Grzasko	Quality Engineer
Mr. Chad Haugh	Industrial Engineer
Mr. Daryl Kosnik	Process Engineer
Mr. Kevin Polito	General Manager

Mr. Kevin Winslow	Maintenance Supervisor

Mr. Dave Sukenik, Quality Assurance of Dyson Corporation and Mr. Charles Kanapicki, Quality Control Manager from American Bridge/ Fluor (ABF) were also present during the Audit as well.

The scope of work reviewed during the Audit of MI's facility was providing heat treatment for Anchor Rods. Bid Item : 66 Furnish PWS Cable System.

Prior to discussions, the Audit team took a tour of the facility followed by an in depth discussion and exit meeting on Audit findings.

AUDIT SUMMARY

The main objective of the Department Audit was to evaluate the overall capability of Modern Industries to provide the noted material and processing in compliance for the Self-Anchored Suspension (SAS) Bridge project, Contract Number 04-0120F4.

Some of the related topics that were discussed and verified during the Audit were:

- Traceability of unique lot numbers from receiving to shipment
- Initial inspection process
  - Receiving Inspection Nonconformance Report
- Generation of Job Process Card (ID#)
  - Verification of contract requirements and ASTM standards with Purchase Order specifications from customer (A354BD)
- Production Procedures and QC oversight
  - Heat Treat Status Card
  - Furnace Time Card
  - 24 hour Monitoring Furnaces – Historic Data
  - Approved for Shipment Card
- Equipment & Lab Calibration

The following summarized our discussions, comments and observations during the department Audit:

Audit Tour of the Facility

Preview

Since 1958, Modern Industries (MI) in Erie, Pennsylvania has been performing Heat Treating. They currenly have the following accreditations: Automotive TS 16949, Military, Aerospace/Nadcap, Nuclear and ISO 9001. Modern Industries has the capacity to process up to 40,000 lb of material a day.

The Audit addressed quality control and procedures in place by MI personnel and management for the application of heat treatment of anchor rods for the project. The initial tour of the facility was followed by a discussion of the submitted MFSQA and an exit meeting.

In Plant Processes from Receiving to Shipment – Discussion from Tour

The Tour included an overview of the in plant processes from incoming inspection, to order input, to heat treatment processes and controls to final inspection and approval. Listed below is the sequence of the tour that took place.

1) Incoming Shipment Receiving Department - Customer product verified for COC, PO, weight and piece count. If any product is missing paper work or is damaged, a "Receiving Inspection Nonconformance Report" is written up and customer is contacted (Figure 5). Product goes to NC holding area (Figure 5). If product passes inspection (Figure 1, 2) a Product Identification Number is created and paperwork goes to main office for Engineering review.

2) Process Card Created – Daryl Kosnik reviews contract specifications and compares to customer purchase order request. Daryl then selects either a pre-programmed heat treat recipe or develops a new one based off specification requirements (Figure 3,4). The recipe for the product is printed out onto the Process Card. Shawn Sova and or Rick Stiller review and sign off for the selected process (Furnace settings – Temp, Atm, Dur, Rx Gas & Quenching Oil)

3) Furnace File Cabinet - Approved Process Cards go into Furnace File Cabinet (Figure 6) to await pick up from Shop Floor Supervisor. Only certain recipes are used for specific furnaces based on Class.

4) Handling Material – When product is ready to be heat treated, product is hand loaded into 330 Stainless Steel racks (Figure 8) and a Furnace Time Card documents material time frame at a station. These are reviewed by Shawn Sova. Along with Process Card is a Heat Treat Status Card to verify each Stage has been signed off and what current stage product is in.

5) Heat Treatment - During heat treatment, if any set points are modified for a furnace during a process, a daily alarm report is created showing what was outside the allowable parameters (Figure 12). While product is being heat treated furnaces are documented continuously and stored for later retrieval (Figure 7, furnace atmosphere, temperature, cycle time, quench variables). Generator stations are also continuously analyzed for atmosphere readings.

6) Approved for Shipment - At the end of the heat treatment and quenching (Figure 11, signed off Process Card and Heat Treat Status Card), product goes to a holding area awaiting an "Approved Shipment Tag". Lab has 4 certified Technicians to verify product meets ASTM standards for the heat treating process (Figure 16-19, Material and Mechanical Properties - Hardness, Tensile, Carbon Content, Sulfur, Phosphorus). Once

results verified product receives an "Approved for Shipment" tag and a COC is attached to outgoing product back to original Customer. Copies of paperwork filed in main office.

Quality Control

The following areas were verified for current calibration and certifications:

- Laboratory – Testing/Quality Control
    - Certification of Lab Technicians
    - List of Lab Equipment provided and Current Calibrations were confirmed
- Company Certifications
    - ISO 9001:2000 Contract Machining, Commercial Heat Treating & Materials Testing
    - ISO/TS 16949:2002 Contract Machining and Commercial Heat Treating
    - ISO/IEC 17025 Aerospace Accreditation
- Equipment & Materials - Chad Haugh
    - Calibration – Equipment (Quarterly)
        - System Accuracy Test Logs
            - Furnaces Surveys
            - Probes checked weekly
        - Quench Oil verified (Quenchometer Test)
    - Quench Oil – COCs on file

Discussions MFSQA & Exit Meeting

MI provided adequate demonstration of assurance of product quality, traceability, and documentation in the walk through of their heat treating facility in Erie, Pennsylvania.

Some items brought up by the Department's letter from February 3, 2009 were addressed in the Final Discussions and Exit Meeting as follows:

- MI provided a Non Conformance Receiving Document along with an NC Red Tag during the actual walk through and explained that the customer would be notified in writing of such an occurrence.

- In discussing what tolerances are intended to be used for product, MI deferred to the guidelines of the ASTM standards and project specifications which will be identified on the Process ID Cards showing allowable limits.

- An updated equipment list was provided during the Discussion Meeting.

- In handling material, MI demonstrated throughout the walkthrough the product being carefully hand packed into racks or storage containers. Final Inspection and sign off of Process Card material receives an Approved for Shipment tag along with a COC.

In the post exit meeting scheduling was discussed. Dave from Dyson expressed product was ready to deliver immediately for heat treating at MI and requested the Audit process be expedited. Department agreed in expediting the process for the approval of MI.

CONCLUSION

Overall, the Audit team found MI's facility capable of providing heat treating application for Anchor Rods on the project.

RECOMMENDATION

Based on the Department Audit of the Modern Industries Inc. of Erie, Pennsylvania, METS recommends MI receive an Audit Pass; and the facility be approved to perform heat treating of anchor rods for the project Contract Number, 04-0120F4.

If you have any questions, please call Mohammad Fatemi, Structure Materials Representative at (916) 813-3677, or Keith Hoffman at (510) 450-7765.

Signed Copy on File
Mohammad J Fatemi, PE
Structural Materials Representative

Division of Engineering Services
Materials, Engineering, and Testing Services
Office of Structural Materials

