DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

N759667175

FACILITY: DEXTER FASTENER TECHNOLOGIES INC.		**SRN / ID:** N7596
LOCATION: 2110 BISHOP CIRCLE EAST, DEXTER		**DISTRICT:** Jackson
CITY: DEXTER		**COUNTY:** WASHTENAW
CONTACT: Don Semones , Environmental, Health & Safety Manager		**ACTIVITY DATE:** 04/19/2023
STAFF: Mike Kovalchick	**COMPLIANCE STATUS:** Non Compliance	**SOURCE CLASS:** MINOR
SUBJECT: Compliance inspection. Heat treat lines operating under Rule 290 permit exemption However, Company failed to consider potential hexavalent chromium emissions that can be generated from these types of facilities. This makes use of Rule 290 inappropriate.		
RESOLVED COMPLAINTS:		

Minor Source: Compliance Inspection SRN N7596

Contacts

Don Semones, EH&S Manager

(734)426-5200

DSemones@dextech.net

Joseph Kopacz, Engineering Manager

(734)426-5200

Jkopacz@dextech.net

Purpose

On April 19, 2023, I conducted an unannounced compliance inspection of Dexter Fastener Technologies, Inc. in Dexter, MI. This is a minor source that operates using Permit to Install (PTI) exemptions for their various cold forming, heat treating, and packaging processes.

Facility Location

The Company is located inside an industrial park within the City of Dexter. There is a large residential subdivision just east of the facility. Heat treat stacks are about 350 feet away from the nearest homes with actual building 140 feet away.

Background

The facility was last inspected on 3/15/2016 and found to be in compliance.

Dexter Fastener Technologies manufactures bolts used in the automotive industry. Their process consists of straightening, cutting and forming wire of various gauges to the product specification of their customers. Large spools of wire are fed into the cold forming machines

whereby it is pulled and hammered straight. (Note: Cold forming machines exhaust indoors to small ESP's which are used to remove oil mist generated from heated header oil. They are exempt per Rule 285(2)(l)(i) or(l)(vi).) Next, the wire is cut to length, depending on the bolt's application. The slug of wire is then struck to form the head of the bolt. These blank bolts are finally forced through a die that forms the threads and the bolts are ejected from the machine. From there, bolts are heat treated in another machine to increase strength. The heat-treating process heats the bolts in a furnace fired by Rx Gas and subsequently quenched in oil. The heat treat furnace (quench furnace) is followed by a tempering furnace that completes the process. Vaporized quench oil is tracked for Rule 290 as particulate matter (PM). Following heat treating, some bolts are assembled with a washer; others are threaded or staged to be sent out for plating. Those bolts not receiving further processing are packaged.

The following is a detailed description of the heat treat line provided by the Company:

In general, parts (either threaded or non-threaded bolts) of various sizes enter a furnace line through an automated feeding system. The feeding system begins with a process can or tub dumper which deposits the parts into a weighing and metering system. Parts are then metered out to a Pre-wash process. The Pre-wash process conveys parts through a dip tank containing a water and detergent solution then through a water spray followed by forced-air drying. The Pre-wash process effectively removes residual oils left on the parts from the heading and thread rolling processes. The parts are then conveyed to a ram hopper which services to orient and meter the parts out in lot quantities to a continuously running quench furnace mesh belt conveyor.

The mesh belt conveyor moves parts into the pre-heat section of the quench furnace where they receive initial exposure to elevated temperatures. This section of the furnace is open to the atmosphere and exhaust gases are directed via collection hood and exhaust stack directly to the roof for discharge. On smaller furnaces, the pre-heat section exhaust stack is tied into the combustion discharge stack inside the building to form one exhaust stack to the roof.

The conveyor continuously moves the parts through the various zones of the controlled atmosphere quench furnace. There are typically four temperature zones within the furnace where temperatures range from 840 to 890°C and effect chemical changes in the steel. The atmosphere is controlled b using an endothermic Rx gas. Rx gas is typically 0.4% CO2, 20% CO, 40% H_2, trace amounts of CH_4 and the remainder N_2. This

gas is generated on site. The quench furnace uses natural gas combustion to generate heat. The natural gas combustion exhaust is discharged on both sides of the furnaces to a collection hood and then discharged to a roof exhaust stack. Smaller furnaces have combustion discharges (along with pre-heat section discharge) combined inside the building to form one roof exhaust stack.

