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## Black Oxide Project: Full Interview with ZFX Shop Foreman Dylan Lightfoot September 7, 2007

E: Tell me about the Black Oxide Project.

D: It sounds very mysterious, doesn't it – even foreboding. It's actually nothing new. It's a chemical process, also called passivation, which both darkens ferrous metals by immersion in alkaline salts and makes them rust-resistant. Any local metal finishing or plating firm is set up to do black oxide. Gunsmiths have small black oxide set-ups, only when they do it, it's called bluing. Basically, a piece of metal is run through a series of chemical treatments and rinses, maintained at specific concentrations and temperatures, which results in a black, dark brown or deep blue finish.

E: What, then, is different about what ZFX is trying to do?

D: First, we are trying to blacken stainless steel wire rope. Blackening stainless isn't unheard of: the military does it, and the vendor we use for our chemicals actually makes salts that meet military specifications. But some people I talked to seemed to think I was a little bit stupid when I asked about products or processes for blackening stainless steel, which is already rust-proof, so it's not all that common.

Second, our goal is not to dip discrete lengths of coiled wire rope in vats of chemicals, as has been done for us by outsource firms in the past. This way of doing things only gives a certain length of wire rope the treatment, which is naturally limiting. Also, there have been problems with quality control: black oxide, if done improperly, will give a non-adherent finish, leave residual chemicals inside the strands, and possibly render the rope brittle. What we want to do is develop a highly controlled black oxide rig that will continually feed 5,000 foot spools of stainless wire rope through the various treatments via a system of pulleys, spooling it back up at the end for shipment or dispensation. The rig we are planning will do two spools per day, or about ten miles of wire rope in a week.

E: That is so cool! Tell me more!

D: Well, there will be six steel tanks. First there is a heated alkaline cleaner, then a water rinse, then an activation of sulfuric acid heated to 180 degrees – this preps the stainless to take the black oxide – then another water rinse, then the black oxide at 245 degrees, then a final rinse. The last stage is a water-displacing oil bath that purges the remaining chemicals and gives a nice shiny, lubricated finish. It's all very sexy. Our pulley system will have to be designed to handle the heat and the extremes of acidity and alkalinity. There will also be automated systems for controlling temperature, and to add water as needed to maintain chemical concentrations.

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#### Development Facility

611 Industry Road Louisville, KY 40208  
tel: 502.637.2500 • fax: 502.637.7878

#### Financial Offices

6232 Moonfield Drive Huntington Beach, CA 92648  
tel: 714.775.4321 • fax: 714.775.0711

#### European Operations

Veldzigt 3 3454 PW De Meern The Netherlands  
tel: +31(0)30-2428280



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E: When will it be done?

D: The R&D is mostly behind us. I now have all the parts for assembling the tanks, and have been working out details for the other parts and systems. It will take a few months at least to make it a going concern.

E: Then what?

D: Then ZFX supplies itself, as well as our wire rope vendor and the theatrical world at large, with spooled black stainless wire rope.

E: Why would anybody care?

D: Anybody who has worked with wire rope in a theatrical setting knows the problems involved: if you want low visibility – and you do – you either have to lay the stuff out on the floor and paint it, or you have to buy powder-coated rope. Paint flakes off immediately, making a mess of the flying rig in the process. Powder coat comes off a little less readily, but still turns to back shiny steel rope, also leaving black dust everywhere it travels. Black oxide takes much longer to wear off. We passed a length of 5/32" 7 x 19 strand blackened stainless wire rope back and forth over a four inch sheave for several thousand cycles. The finish held out to approximately 2,000 cycles. The rope didn't fail until somewhere around 8,000, and lasted longer than the untreated stainless rope, probably because of the lubricative action of the final oil bath. These are tentative results, mind you, and not to be given as official product claims, but they are promising results to mention from the standpoint of product development.

E: Thank you for your time.

D: Have a nice day!

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