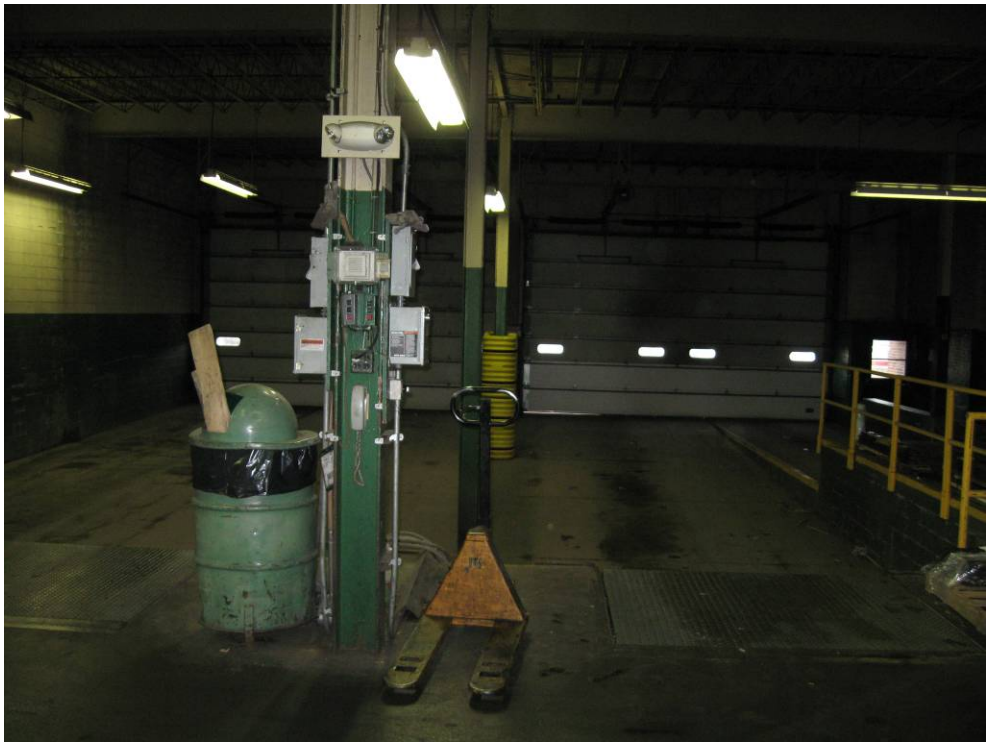

Figure1: Shipping & Receiving

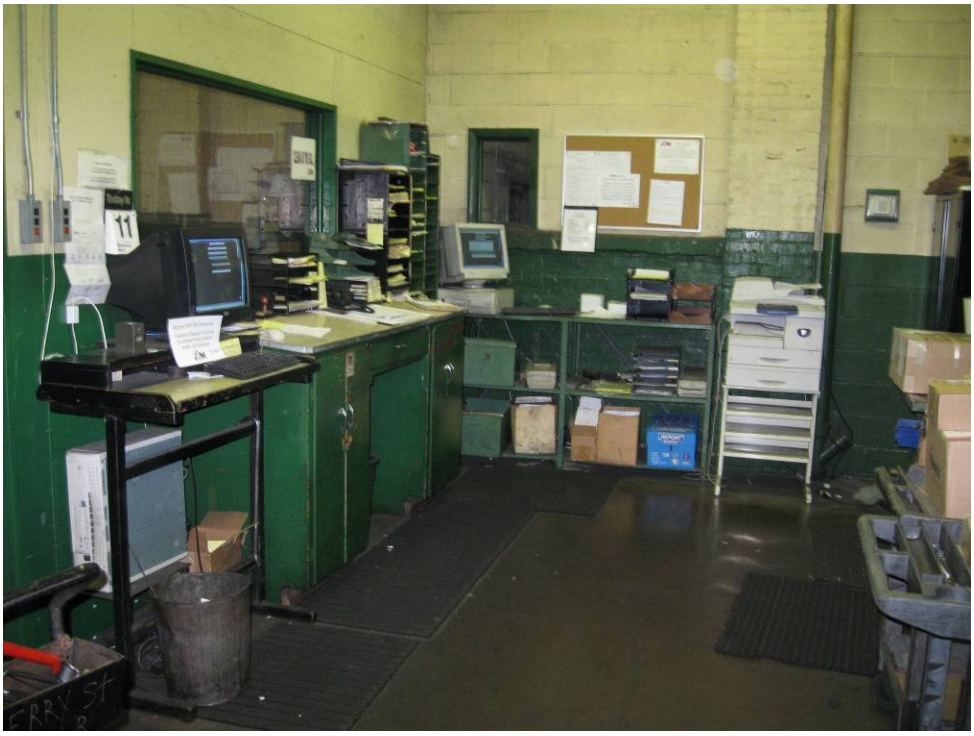

Figure 2: Product Passes inspection, Product ID# created

Figure 3: ASTM Standards on File

Figure 4: Daryl Kosnik reviews PO with Contract Specifications

Figure 5: Non Conformance Holding Area

Figure 6: Furnace File Cabinet (Process Cards)– Product awaits Heat Treatment

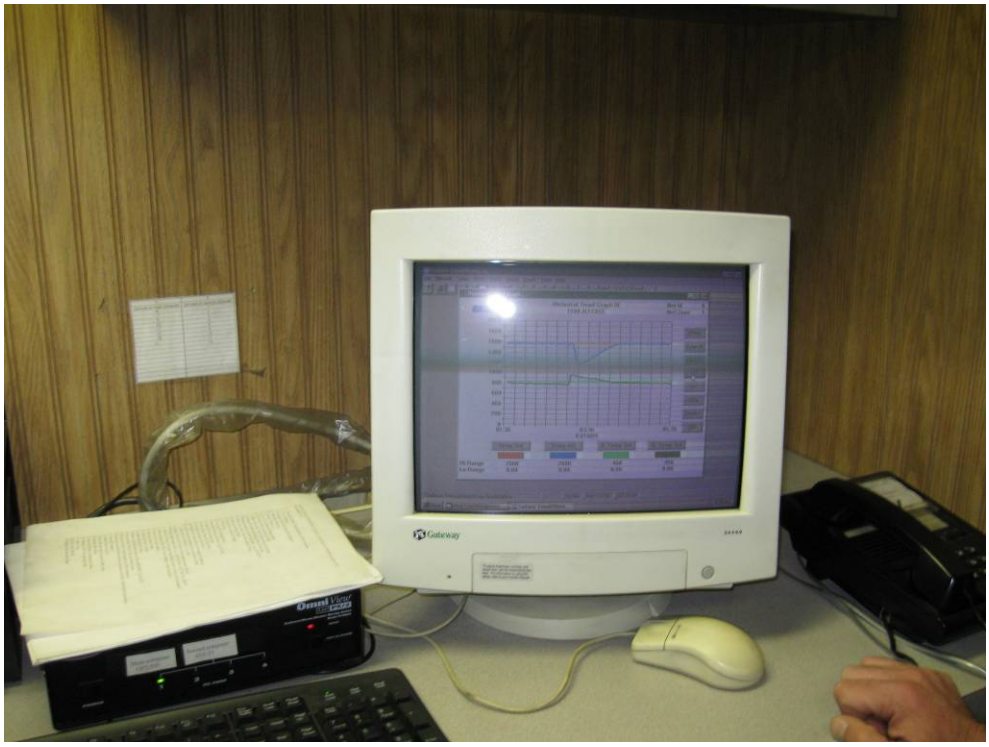

Figure 7: Looking at Historic Furnace Data (Temps)

Figure 8: 330 Stainless Steel Racks used

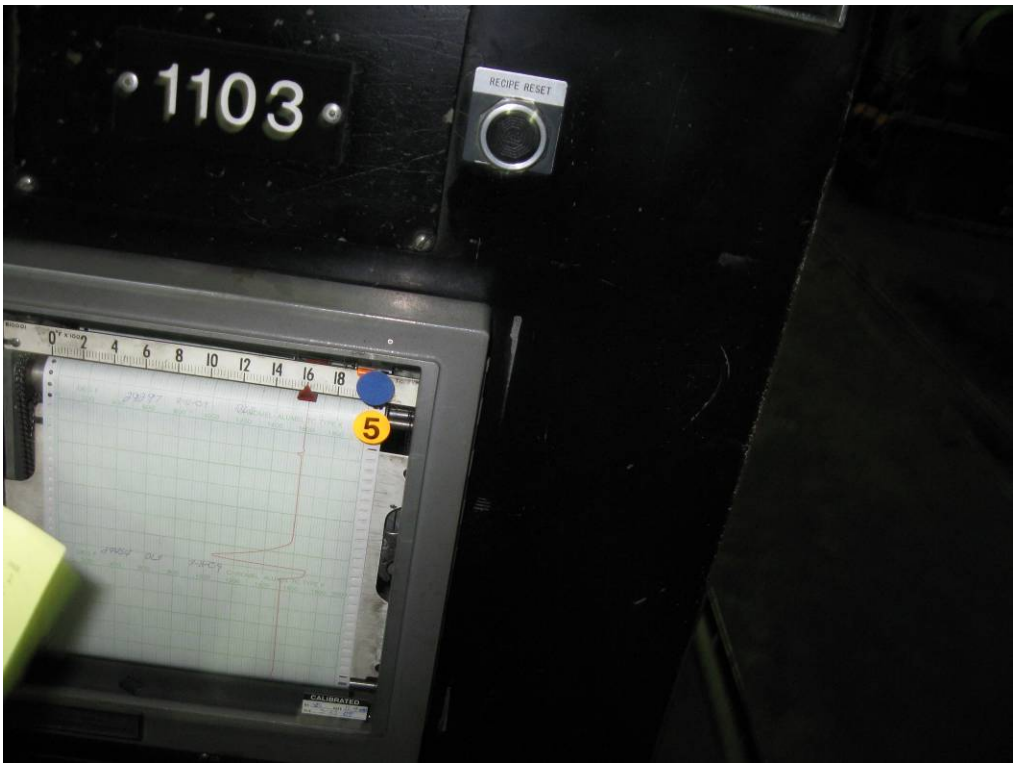

Figure 9: Furnace System - Calibration Chart from Certification

Figure 10: Current Certifications and Calibrations

Figure 11: Furnace Time Card and Process Card shown

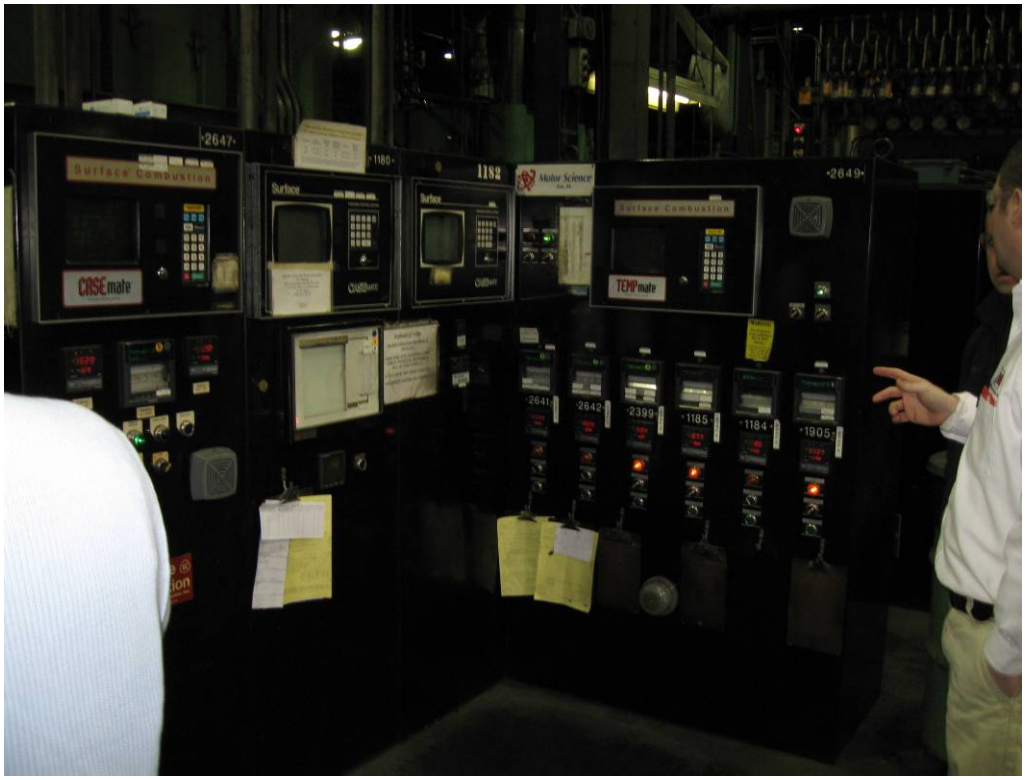

Figure 12: Process cards written for specific furnaces and classes

Figure 13: Handling of product during loading into baskets

Figure 14: Holding area prior to heat treat

Figure 15: Furnaces & Quenching operations

Figure 16: Lab results on file

Figure 17: Lab - In Process Card received to verify Material Properties

Figure 18: Tensile Test Station

Figure 19: Test results stored electronically along with hard copies

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July 09, 2008

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-002346

Michael Flowers
Project Executive
American Bridge/Fluor, A JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Submittal 674, Rev. 1 - Monnig MFSQA (Response to Audit Contingencies)

The Department has completed review of Submittal ABF-SUB-000674R01, "Monnig MFSQA," dated June 25, 2008, which contains the response to the audit contingencies in State Letter 05.03.01-002100. The submittal is "Approved," and Monnig Industries and Phoenix Manufacturing are receiving a Pass. It is acceptable for Monnig Industries to perform hot dip galvanizing of threaded anchor rods, with Phoenix Manufacturing performing abrasive blasting.

If you have any questions, please contact Dr. Venkatesh Iyer at (858) 967-6363.

Sincerely,

<<< ORIGINAL SIGNED >>>

GARY PURSELL
Resident Engineer

cc: Rick Morrow
Brian Boal
Gary Lai
Venkatesh Iyer
file: 05.03.01, 55.0674

June 2, 2008

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

The Office of Structural Materials (OSM) audit of Bob Monnig Industries (BMI), galvanizing facilities based on the Manufacturing and Fabrication Self Qualification Audit (MFSQA) dated April 17, 2008.

OVERVIEW

Bob Monnig Industries, in Glasgow, Missouri, a subcontractor for the Dyson Corporation, successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on April 17, 2008. The Office of Structural Materials (OSM) performed a Department audit at Bob Monnig Industries facilities in Glasgow, Missouri, on May 21, 2008. The audit also included Phoenix Industries, the on-site blasting subcontractor to Bob Monnig Industries. The OSM audit team included Structural Material Representatives (SMR) Dr. Venkatesh Iyer and Mr. Gary Thomas.

On May 21, 2008, the audit team visited the Monnig facilities and met with Mr. John Monnig, Owner and President; Mr. Jason Monnig, Quality Control Coordinator; and Mr. Ronald Wise, Quality Control Manager. Mr. Charles Kanipicki, P.E., Quality Control Manager from American Bridge/Flour, a Joint Venture (ABF) was also present during the audit.