Parts exit the quench furnace through an oil curtain that limits escape of the controlled atmosphere and prevents ambient air contact. This oil curtain is vented to a flare inside the building with post flare discharges vented to a roof exhaust stack. Parts drop from the quench furnace conveyor through the oil curtain into quench oil which at 70 to 90°C. Parts are conveyed out of the quench oil tank, through forced-air drying, onto a Mid-wash process. The Mid-wash process conveys parts through a dip tank containing a water and detergent solution then through a water spray followed by forced-air drying. The Mid-wash effectively removes residual quench oil from the parts.

The parts are then fed to a ram hopper for orientation and staging prior to entry into a temper furnace. Parts are metered onto a continuous mesh belt conveyor and enter the controlled atmosphere temper furnace where they are heated to 430 to 600°C depending on the desired final material properties. The atmosphere is controlled by the addition of an exothermic Dx gas. Typical Dx gas is comprised of 0.5% CO_2, 11% CO 0.5% H_2, trace amounts of CH_4, and the remainder N2. This gas is generated on site. Parts exit the temper furnace and are either placed into process cans or us directly, or passed through a soluble oil, are then placed in process cans or tubs. The temper furnaces are either electrically heated or with natural gas and have a collection and discharge stack at the entry and exit to the furnace. The largest temper furnace is rated at 270 kW (921,900 Btu/hr)

Production capacity depends on the particular heat treatment line ranging from 700 to 1000 kg/hour.

Compliance Evaluation

Upon arriving at the facility, a light oily smell was present in the parking lot and loud noises were emanating from open bay doors. (Note: Oily smell was also present throughout the inside of the building including in the offices along with slight decrease in visibility/haze in the production area.) No opacity could be seen coming from the roof.

This Company currently utilizes the Rule 290 permit exemption for their Heat Treat furnace lines, of which they are labelled A through I. They

have 9 heat treat lines but 1 of the lines (Line A) is no longer able to function. However, there are plans to rebuild/restart a new line within the next year.

The Company first started operating under Rule 290 in 2002. This happened after an internal audit showed that the Company was operating 5 heat treat lines without an air permit. The Company initially indicated that they would provide a PTI application to AQD but instead submitted a Rule 290 demonstration. (Note: AQD does not have a formal process to approve exemption requests.) The Rule 290 demonstration showed adherences for all the pollutants identified.

Various records were requested during the inspection and provided on 4/24/23. This included steel specifications for the wire used in the cold forming machines (Shows that it contains up to 0.9% chromium.), SDS for the quench oil, SDS for the header oil used in the cold forge machines, SDS for the coating they use in their spin-dip coating line (very low VOC), and fuel consumption used in the furnaces.

During previous inspection, an emergency backup generator rated at 153.2 HP was inspected and required EPA Exhaust Emission Compliance Statement required by 40 CFR Part 60 Subpart JJJJ was provided. (Not inspected during this visit.)

Summary

I held a pre-meeting with Don and Joe to discuss the purpose of my visit. I outlined that EPA's toxic release inventory showed that the Company generated 12,000 pounds of chromium waste in 2021 and I was concerned about potential hexavalent chromium (Cr6) air emissions They explained that milling metal waste contains around 0.9% chromium. It is sent to a recycler. They said they were unaware that their heat treat lines could emit Cr6. We discussed the process and layout of the facility. From there, we headed into the facility to walk through the different process areas.

I observed the process from beginning to end; starting with the cold forming process, continuing to heat treating (see attached photo), and finishing up with a visit to the control room and coating line. (See attached photo.) The heat treating line has exhaust points in the preheat section, combustion exhaust discharge, quench oil curtain flare discharge, (Coating line is currently underutilized using less than 200 gallons/month.) Control room showed a set point of 880°C (see attached photo) in the quenching furnaces and 460°C in the tempering furnaces. (Final packaging building not visited.) We also went up to the roof to

view a host of different stacks, each corresponding to a different furnace. (See attached photo.) Don informed me that he had a camera placed on the roof that allows him to view the stacks on a continuous basis. No opacity was noted. Don indicated that occasionally, opacity is noted. It can be seen from the camera. Once identified, it is quickly resolved generally by tuning a burner. All the furnace stacks are located on a roof that is 35 to 40 feet above the ground. Each stack extends 5 feet above the roof and equipped with a rain cap.

Having completed the facility tour, we headed back to the conference room and discussed the records that I requested and when I expected them to be provided. I then exited the facility.

After the inspection, I researched heat treat furnaces emissions. Based on my review, it appears that hexavalent chromium (Cr6) emissions cam be generated from the heat treat furnaces. (Note: Cr6 is harmful via inhalation, ingestion or via skin exposure.)

