Urban Interface Engine

A major impediment to bringing fire back to the forest is urban interface. It's a problem that's not going to go away anytime soon. Until we find ways to better protect people and their infrastructure from fire at the urban interface, there's no political or practical way to stop excessive fire suppression.

As I watch the California fires on the news, two things are obvious. We don't need more personnel; we need better trained personnel. We don't need more equipment; we need different equipment.

I grew up in the Southern California chaparral and Santa Ana winds. I have 16 years experience as a volunteer firefighter on a well respected rural department, where I spent many hundreds of hours a year building and maintaining equipment. I have many years experience logging and thinning in our Southwestern forests. I built the sawmill that I built my 3,000 square foot house with, mostly from blow-downs, road cuts, and burn scars. I've small scale, non intrusively, salvage-logged several fires. My daughter and son-in-law are professional firefighters with the Forest Service. I'm a mechanic, a machinist, a welder, a millwright, and a lot of other things. I've also been studying climate for many years. I know a bit about what I'm talking about.

Again and again on the news, I watch firefighters pouring a full flow straight stream on a fully involved fire. It might look good on the news, but they might as well be throwing rocks at it for all the good they're doing. They don't have even the most basic real knowledge of fire behavior and firefighting. Most of the firefighters on the wildland fireline are competent and the task is simple, but the urban interface is fought by a wide variety of personnel, and their training and expertise vary widely.

In 2003 I toured the Cedar Fire a few months after the fire with a friend who was one of San Diego County's fire chiefs. 280,000 acres; 2,232 structures, 15 fatalities, 1.331 billion. There were around 700 engines on that fire; almost all of them doing structural protection with equipment designed for firefighting on a fire that cannot be fought with contemporary equipment. Since then, little has changed in both tactics and equipment.

A large part of our firefighting budget is spent on fighting fires to protect man made structures in areas where fire is a natural and necessary part of the ecosystem. In most places, it would be substantially more cost effective to protect the structures and let the fire go by till it hits a substantial firebreak, but preplanning and liaison with the community are seriously inadequate, there aren't any firebreaks, and there's currently no equipment and expertise specifically directed toward the protection of structures. In a moderate fire, ground crews can do structural protection with saws and burnouts, but the hotter the fire, the more dangerous it gets. All of their equipment and expertise is focused on fighting fire, and their protection from the fire is almost nonexistent.

My daughter and son-in-law lost good friends in the Yarnell Hill Fire. My grandson's good buddy lost his father. The old guard will tell you that the deaths of 19 Hotshots was a freak accident or the poor decisions of an individual crew. It was not. It was the direct result of seriously obsolete methods of interface firefighting.

The Hotshots and all the rest of the ground based resources of the Forest Service and state and local firefighting crews are trained and equipped for fighting wildfire and should be used as such, but fighting the fire to protect structures in imminent danger is often too dangerous for any kind of attack with personnel on the ground, no matter what their level of skill and strength. Urgency can easily cloud judgment. Knowing that there were likely to be thunderstorms with dangerous downdrafts, teams fighting the Yarnell Hill Fire were still sent into hot dry chaparral. Even though it's widely known that it's almost always a change in the wind that gets firefighters in trouble, urgency clouded judgment that day and firefighters were put into harm's way to save houses.

With the exception of Northeastern North America and Eastern Siberia, climate zones planet-wide are shifting progressively uphill and towards the poles. In the short term, this will result in severe heat stress in many temperate ecosystems. In the immediate future, most temperate zone ecosystems will be living in climates that are periodically much hotter, dryer, and windier than those in which they evolved, interspersed with wet years to grow new fuel. Wildland and interface firefighters are already having to deal with these changes in a major way, but the inertia of the old guard of the Forest Service, Cal Fire, and the fire equipment industry is seriously in the way of the changes needed to keep pace with changing fire conditions.

It's quite obvious by now that many fires cannot be successfully fought with current equipment and tactics under current weather conditions. The entire concept of fighting fire in today's climate ignores some very basic reality. Many ecosystems are fire dependent, and most ecosystems have become extremely flammable due to climate change, misguided forest management, and excessive fire suppression. In this era of hot, dry weather, without sufficient moisture to rot dead vegetation, it piles up till it burns. We've suppressed fire for so long that many types of vegetation have grown thick and tall and extremely flammable in the dry seasons. It's gonna burn. All of it will eventually burn. If you put the fire out this time there'll just be a bigger one the next time it finds a spark and some wind.

I served many years on a volunteer department and we saved a lot of structures, but we could only do it within the safety limits of our equipment. There were times when we went on to something safer. Most volunteer departments are a mix of people ranging from dedicated well trained personnel to untrained, reckless fools, so it tended to be a dangerous thing to do.