The overall scope of work to be provided by Monnig Industries and Phoenix Industries was discussed. Monnig Industries is to perform hot-dip galvanizing of 3" diameter threaded anchor rods in lengths of 17'- 2" and 10'- 0" for the Dyson Corporation. Phoenix Industries will be sub-contracted to perform dry-grit blasting services prior to hot-dip galvanizing.

AUDIT SUMMARY

The main objective of the Department audit was to evaluate Bob Monnig Industries' overall capabilities to hot-dip galvanize threaded anchor rods for the Self-Anchored Suspension (SAS) Bridge, and to verify the accuracy of the responses provided in the MFSQA.

Mr. John Monnig stated at the onset of the audit that Bob Monnig industries would provide all the QC inspections and documentation for the work performed by Phoenix Industries. The material will be in the control of Bob Monnig Industries, with Phoenix Industries providing only the equipment and personnel required for the dry-grit blasting operations.

Discussion of MFSQA

All sections of the completed MFSQA were reviewed with Bob Monnig Industries during the audit, and Bob Monnig Industries was given the opportunity to expand on their written responses. Only those sections of the MFSQA with significant discussion are addressed below:

Section A, Item 3. Monnig Industries will obtain a copy of ASTM E376 and retain on file. Pursuant to the Contract Special Provisions, fabricator will obtain and posses the latest copy of all applicable specification references.

Section E, Item 2. Certificate of Compliance from Zinc supplier will reflect conformity with ASTM B6. This requirement is referenced in ASTM 153.

Section P, Item 2. Monnig Industries quality control form will be revised to better identify the material throughout the process and document the galvanizing surface thickness. This form shall include heat numbers for traceability and galvanizing surface thickness with minimum and maximum limits as required in the contract.

Monnig industries will address process and procedures to test kettles for zinc composition in the Monnig Industries work plan.

Quality control measures shall address maintaining calibration records and written procedures to document these records.

Section R, Item 3c. Monnig Industries will address parameters for environmental concerns during blasting operation. These parameters include humidity, temperature and other environmental conditions that may affect the dry-grit blasting operation. These concerns and appropriate actions will be addressed in Monnig Industries work plan.

Section R, Item 3d. Adhering test results will be documented on the appropriate quality control form.

Observations during Facility Tour
The OSM Audit Team observed the following processes and conversations during the audit tour at Monnig Industries.

Mr. John Monnig conducted the tour of the Monnig Industries facilities; Mr. Jason Monnig provided the OSM audit team a diagram layout of Monnig Industries. The diagram was useful for identifying the different operations throughout the facility.

The entire facility is owned by Mr. John Monnig, which includes six large industrial units that are primarily used for galvanizing operations. Mr. Monnig also sub-leases space to Phoenix Industries in Unit 5 which is performing the blasting operation for the anchor rods on this contract.

The anchor rods will be shipped from the Dyson Corporation to the Monnig facility where it will be inspected by Monnig Industries QC personnel and stored in Unit 5. If the anchor rods are acceptable they will receive a Monnig Industries green identification tag, which indicates they were inspected and are approved to proceed to the next stage of galvanizing. Damaged anchor rods will receive a red identification tag. Red-tagged material is considered rejected and is not

allowed to proceed to the next stage of galvanizing; a non-conformance report will be written and the rejected anchor rods will be placed in a designated quarantine area.

Green-tagged anchor rods will be stored in Unit 5, where they will be dry-grit blasted. Unit 5 is an enclosed shop; however, limited environmental quality controls were noted during the tour. Additional controls would address contingency plans in the event of adverse weather conditions not conducive to dry-grit blasting.

Upon successful completion of the blasting operation by Phoenix Industries and inspection by Monnig Industries, the material will be transported to Unit 2 for the pre-flux process. The anchor rods will be transported by forklift using skids, hoists, and gantry cranes throughout the galvanizing process. Upon completion of the pre-flux process, the anchor rods will be submerged in one of three hot dip galvanizing kettles: two of the kettles are 25 feet long and the third is 32 feet long. The raw zinc material used for galvanizing is stored in Unit 3. Monnig Industries purchases the raw zinc material (Western Prime Grade) from Horsehead Corporation in Monaca, Pennsylvania.

During the morning audit meeting and during several stages of the tour, Monnig Industries was reminded that acid-pickling of the anchor rods is not permitted for this contract. Jason Monnig advised the OSM audit team that all personnel working on this project will be trained on the contract requirements as referenced in the Monnig work plans.

The contract provides a 4-hour time limit from blasting to initiation of hot-dip galvanizing. During the audit tour, Phoenix Industry and Monnig Industries workers were noted performing a dry run to resolve any issues prior to actual production. The SMR encouraged Mr. John Monnig to use a high grade of steel when performing the blasting dry run to better simulate the properties of the A354 BD rods.

Immediately after galvanizing the rods, QC personnel will brush the threads of the rods. The galvanized rods will be placed on racks adjacent to the galvanizing pits where QC personnel will check and record the galvanizing thickness, run a nut down the threaded portion of the rod, verify that lot identification is maintained, and perform an overall visual inspection of the final product. Conforming material will be identified by a QC tag and moved to Unit 2 or 3, where it will be stored until a Caltrans QA inspection. Following a successful QA inspection, the material will be released for shipment to the jobsite with Caltrans orange tags.

It should also be noted that Monnig Industries operates a mechanical galvanizing plant within this facility. The facility appears to be capable of producing galvanized products that meet the standards of the Department.

SUMMARY OF FINDINGS

Overall, the audit team generally found Monnig Industries capable of performing hot-dip galvanizing of threaded anchor rods as required by the contract.

In summary, the facility was able to demonstrate capabilities satisfactory to meet the contract requirements for performing hot-dip galvanizing provided the following Department Items of Concern (I.O.C.) for this facility are addressed:

1. *Documentation.* Pursuant to the requirements of the contract, Monnig Industries shall obtain and possess current copies of applicable specifications and required Certificates of Compliance. Monnig Industries has shown the ability to obtain this paperwork.

2. *Quality Control.* The policies and practices provided in the MFSQA appear to be adequate with some minor exceptions that were noted during the audit. Monnig Industries are aware of these concerns and are currently making revisions to their work plan to incorporate the necessary procedures to address these concerns. Monnig Industries shall incorporate the following in their revised work plan:
    a. Procedures for recording calibration records;
    b. Procedures and actions addressing environmental concerns during blasting operations;
    c. Procedures that will address documenting required QC test results on QC forms.

CONCLUSION

Based on the Office of Structural Materials Department audit of Monnig Industries and Phoenix Industries in Glasgow, Missouri, OSM recommends a **Contingent Pass** audit for hot-dip galvanizing of threaded anchor rods.

If you have any questions, please call Venkatesh Iyer, Structure Material Representative at (858) 967-6363, or Keith Hoffman at (510) 450-7765.

Signature on file

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering, and Testing Services

Office of Structural Materials

Photo 1. Automated control dry-grit blaster operated by Phoenix Industries in Unit 5.

Photo 2. Monnig Industries internal identification tags.

Photo 3. Galvanized components stored in the Monnig Industries yard. Material is supported by pallets, skids, and hoists while being transported by forklifts and gantry cranes through the facility.

Photo 4. A gantry crane transports components to the pickling area in one of the galvanizing units.

Photo 5. Components being pre-fluxed prior to hot-dip galvanizing.

Photo 6. Components being hot-dipped
in one of Monnig's three galvanizing kettles.

Photo 7. Components are placed on supports after hot-dip galvanizing.

Photo 8. Mechanical mill thickness gage used by Monnig Industries to measure galvanizing thickness on components.

Photo 9. Raw zinc material, supplied by Horsehead Industries, is stored in Unit 3.

Photo 10. Automated kettle controls.

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February 13, 2009

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-003482

Michael Flowers
Project Executive
American Bridge/Fluor, A JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Submittal 135, Rev. 4 – MFSQA for Stork Herron Testing Laboratory (STHL)

The Department has completed review of Submittal ABF-SUB-000135R04, "Manufacturing and Fabrication Self Qualification Audit (MFSQA) – Stork Herron Testing Laboratory," dated February 13, 2009. The submittal is "Approved," and accordingly, Mr. Shane Levermann may perform NDT (MT) on the Project for the Dyson Corporation.

If you have any questions, please contact Mohammad Fatemi (916) 813-3677.

Sincerely,

<<< ORIGINAL SIGNED >>>

GARY PURSELL
Resident Engineer

cc: Rick Morrow
Brian Boal
Gary Lai
Mohammad Fatemi
file: 05.03.01, 55.0135

July 27, 2007

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

OSM Department Audit of Stork Herron Testing Laboratory (SHTL) facilities based on the Manufacturing and Fabrication Self Qualification Audit (MFSQA) dated May 17, 2007.

OVERVIEW

Stork Herron Testing Laboratory (SHTL), in Cleveland, Ohio, a subcontractor for the Dyson Corporation, successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on May 17, 2007, per Special Provisions section 8-4.01. The Office of Structural Materials (OSM) performed a department audit at SHTL facilities in Cleveland, Ohio, on July 13, 2007. The audit team included Mr. John Kinsey and Mr. Markian Petrina.

On July 13, 2007, the audit team visited the SHTL facility and met with Mr. Gregory Cznadel, SHTL Quality Assurance Manager, Mr. Mark Bixby, Sales Manager, and Mr. Matt Novak, ASNT NDT Level III. Mr. Dan Radu, Steel Fabrication Manager and Mr. Charles Kanipicki, P.E., Quality Control Manager from American Bridge/Fluor, a Joint Venture (ABF), were present during the audit as well.

The overall scope of work to be provided by SHTL facilities was discussed. SHTL is to perform destructive mechanical testing as well as nondestructive testing (NDT) for Dyson Corporation.

AUDIT SUMMARY

The main objective of the department audit was to evaluate the overall capability of SHTL to test fasteners and fastener steel for the Self-Anchored Suspension (SAS) Bridge, to verify NDT compliance with SNT-TC-1A and CP-189 standards, and to verify the accuracy of the responses to the MFSQA. SHTL understanding of the contract documents was also discussed.

Discussions of MFSQA
All sections of the completed MFSQA were reviewed with SHTL during the audit, and SHTL was given the opportunity to expand on their written responses. Only those sections of significant concern are discussed below.

Section N, Item 1. Details were requested concerning traceability of materials. At SHTL, a policy that a manager must review all work orders before they are entered into the system. Once entered, all procedures and tests are recorded for a sample. Before accepting samples, SHTL ensures that they are capable of performing requested testing, and determine whether they have the specification. The specific test, if more than one variant exists, is also determined. Once entered into the system, to minimize errors, the customer's purchase order that follows the sample, not the SHTL work order, is the primary source of testing information for technicians.

Section N, Item 3. Heat and lot numbers are verified if present on customer purchase orders.

Section N, Item 6. A unique identification code, consisting of a 6-digit customer number, month, year, and sequential number, identifies each sample lot.