Cr6 forms when solid chromium on the surface of metal is exposed to high heat. I was able to locate a heat treat facility in California with similar Cr content in the metal and similar operating temperatures that stack tested a concentration of 24,500 ng/m^3 of Cr6. (24 µg /m^3). Note that the Initial Risk Screening Level (IRSL) for Cr6 is only 0.000083 µg /m^3 so even very small amounts of Cr6 emissions are meaningful. (Note: IRSL would be the concentration of a pollutant for a defined time period as modeled at the fence line of a facility that would result in an increase of 1 in a million cancer risk.) Refer to this link: http://www.aqmd.gov/docs/default-source/Agendas/Governing-Board/2018/2018-nov2-028.pdf?sfvrsn=8 and this link: http://www.aqmd.gov/docs/default-source/compliance/Carlton-Forge-Works/aerocraft-16-334.pdf

Rule 290 permit exemption cannot be applied to processes that generate air containments that have an IRSL less than 0.04 micrograms per cubic meter. Rule 290 has no de minims value so if there is any Cr6 emissions, the exemption cannot be used; hence the Company should not have been using Rule 290 to maintain their exemption status. (Note: A small amount of nickel would also be expected to be emitted from the process which would also not meet the IRSL.) Rule 282 also is not applicable due to the presence of oil quench tanks.

Potential Title 5/Renewable Operating Permit applicability issues were also reviewed. Potential to emit calculations were found in our files that dated back to 2006. At that time, there were 6 furnace lines.

NOx PTE 27.6 tons, CO PTE 27.8 tons, PM PTE 2.1 tons, SO2 PTE 0.17 tons, VOC PTE 1.5 tons, HAP PTE of 0.5 tons.

It appears that with 8 furnace lines, the facility would still fall short of major source thresholds. Note: If actual NOx or CO emissions exceed 40 tons per year, the Company would be required to submit annual emission reports to the Michigan Air Emissions Reporting System. (MAERS). Also note that beginning in 2024 for reporting year 2023, MiEnviro Portal will be used for emission reporting.)

Compliance Status and Recommendations

I have determined that this facility is out of compliance with the Rule 201 for the 8 heat treatment lines. A Violation Notice will be issued. The Company will be given 21 days to respond. An acceptable compliance plan to resolve the violation in this case may include submitting a Permit to Install application for the 8 furnace lines along with conducting representative Cr6 stack testing of one of the furnace lines to determine Cr6 emissions from the facility.

Image 1(Coating Line) : Dip/spin coating line that uses low VOC coatings.

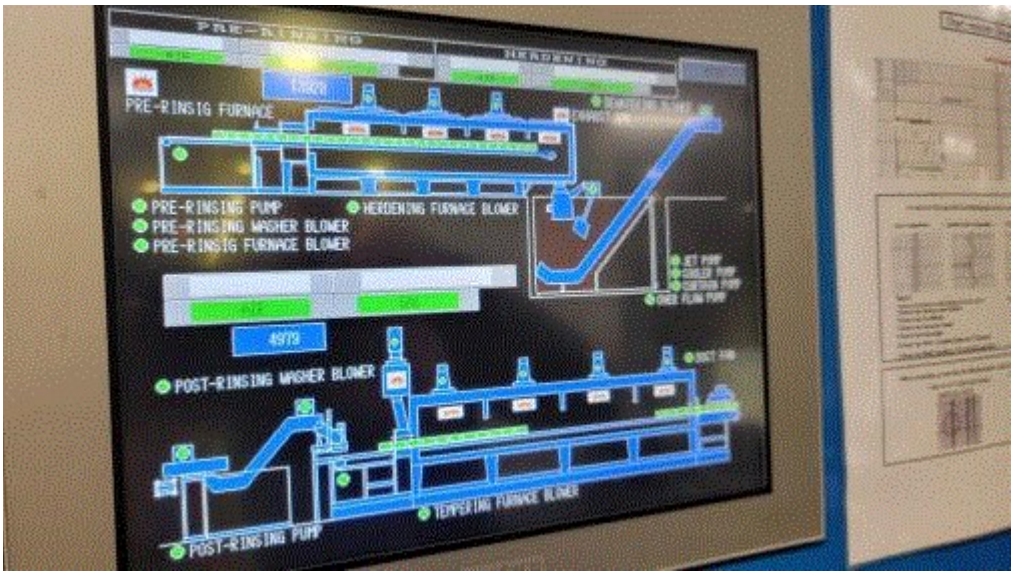

Image 2(Control Room Display) : Control room furnace display panel

Image 3(Furnace) : Furnace

Image 4(Roof View) : View of nearby residential neighborhood.

Image 5(Roof stacks) : Furnace roof stacks.

Image 6(Temp set points) : Furnace temperature set points.

NAME _____ DATE _____ SUPERVISOR _____