Section N, Item 7. In the event a lot fails, it is separated from other lots.

Section K. The NDT program at SHTL was reviewed. SHTL is to test ASTM A 490M bolts, which require magnetic particle testing (MT) with the added option of liquid penetrant testing (PT). Mr. Kinsey indicated that since Dyson has designated SHTL to perform NDT, MFSQA responses should be submitted for Section K, items 6 through 11 and 15.

The SHTL program complied with SNT-TC-1A 1980, which is outdated. The Written Practice did not specify a single Certifying Authority, as required: two individuals, identified as Level III personnel, had signed numerous documents. Qualifications were improperly documented, including absence of qualification expiration dates and improper categories listed for Mr. Novak's Level III qualifications.

Neither Mr. Novak, ASNT NDT Level III for MT and PT, nor Mr. Cznadel appeared conversant with the requirements for maintaining an NDT program. Mr. Kinsey provided general guidance, including the need to designate a Certifying Authority, the earliest acceptable SNT-TC-1A standard (2002) for the SAS project, and the necessity to bring certification documentation into compliance. SHTL was informed that once they conform to SNT-TC-1A 2002, they should submit revised Written Practice and personnel qualifications, along with MFSQA responses and testing procedures, to be qualified for NDT on this project.

Observations during Facility Tour

Mr. Cznadel led the tour through the SHTL facility. The overall impression in several areas is of some disorder. However, this is the consequence of an expansion and reorganization, and it is apparent that the disorder is being effectively managed and is not being allowed to affect testing operations. The receiving area is organized and free of clutter (Photograph 1).

In the receiving area, OSM auditors saw incoming Dyson material (Photograph 2) and observed Mr. Cznadel, as a manager, approved a work order, which the receiving clerk then logged in and labeled corresponding samples. The Dyson purchase order (Photograph 3) specified material

(shown in photograph) and tests (not visible in photograph); to minimize error, this document, not the work order, is the technician reference for testing. Near the receiving area, tested samples are stored for 30 days (Photograph 4).

The machine shop (Photograph 5) is large and appears to be efficiently-run and well organized. Samples are clearly marked whether by labeling (Photographs 6) or stenciling on smaller items (Photograph 7). When an item is cut into several pieces, as in Photograph 6, all component pieces are labeled with the previously-whole part's assigned number.

In the testing areas, a single technician determines which tests are to be performed for each sample, then researches the test specifications (Photograph 8) and provides them to the appropriate technician. OSM observed computerized tensile testing (Photograph 9) and manual hardness testing (Photograph 10) equipment that appeared to be properly calibrated. Faulty equipment was taken out of service, labeled, and stored (Photograph 11).

In all areas of SHTL, samples were maintained in an orderly fashion (Photograph 12).

The NDT area appeared to have the properly calibrated equipment (Photograph 13) appropriate for testing fasteners (Photograph 14), as well as necessary consumables.

At the front office area, OSM auditors were introduced to one of the report clerks. A manager approves every step of a sample's progress through SHTL; the documentation is then given to a report clerk, who prints and sends a report with an electronic signature. OSM auditors were satisfied that sufficient safeguards existed that a final review of printed test results, while desirable, was not strictly necessary.

SUMMARY OF FINDINGS

Overall, the audit team generally found SHTL facilities capable of performing mechanical testing of fastener components and base steel as required by the contract. However, SHTL did not at this time demonstrate the ability to maintain a proper NDT program.

In summary, the facility was able to demonstrate their capabilities are satisfactory to the contract requirements for performing mechanical testing but not NDT. The following Department Item of Concern (IOC) was noted for this facility:

NDT – Wrong standard, inadequate certification documentation, confusion over Certifying Authority.

CONCLUSION

Based on the Office of Structural Materials Department audit of SHTL facilities, OSM submits the following for Stork Herron Testing Laboratory:

- Mechanical Testing: recommend **Pass** audit;
- NDT: recommend a **Contingent Pass.** To receive a passing grade, Dyson Corporation must ensure that SHTL is in compliance with the correct version of SNT-TC-1A, the Written Practices are correct, and testing methods as well as necessary MFSQA responses are submitted.

If you have any questions, please call Venkatesh Iyer, Structure Materials Representative at (858) 967-6363, or Keith Hoffman at (510) 450-7765.

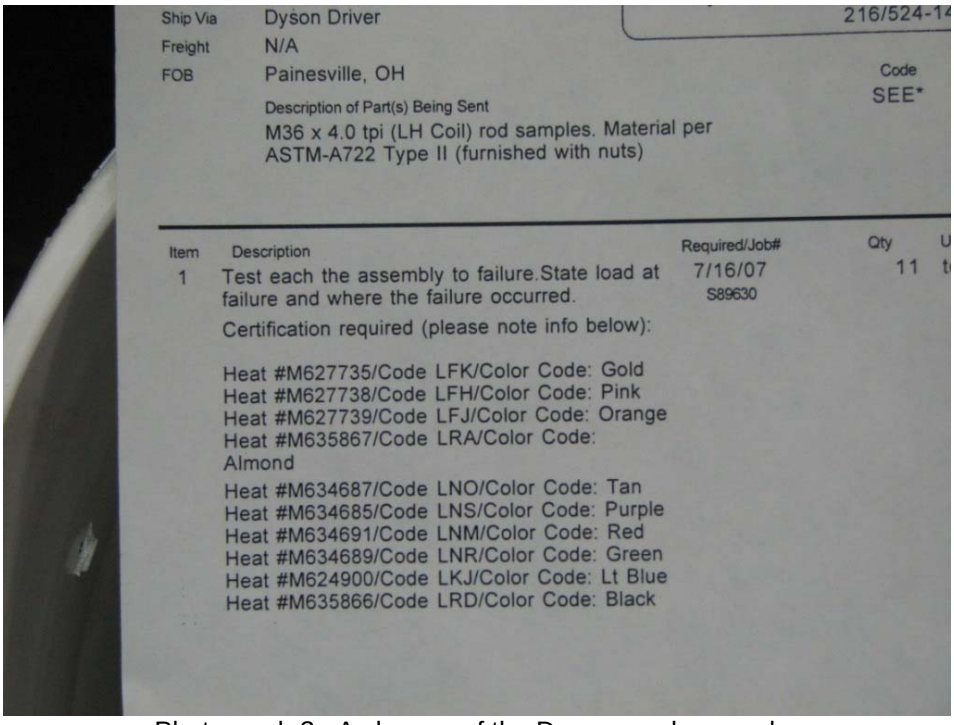
Signature on file

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

APPENDIX

Photograph 1. The SHTL receiving area has samples awaiting receiving.

Photograph 2. Dyson Corporation fastener assemblies are labeled and identified.



Ship Via Dyson Driver
Freight N/A
FOB Painesville, OH
216/524-14
Code SEE*

Description of Part(s) Being Sent
M36 x 4.0 tpi (LH Coil) rod samples. Material per ASTM-A722 Type II (furnished with nuts)

Item	Description	Required/Job#	Qty
1	Test each the assembly to failure.State load at failure and where the failure occurred.	7/16/07 S89630	11

Certification required (please note info below):

Heat #M627735/Code LFK/Color Code: Gold
Heat #M627738/Code LFH/Color Code: Pink
Heat #M627739/Code LFJ/Color Code: Orange
Heat #M635867/Code LRA/Color Code: Almond
Heat #M634687/Code LNO/Color Code: Tan
Heat #M634685/Code LNS/Color Code: Purple
Heat #M634691/Code LNM/Color Code: Red
Heat #M634689/Code LNR/Color Code: Green
Heat #M624900/Code LKJ/Color Code: Lt Blue
Heat #M635866/Code LRD/Color Code: Black

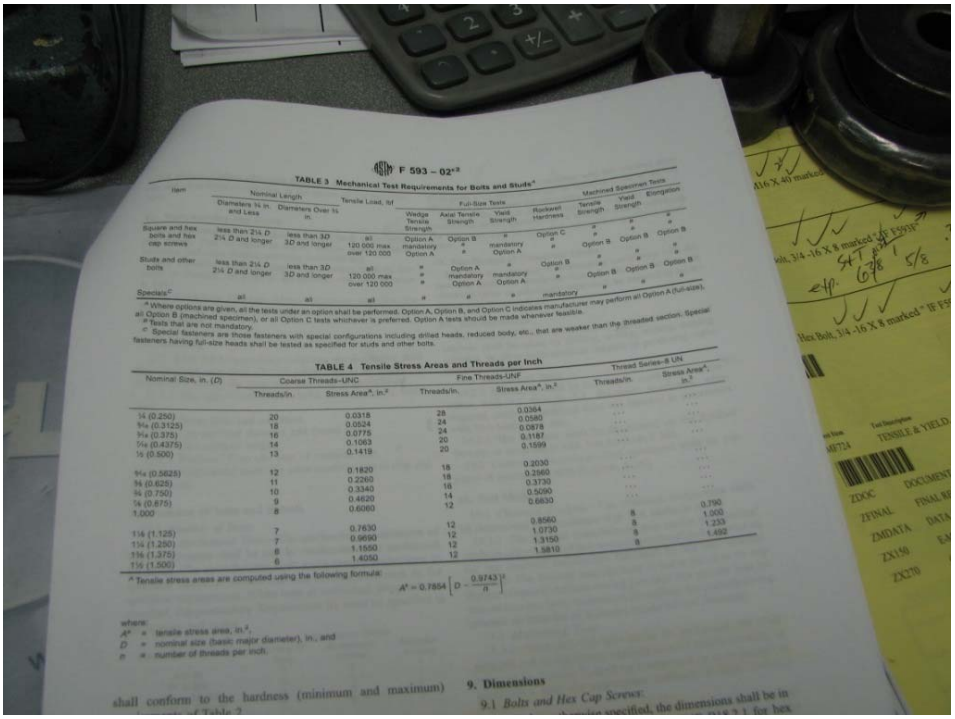
Photograph 3. A closeup of the Dyson purchase order shows identification for items shown in Photograph 2.

Photograph 4. The storage area for tested samples is orderly and organized.

Photograph 5. The SHTL machine shop is extensive.

Photograph 6. A sample, after cutting, shows its identification markings.

Photograph 7. Samples marked on the edges await machining at SHTL.



Photograph 8. The proper test specification (left) and sample tracking paperwork (right) were seen at a tensile testing bench.

Photograph 9. A computerized tensile testing machine performing a test.

Photograph 10. Hardness testing machines await samples at SHTL.

Photograph 11. Out-of-order equipment is clearly labeled, then stored, either until repaired or for spare parts.

Photograph 12. Samples awaiting testing are organized and clearly labeled.

Photograph 13. The MT testing equipment shows a current calibration sticker.

Photograph 14. This MT apparatus is suited for measuring fasteners.

REQUEST FOR INFORMATION (RFI)

Run Date: 3/18/13 10:27

RFI No: ABF-RFI-000846R00 **Submitted By:** Mackey, Kim **Pages:** 2

Rev: 0 **Pages Attached:** 1

RFI Dated: 02-Aug-2007 **Contact Name:** Kanapicki, Charles **Phone No.:** (510) 808-4600

Subject: Stork-Herron MFSQA Audit	
References:	
Sub/Supplier: DYS	**Sub RFI#:**
Response Required by: 10-Aug-2007	**Response affects critical path activity?**

Description:

The Department's audit report of Stork-Herron Testing Laboratory, a subcontractor to The Dyson Corporation, gave Stork-Herron a contingent pass. It is our understanding that the Department's audit team did not have any issues with Stork-Herron's mechanical testing capabilities and that the contingency has to do with Stork-Herron's NDT program. As such, will the Department allow Stork-Herron to perform mechanical testing only for The Dyson Corporation prior to Stork-Herron submitting and the Department accepting the required NDT documentation?

Contractor Disposition:

This RFI is being submitted for:

The Cost and Time Impact from this RFI is:

Response:

Agreed Ext. Due Date:

Pages: 1

Pages Attached: 0

The Contractor is correct in his understanding; the Contingent Pass given to Stork-Herron Testing Laboratory was solely due to their NDT procedure. Therefore, Stork-Herron may perform mechanical testing prior to the Department's acceptance of the required NDT documentation.

The facility was audited as a whole. Consequently, because the NDT did not pass, The Department could not give the entire facility a pass.

Administrative Action:

This response resolve the RFI. No further action required

Dated: 03-Aug-2007	**Respondent:** Rizzardo, Gina	**Phone No.:**

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program
333 Burma Rd.
Oakland, CA 94607
(510) 622-5660, (510) 286-0550 fax

Flex your power
Be energy efficient!

June 06, 2007

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-000296

Michael Flowers
Project Executive
American Bridge/Fluor Enterprises, a JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Submittal 136 - MFSQA for Tensile Testing Metallurgical Laboratory

The Department has reviewed submittal ABF-SUB-00136, "MFSQA for Tensile Testing Metallurgical Laboratory," dated May 23, 2007. This submittal is Approved and upon receipt and approval of the MFSQA documents for the remaining Dyson subcontractors, the Contractor may schedule a Department audit as required by Special Provisions, Section 8-4, "Audits."

If you have any further questions please contact Dr. Mazen Wahbeh at (818) 292-0659.

Sincerely,

Gary Pursell

GARY PURSELL
Resident Engineer

cc: Rick Morrow
file: 05.03.0, 55.0136

July 23, 2007

PROJECT INFORMATION

04-0120F4
Self Anchored Suspension Bridge

SUBJECT

OSM Department Audit of Tensile Testing Metallurgical Laboratory (TTML) facilities based on the Manufacturing and Fabrication Self Qualification Audit (MFSQA) dated May 18, 2007.

OVERVIEW

Tensile Testing Metallurgical Laboratory (TTML), in Cleveland, Ohio, a subcontractor for the Dyson Corporation, successfully completed the Material Fabrication Self-Qualification Audit (MFSQA) on May 18, 2007, per Special Provisions section 8-4.01. The Office of Structural Materials (OSM) performed a department audit at TTML facilities in Cleveland, Ohio, on July 11, 2007. The audit team included Mr. John Kinsey and Mr. Markian Petrina.

On July 11, 2007, the audit team visited the TTML facility and met with Mr. Jeffry Smith of the TTML management team. Mr. Dan Radu, Steel Fabrication Manager and Mr. Charles Kanipicki, P.E., Quality Control Manager from American Bridge/Fluor, a Joint Venture (ABF) were present during the audit as well.

The overall scope of work to be provided by TTML facilities was discussed. TTML will perform destructive mechanical testing for Dyson Corporation.

AUDIT SUMMARY

The main objective of the department audit was to evaluate the overall capability of TTML to test fasteners and fastener steel for the Self-Anchored Suspension (SAS) Bridge, and to verify the accuracy of the responses to the MFSQA. TTML's understanding of the contract documents was also discussed.

Discussions of MFSQA

All sections of the completed MFSQA were reviewed with TTML during the audit, and TTML was given the opportunity to expand on their written responses. Only those sections of significant concern are discussed below.

Additional details were requested concerning traceability of materials. During an extensive brief presented by Mr. Smith, OSM auditors saw a detailed description of receiving and traceability. TTML policy is to inspect samples thoroughly when they have been received, and to match them

to accompanying documentation. If discrepancies are noted, samples are placed on hold until the discrepancies are resolved. Once released for testing, a computer-generated number along with Julian date and sample number (001 to 999) for a particular date is assigned. This number remains with the sample and work order.

TTML has trained on ASTM F 1470, and the specification is available to those who require it. However, almost all sample sizes are determined by customers, who send TTML the desired number of samples to be tested.

TTML has no need to verify subcontractor suitability for this contract, because TTML will perform all Dyson work in-house. TTML subcontracts nondestructive testing (NDT), but does not expect to be responsible for NDT. In any event, TTML uses the same NDT laboratory as Dyson, Stork-Herron, which is detailed in a separate report.

Observations during Facility Tour

Mr. Smith led the tour through the TTML facility (Photographs 1 and 2). At the receiving area, OSM auditors observed clearly-marked materials (Photograph 3) with appropriate documentation. Photograph 4 shows the holding area for samples that have been entered into the traceability system and are awaiting preparation (machining, heat treatment, etc.) and testing. Mr. Smith stated that unverifiable samples are rejected and sent back.

Most samples are prepared for testing in the machine shop, Photographs 5 through 7. Mr. Smith explained the TTML policy for cutting and machining samples large enough that ensures the necessary size remains for testing after all machining.

Everywhere at TTML, samples awaiting a procedure (machining or testing) were arranged in an orderly fashion that minimized the chances for confusion (Photograph 8). All samples were marked with paint or some form of engraving should they become separated from their paperwork.

Some samples are heated in calibrated ovens (Photograph 9) in preparation for testing. One calibration sticker (Photograph 10) was observed to be blank or the markings leached off, which was brought to Mr. Smith's attention.

In the actual testing areas, orderly arrangement of samples continues, as in the machine shop (Photograph 11). Tensile testing is performed on one of several computerized machines (Photograph 12) or one of many mechanical machines (Photograph 13). Calibration stickers were seen on all tensile testing equipment, and appeared to be calibrated within six months (Photograph 14). Hardness testing machinery (Photograph 15) is also available in adequate numbers.

When tests are completed, the test forms are reviewed (Photograph 16) for accuracy. Results are sent to clients, and a copy is filed (Photograph 17) in an easily-accessible area.

SUMMARY OF FINDINGS

Overall, the audit team generally found TTML facilities capable of testing fastener components and base steel as required by the contract. TTML's ongoing experience working for Dyson on fastener testing and wide-ranging experience in fasteners makes it apparent that they are capable of performing the work required.

In summary, the facility was able to demonstrate their capabilities are satisfactory to the contract requirements for performing this portion of the work. No Department Items of Concern (IOC) were noted for this facility.

CONCLUSION

Based on the Office of Structural Materials Department audit of TTML facilities, OSM recommends Tensile Testing Metallurgical Laboratory be approved as a facility capable of performing the work and should receive a pass audit.

If you have any questions, please call Venkatesh Iyer, Structure Materials Representative at (858) 967-6363, or Keith Hoffman at (510) 450-7765.

Venkatesh S. Iyer, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

Document Number CAL 00

APPENDIX

Photograph 1. View of TTML shop floor shows part of the machine shop ; receiving area is below and to the right.

Photograph 2. Back records are kept in a secure area at TTML.

Photograph 3. Clearly-marked samples with documentation await disposition in the receiving area of TTML.

Photograph 4. Incoming samples have received work orders, traceability numbers, and are staged to await machining and testing.

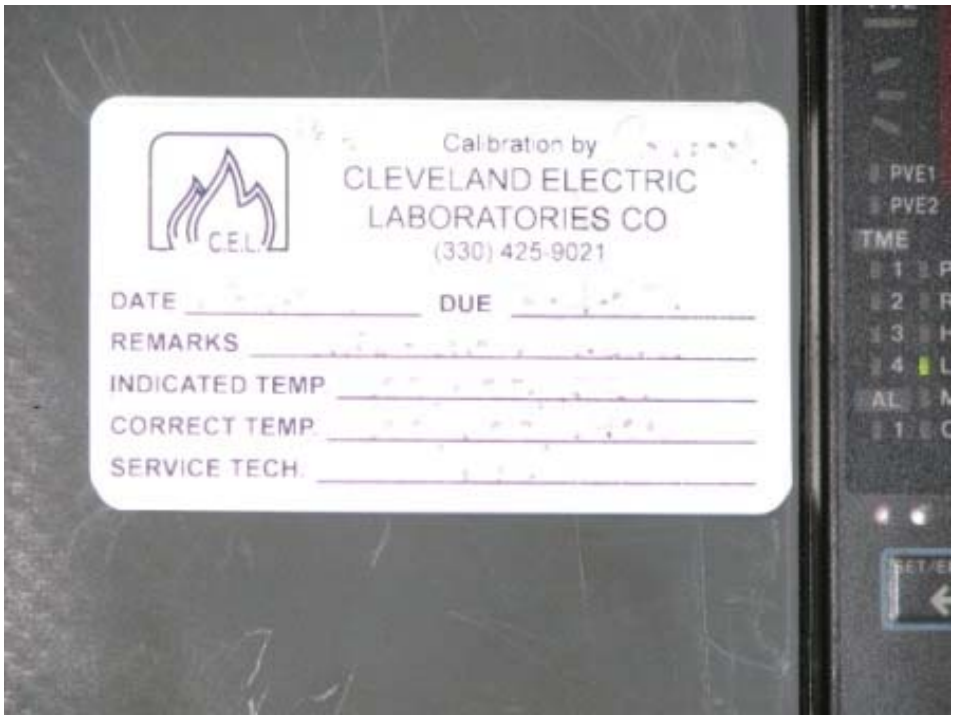
Photograph 5. The machine shop is neat and orderly, and is an important starting point for preparation of many test samples at TTML.

Photograph 6. Band saws in the machining area prepare samples for testing.

Photograph 7. Milling machine at TTML finishes sample preparation.

Photograph 8. Small samples have been cut and await milling at TTML.

Photograph 9. When required, samples are heat-treated in calibrated ovens



Photograph 10. Oven calibration sticker was observed with non-visible data.

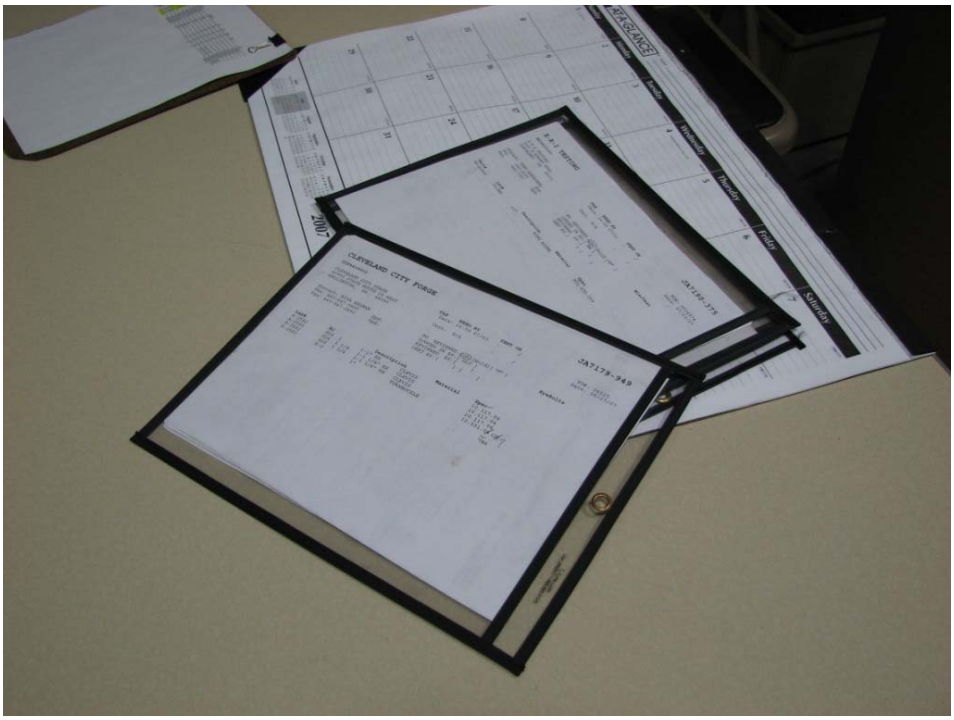
Photograph 11. Machined samples await tensile testing on the TTML computerized tensile testing machine.

Photograph 12. The computerized tensile testing machine destructively tests a machined sample at TTML.

Photograph 13. Tinius-Olsen mechanical (non-computerized) tensile testing machine at TTML. Most of TTML's machines are of this type.

Photograph 14. Printer for mechanical tensile testing machine at TTML shows a current calibration sticker.

Photograph 15. Hardness testing machine awaits a sample at TTML.



Photograph 16. Test result forms at TTML show traceability in the upper right hand corner: a unique identifier generated at receiving, Julian date, and job number for that date.

Photograph 17. TTML keeps testing records easily accessible and available for extended periods.

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge Program
333 Burma Rd.
Oakland, CA 94607
(510) 622-5660, (510) 286-0550 fax

Flex your power
Be energy efficient!

July 01, 2008

Contract No. 04-0120F4
04-SF-80-13.2 / 13.9
Self-Anchored Suspension Bridge
Letter No. 05.03.01-002312

Michael Flowers
Project Executive
American Bridge/Fluor, A JV
375 Burma Road
Oakland, CA 94607

Dear Michael Flowers,

Submittal 183, Rev. 1 - MFSQA for TC Industries (Response to Audit Contingencies)

The Department has completed the review of Submittal ABF-SUB-000183R01, "MFSQA for TC Industries, a subcontractor to The Dyson Corporation," dated June 20, 2008, which contains the response to the audit contingencies in State Letter 05.03.01-001379. The submittal is "Approved," and TC Industries is receiving a Pass.

It is acceptable for TC Industries to perform heat treatment services for The Dyson Corporation. The Contractor was verbally notified earlier on July 1, 2008 of the acceptable response to the audit contingencies.

If you have any questions, please contact Ryan Smith at (858) 232-6799.

Sincerely,

<<< ORIGINAL SIGNED >>>

GARY PURSELL
Resident Engineer

cc: Rick Morrow, Brian Boal, Gary Lai, Ryan Smith
file: 05.03.01, 55.0183

February 12, 2008

PROJECT INFORMATION

04-0120F4 - SFOBB Self Anchored Suspension (SAS) Bridge

SUBJECT

Department Audit of the TC Industries (TCI) Inc., Crystal Lake, IL, a heat treating subcontractor to The Dyson Corporation, who will provide special bolts, nuts, anchor rods and anchor bolts for bid items 45, 50, 52, 54, 56, 57, 60, 61, 66, 82 and 85.

OVERVIEW

The Dyson Corporation intends to manufacture long (more than 9 m) anchor rods for PWS cable system. For these long anchor rods, they would not be able to perform heat treatment within their facility. Therefore, they intend to use TCI as a sub to perform the heat treatment. TCI successfully completed the Manufacturing and Fabrication Self Qualification Audit (MFSQA) per Special Provisions, Section 8-4.01. The ABF-SUB-000183 was approved on July 09, 2007. Office of Structural Materials (OSM) scheduled a department audit of TCI facility in Crystal Lake, IL on January 25, 2008. The audit team included Mr. Ryan Smith P.E. and Mr. Jinesh Mehta P.E.

On the day of the audit, the audit team visited the TCI facility and met with Mr. Bill Weber (Division Manager, TCI), Mr. Pat Pipitone (Sales Manager, TCI), and Mr. Joshua Robach (6 Sigma Black Belt, TCI). Also in attendance from American Bridge/Fluor (ABF), was Mr. Charles Kanapicki (ABF Quality Control Manager (QCM)). It was noted that even though TCI was presented as a sub to Dyson, there was no representation from Dyson at the time of audit.

The overall scope of work was discussed and it was indicated that for this project, scope of TCI is limited to performing batch heat treatment for large anchor rods conforming to the relevant ASTM standards. They would perform testing to confirm hardness of material; however final testing and certification of anchor rods will be performed by Dyson. TCI Inc. has several other capabilities for variety of thermal processing, however with the limited scope, audit was limited to batch heat treatment for large anchor rods.

The audit began with a brief introduction of TCI history, experience and capacity. First established 1881, TCI is involved in several different segments of material processing. TCI's mill product division is performing commercial heat treatment for over 40 years. TCI is an ISO 9001 certified company and also possess A2LA certification for their lab. It was noted that they can perform heat treatment for up to 45' (13.5 m) long components. Thus, TCI is a leading commercial heat treater for large components.

Following the introduction, audit team provided brief information regarding uniqueness and high expectations associated with the SAS project and also briefly explained

Caltrans' process for Quality Assurance. This discussion was followed by a tour of the TCI facility, which was followed by a review of their responses to the MFSQA. An exit meeting was held during the afternoon to discuss the team's audit findings.

AUDIT SUMMARY

The main objective of the Department audit was to evaluate the overall capability of TCI to perform quality heat treating for large anchor rods for bid items 66. Their capability of processing these unique and large structural components was evaluated using the written responses to the MFSQA. Some of the related topics that were discussed with TCI included material control and traceability, in-process verifications, understanding of the material specifications and their quality control programs. The overall objective can be broken down in following segments.

- Their overall capability to perform quality heat treatment for large anchor rods
- Understanding of applicable specifications and maintain traceability
- Quality management system to provide consistent quality

The following summarizes our discussions, comments, and observations during the department audit:

Observations during Facility Tour

Mr. Bill Weber (Division Manager), Mr. Pat Pipitone (Sales Manager), and Mr. Joshua Robach (6 Sigma Black Belt), of TCI led the tour through the facility. In the beginning audit team inquired about the photography and TCI representative showed reservations towards taking pictures of their equipment. They requested not to take pictures of any equipment within their facility. Therefore, appendix includes pictures of their entire heat treatment facility except the operational equipment.

The audit team was first led to the material receiving area (Photograph 1 to 8). It was noted that TCI had very well organized shipping and receiving area. Received material was organized by sizes. Receiving inspection was performed, which even included verification of dimensional tolerances. To maintain proper traceability, in addition to regular tag, heat number were listed with permanent marker on the metal straps on both ends of the bundle. Once the reception inspection is complete material is issued a production order (Photograph 9). Production order is not issued until the reception inspection is clear.

Next, the audit team visited the entire heat treatment process. One of the heat treatment furnaces was in operation. A typical layout of the furnace is illustrated in photograph 10. Temperature compliance of different chambers was verified and was noted within their tolerances. It was also noted that various fixed parameter were posted next to different designated area for operator's benefit (Photographs 11 & 12). Organized and smooth

operations were observed at all equipment stations. It was also noted that strip charts for multiple thermocouples were being plotted.

During the tour, it was noted that there were two different heats being entered in the batch at the same time. One heat contained three bars and the other contained two bars and all five of them were of identical sizes (Photograph 15). The heat numbers were marked with some paint at the ends; however it appeared that marking can easily diminish during the heat treating/quenching process. Additionally, review of furnace report at that time did not show any note regarding location of different heats within the batch (Photograph 16). This raised a serious concern regarding mix-up of two different heats and loss of traceability.

Next the audit team inquired about calibrations of thermocouples. They indicated that they do not calibrate the furnace thermocouples but just perform verification of all furnace thermocouples every two weeks, using master thermocouples. Thermocouples are replaced when they deviate plus or minus ten degrees. However, this procedure was not documented and review of their work order did not confirm with stated variation. It appeared that it was left to electrician's discretion regarding when to replace the thermocouples. Audit team expressed that a procedure complying with manufacturer's recommendation and corresponding ASTM, for thermocouple calibration and verification, should be developed and enforced.

Upon inquiry it was noted that during any process, when non-conformance is found a non-conformance report is generated. The sales manager contacts the customer regarding the issue and determines whether QC needs to get involved. Based on customer's need necessary testing or modifications are made and finally they are resolved by the sales manager. Thus, QC's involvement in the process was determined and controlled by the sales department. Audit team expressed concern regarding handling of non-conformances by sales instead of quality department. They indicated that majority of their non-conformances are associated with quality of raw material and therefore they are better handled by sales. They also indicated that when non-conforming material is accepted by the customer, an exception note is made on the certification documenting that deviation.

At the end, the audit team visited the QC department and testing laboratory (Photographs 17 to 20). Several hardness testing equipment were available. All the equipment had current calibration stickers (Photograph 20) along with calibration block for hardness tester (Photograph 18). When asked, who signs off on the final report, it was indicated that QC Manager signs the report. However, based on review of typical report (which was forwarded to audit team at a later date), it was noted that the inspector performing the hardness testing is signing off on final inspection report and certificate of compliance (COC). No further review of his work was conducted. This appears to be violation of laboratory accreditation guideline ISO 17025, which requires authorizing person sign off on the report. Also, it is noted that the lack of review of inspector's report might increase chances of error in final report/COC.

Discussions of MFSQA

Following the plant tour, a detailed review of all relevant sections of the MFSQA was conducted in order to discuss and give the TCI representative the opportunity to expand on their written responses. Only the sections of significant concerns are discussed below:

- Section M, questions 14 and 15 asks if the fastener components were tested by a laboratory acknowledged by Caltrans or NIST (which follows ISO/IEC guide 25)? The response marked "NA", however they do perform hardness testing and they do have current A2LA lab accreditation. Therefore, their response to MFSQA was modified to "YES" instead of "NA."
- Under Section N, Material Receiving, it was noted that TCI has a very good and thorough system for material receiving. There is a very good system of multiple identification to avoid any lose in traceability during receiving or storage. This was also verified during the plant tour (Photograph 1 to 8).
- Section N, item 6 asks "Does the manufacturer have a material identification system to assure control of materials of different heats, lots and grade?" In response they marked "YES" and stated they mark heat numbers on bundles and bars. Audit team verified that they had a very good system for stored materials. However, when inquired about assigning lot numbers after each heat treatment batch, they indicated that they do not assign separate lot number after each batch. They assign one lot number to the entire heat of material, irrespective of number of heat treatment batches. They perform testing on the entire heat instead of testing each batch that is heat treated. They indicated that their method is in compliance with corresponding ASTM. However, based on review of material specification (ASTM A 354 section 9.4), it is noted that the a lot should be defined for each batch of heat treatment and testing should be performed accordingly for each lot.
- Section R, question 2 and 6 refers to organization chart, which would reflect commitment to the quality and independence of quality control from production. In the MFSQA TCI had attached an organization chart meeting this requirement. However, this chart was for the entire firm and therefore a facility specific chart was requested for their Mill Product Division (MPD). An organization chart for MPD was submitted at a later date. Based on review of the chart it was noted that the QA manager works for VP of operations. Also, it was noted that during the tour that items like non-conformance reports and furnace thermocouple verifications were primarily handled by other departments. It appeared that QC department works as an ancillary structure and gets involved in the issues only when consulted by production or sales.

SUMMARY OF FINDINGS

Overall, the audit team generally found that TCI has a good material receiving system, lots of experience and credentials; however during heat treatment processing the process of lot identification does not comply with ASTM requirements. Overall facility has

capability to perform heat treatment on large anchor rods; however there are Items of Concerns, as noted below, should be addressed before any of the project work is performed by TCI.

Items of Concern:

Lot Identification and Traceability – TCI should define lot as batch that is heat treated as required by ASTM A 354 and perform sampling and testing in accordance with those lots instead of heat lots. Additionally, TCI should take extra precaution to make sure that when two different heats are heat treated in the same batch, permanent identifications are made to avoid any mix-up in different heats. A procedure for such scenario should be documented and enforced.

Calibration of Thermocouples: For furnace thermocouple calibration and verification, a procedure complying with manufacturer's recommendation and corresponding ASTM tolerances, should be developed and enforced.

Certificate of Compliance: Even though it was stated that QC Manager signs off the final certificate, it was noted that final Certificate of Compliance was signed off by the inspector performing the testing on the material. TCI should clarify their standard practice and make sure that test results are reviewed and signed off by authorizing personnel, as stated during the audit.

Lack of Involvement of Quality Control: It was noted that involvement of quality department lacked in various quality functions like handling of non-conformances, verification of equipment etc. This poses a concern that a problem might remain undetected due to lack of review or involvement from quality. TCI shall address the Department's concern and submit it in writing for the Department's review.

Findings:

No findings were noted during the audit.

CONCLUSION

The audit team concluded the following:

- **Heat Treatment Capability:** TCI generally demonstrated to the audit team that they have the experience, engineering support, and equipment capacity to perform quality large component batch heat treatment for anchor rods for the project.
- **Sense of Commitment to Quality:** During the visit the audit team sensed the company has a strong commitment to produce a quality product. Company showed a quality conscious attitude, and maintains various quality certifications to support their practice. However, certain practices did not comply with the corresponding specifications or standards.

- **Management Team:** TCI management team has tremendous experience in the heat treatment however needs some changes in their system to comply with corresponding standards and maintain quality standards.

RECOMMENDATION

Based on the Department audit of TCI facility, OSM recommends TCI receive a Contingent Pass, the above mentioned item of concerns should be addressed via ABF and submitted to Caltrans for review and approval.

During the closing meeting, TCI acknowledged some of these concerns and showed willingness to work on the items of concerns.

If you have any questions, please call Mazen Wahbeh, Structure Materials Representative at (818) 292-0659, or Keith Hoffman at (510) 450-7765.

Signature on file

MAZEN WAHBEH, Ph.D., P.E.
Structural Materials Representative
Division of Engineering Services
Materials, Engineering and Testing Services
Office of Structural Materials

cc: Dan Speer, Keith Hoffman

APPENDIX A – PHOTOS

Photograph 1: Well organized shipping and receiving area

Photograph 2: Well stacked bundles of materials with proper IDs

Photograph 3: Proper stacking of materials to avoid any damage

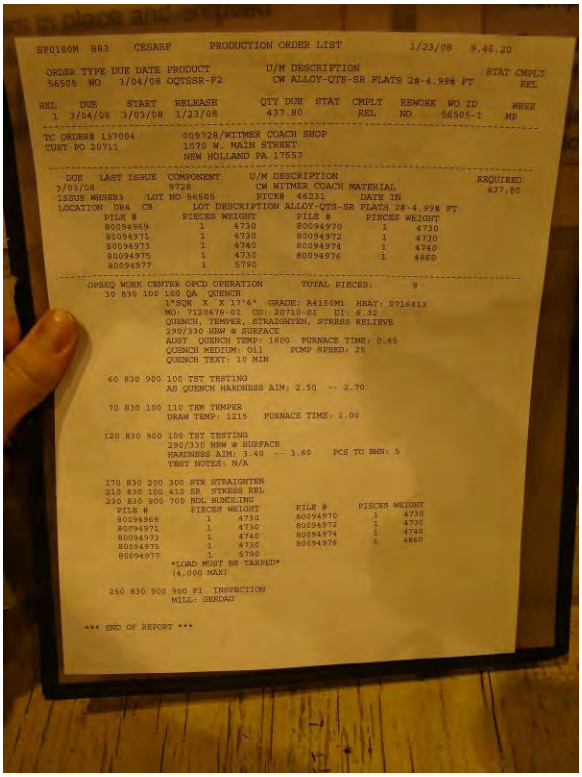
Photograph 4: Tags were well secured and identifiable for all the materials

Photograph 5: Well organized materials as per sizes

Photograph 6: Proper labeling of materials

Photograph 7: Heat numbers marked on metals straps of each bundle

Photograph 8: Materials stored inside, waiting to be processed



SP0180M 883 CRSARF PRODUCTION ORDER LIST 1/23/08 9.46.20

ORDER TYPE DUE DATE PRODUCT U/M DESCRIPTION STAT CMPLT
56505 WO 3/04/08 QQTSSR-F2 CW ALLOY-QTS-SR FLATS 2#-4.99# FT REL

REL DUE START RELEASE QTY DUE STAT CMPLT REWORK WO ID MRSE
1 3/04/08 3/03/08 1/23/08 437.80 REL NO 56505-1 MP

TC ORDER# 137004 009728/WITMER COACH SHOP
CUST PO 20711 1070 W. MAIN STREET
NEW HOLLAND PA 17557

DUE LAST ISSUE COMPONENT U/M DESCRIPTION REQUIRED
3/01/08 9728 CW WITMER COACH MATERIAL 437.80
ISSUE WHSE#3 LOT NO 56505 PICK# 46231 DATE IN
LOCATION DR4 C8 LOT DESCRIPTION ALLOY-QTS-SR FLATS 2#-4.99# FT

PILE #	PIECES	WEIGHT	PILE #	PIECES	WEIGHT
80094969	1	4730	80094970	1	4730
80094971	1	4730	80094972	1	4730
80094973	1	4740	80094974	1	4740
80094975	1	4730	80094976	1	4860
80094977	1	5790			

OPSEQ WORK CENTER OPCD OPERATION TOTAL PIECES: 9
30 830 100 100 QA QUENCH
1"SQR X X 17'6" GRADE: A4150M1 HEAT: 0716413
MO: 7120676-01 CO: 20710-01 DI: 6.32
QUENCH, TEMPER, STRAIGHTEN, STRESS RELIEVE
290/330 HBW @ SURFACE
AUST QUENCH TEMP: 1600 FURNACE TIME: 0.45
QUENCH MEDIUM: Oil PUMP SPEED: 25
QUENCH TEXT: 10 MIN

60 830 900 105 TST TESTING
AS QUENCH HARDNESS AIM: 2.50 -- 2.70

70 830 100 110 TEM TEMPER
DRAW TEMP: 1215 FURNACE TIME: 1.00

120 830 900 100 TST TESTING
290/330 HBW @ SURFACE
HARDNESS AIM: 3.40 -- 3.60 PCS TO BRN: 5
TEST NOTES: N/A

170 830 200 300 STR STRAIGHTEN
210 830 100 410 SR STRESS REL
230 830 900 700 RDL BUNDLING

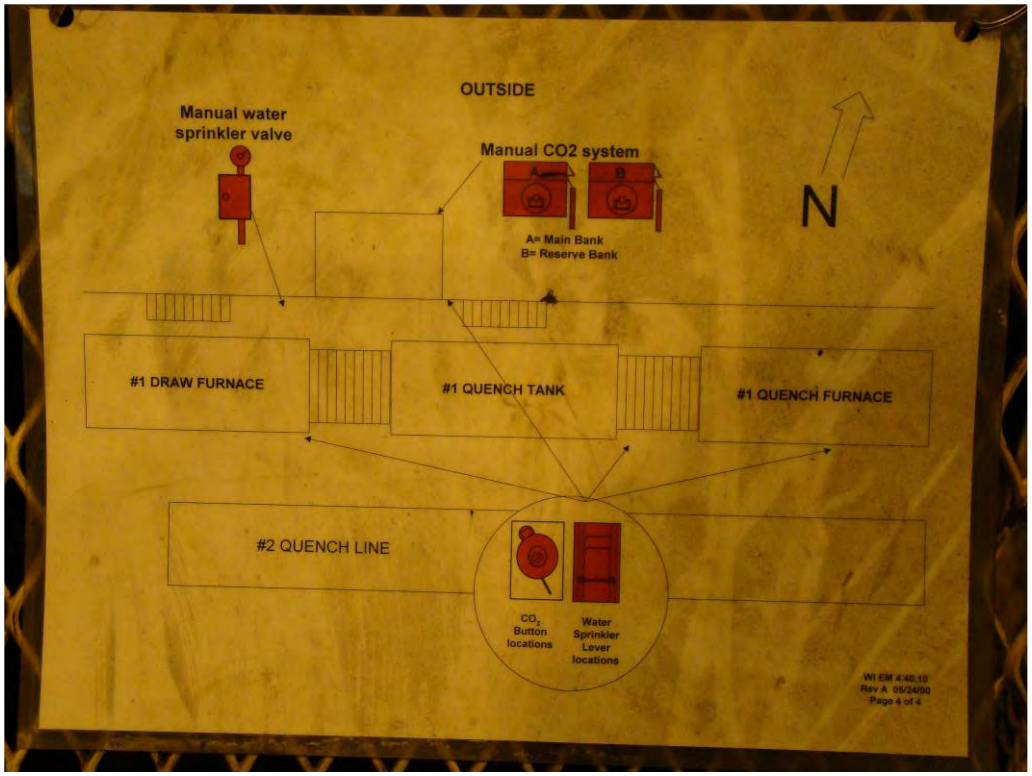
PILE #	PIECES	WEIGHT	PILE #	PIECES	WEIGHT
80094969	1	4730	80094970	1	4730
80094971	1	4730	80094972	1	4730
80094973	1	4740	80094974	1	4740
80094975	1	4730	80094976	1	4860
80094977	1	5790			

LOAD MUST BE TARPED
(4,000 MAX)

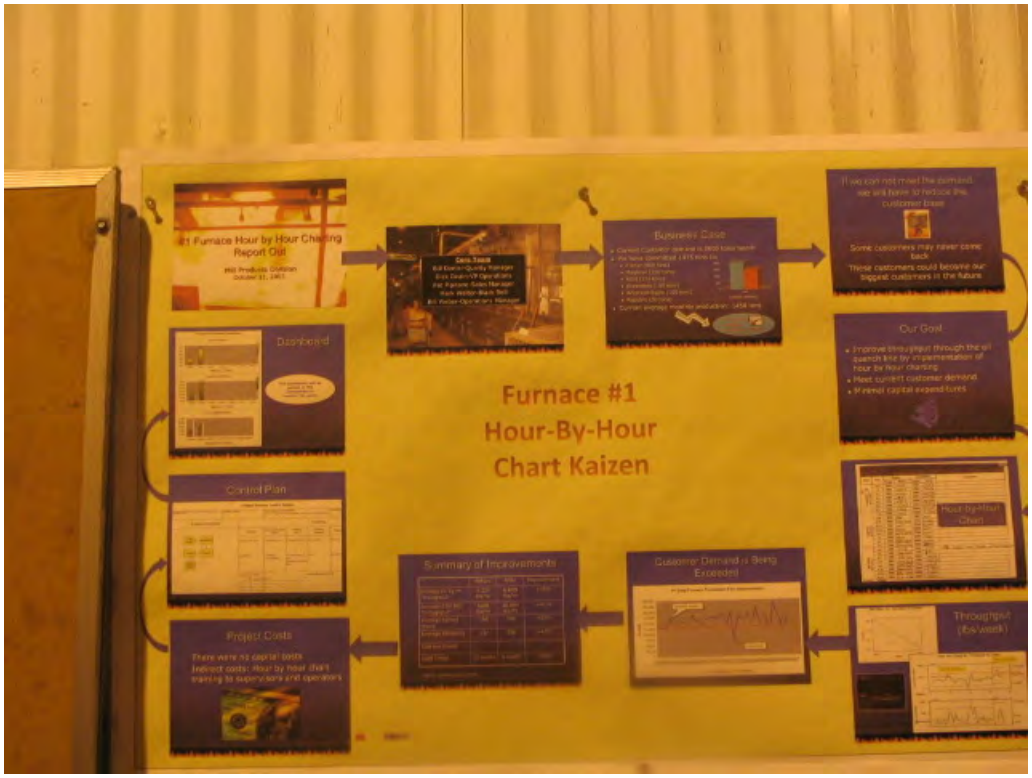
250 830 900 900 FI INSPECTION
MILL: GERDAU

*** END OF REPORT ***

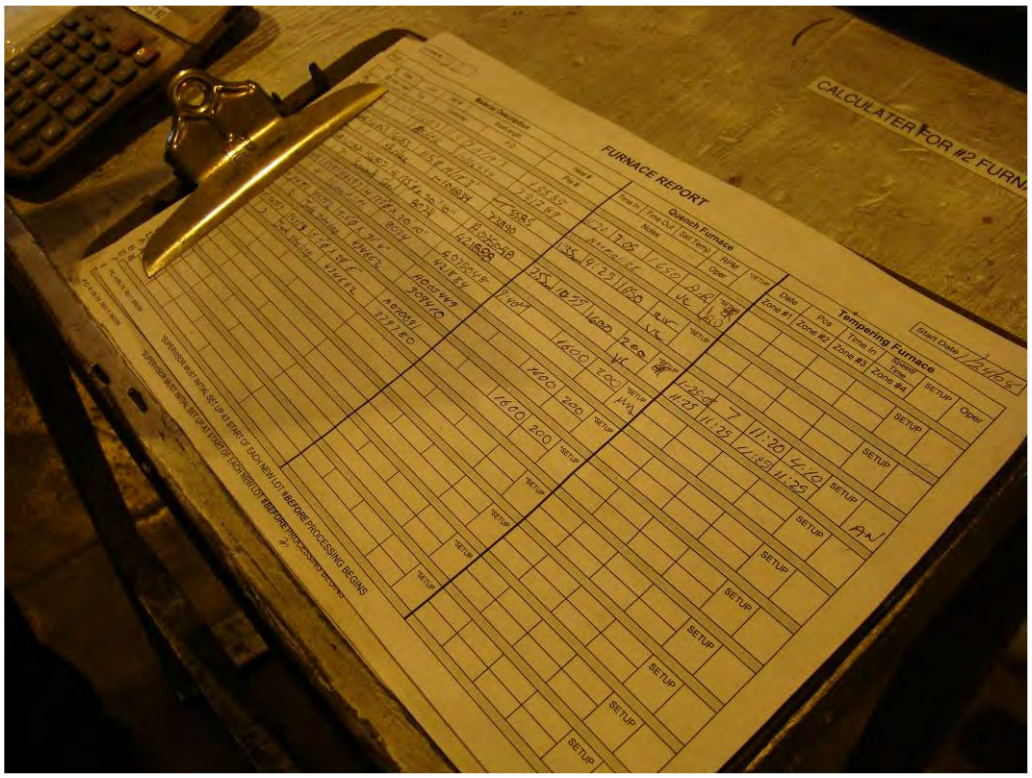
Photograph 9: Typical production order, listing all the steps of processing



Photograph 10: Layout of a heat treatment furnace

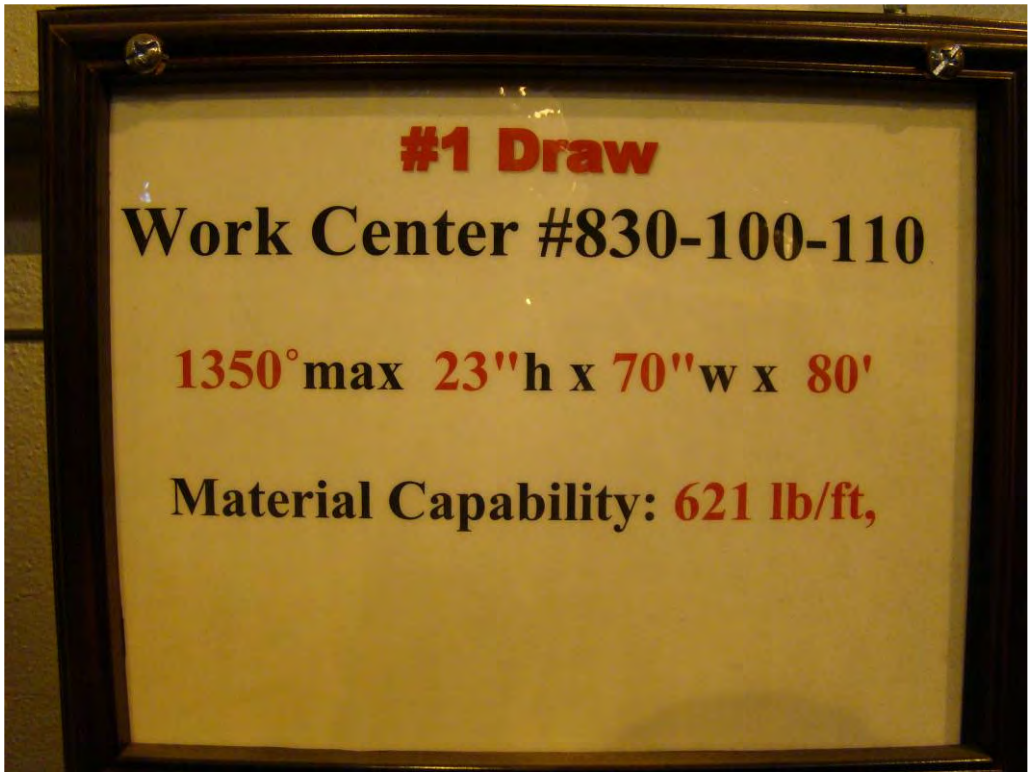


Photograph 11: Processing char for furnace no. 1



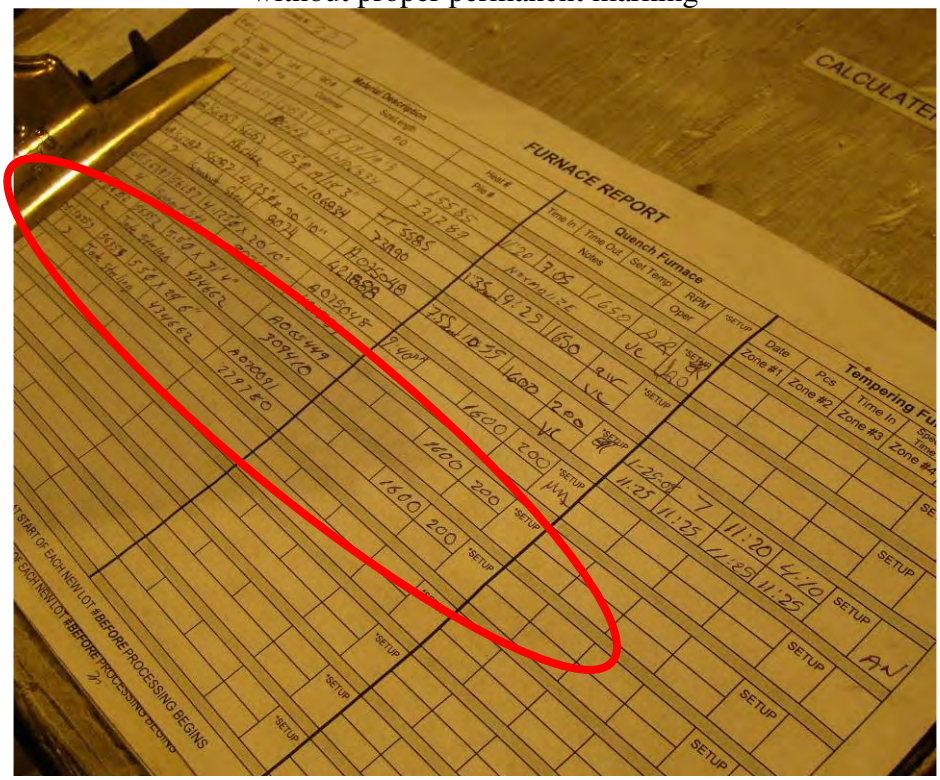
Photograph 12: Operator's furnace report, documenting various parameters

Photograph 13: Quench oil tank parameters posted



Photograph 14: Posted parameters for #1 draw

Photograph 15: Two different heats (identical sizes) being processed in single batch, without proper permanent marking



Photograph 16: Furnace report, when inquiry about above heats was made (Did not show position of two heats placed in the same batch)

Photograph 17: Digital hardness tester

Photograph 18: Standard blocks for hardness tester verification

Photograph 19: Hardness tester

Photograph 20: Calibration sticker showing current calibration