In interface firefighting, if the initial blowup is close to structures, the game plan is often volunteer and local fire departments arriving with just a few minutes to get staged and absorb a direct frontal assault by the fire. Your personal protection from the heat is very hot and heavy and you're working at an extreme level of physical exertion, often at a body temperature around 103. Hoses burn, pumps fail, tires blow, engines stall, engines burn, men go down from heat exhaustion and toxic smoke, and radio communication fails as too many people need to talk on too few channels. Sometimes you win, sometimes you lose, and often you just stand back and stay alive. Later in the evolution of a fire you might have hours or even days to get ready and the focus changes from firefighting to fireproofing. The real death toll for firefighters at the urban interface comes later from the aftereffects of breathing very toxic smoke and suicides from severe PTSD.

In interface firefighting, it’s speed and mobility, task diversity, water capacity, and the effectiveness and reliability of your heat shield that determine your level of success and safety. From the smallest mini to the big class ‘A’s, every engine in service today requires personnel on the ground, is quite flammable, and, if they’re overrun by the fire, the only protection they offer their crews is leave the hoses behind and make a run for it or deploy their personal fire shelters if there’s time and space or get roasted if there’s not.

Today's fire equipment is a bunch of big and clumsy, bright and shiny Rube Goldberg crap that costs twice what it should, is dangerously undependable, and is fundamentally obsolete because it's all designed for fire fighting instead of structural protection. The fire equipment industry has succumbed to an obsession with high-tech crammed into obsolete designs that has been extremely counter-productive. I don't need to tell the computer to tell the servo-motor to turn the valve. My hand is cheaper, faster, and much more dependable. The entire firefighting industry has no equipment designed specifically to protect structures in an urban interface setting, and as a result thousands of houses burn and the lives of thousands of firefighters are put at risk every year.

Personally, I’d rather be riding around in a fully enclosed air conditioned turret with my choice of nozzles and sprayheads for water, foam, or gel, on a compact, powerful, well insulated, heat reflective van with 1200 gallons in the bellytank, a large high pressure pump, a full roll cage, and a serious fire shelter for the vehicle and crew just in case. Unfortunately, this type of equipment doesn’t exist yet. Given a chance, I can build it.

We need a vehicle that addresses the growing need to protect structures from wildland fires. I've spent thousands of hours building and maintaining equipment for the volunteer fire department, and we built some of the best. For many years now I’ve seen the need for a fundamentally different kind of fire truck. There are lots of wildland pumpers in service that carry from 200 to 600 gallons of water and a variety of hand tools and equipment. They are all designed for ground crew support. They almost all have very small pumps. They're all top-heavy and clumsy. As with all conventional fire engines, they offer no protection for the crew. They sell for upwards of a quarter million dollars. The best of them [and some of the worst] were hand built by volunteer departments at a fraction of the cost of the flashy, bright and shiny junk the fire equipment industry builds. Not any more. The fire equipment industry managed to outlaw anything not built by licensed professionals. A lot of structural protection on interface fires is still done with class 'A' pumpers. These are large trucks that can’t turn around at all on small roads, offer no protection for the crew, and are supposed to be committed to standby for structural fires on their district. They cost around half a million bucks.

All of these trucks are designed for use with crews on the ground with hoses and hand tools; a slow and cumbersome process in the face of a fast and dangerous opponent. Most volunteer departments succumb to the temptation to ride completely exposed on top of the truck because that’s what works, but it’s a bit dangerous. I’ve lost my eyebrows several times saving peoples homes and occasionally I’ve found myself planning which way to jump if the truck rolls.

The vehicle that I’m proposing will be the best grass and brush fire truck on the market, but its primary purpose is to fireproof structures threatened by an advancing fire

by coating them with gel if there's lead time, foam if there's not, or taking the fire head on when the need arises. It will be fast, compact, and nimble on road and off. Due to time and safety constraints, it will be capable of coating a structure or fighting the fire without relying on ground crews and hoses. It will have a large, high pressure pump so it can work quickly and make effective use of water tenders and hydrants. Above all, it will be sufficiently fireproof to protect itself and its crew when overrun by fire. In order to protect a structure from a wildfire, you often need to put crews directly in its path. The closer you get the more effective you can be. The more fireproof you are, the closer you can get. The goal is to be able to operate within the fire. Within the realities of presently available, affordable technology, I see a vehicle that can operate without exposing the crew and, if overrun by fire, can deploy a reflective shield, gel itself, and allow the truck and crew to sit it out in relative comfort.

I've been planning this project for years with the intention of an assembly plant and some quantity production. From what I know of interface fires from personal experience, media, training films, and the personal accounts of participating firefighters; in conjunction with much more comprehensive community preplanning and more very large air tankers, with about a hundred million dollar investment in equipment I think we could safely save most of the structures lost in interface fires [but not suburban crown fires]. Payback would come with the first big fire.

Because this vehicle is a fundamental departure from the mainstream approach to firefighting, initial sales will probably be to the most progressive, well funded fire departments and will be done by direct contact with demonstration. Australia and the Mediterranean would be my first choices in the international market, but as the climate changes, the need is constantly expanding.

I have a variety of designs, depending on available financing, currently available tooling, materials, and components, and the type of fire and its fuel load. The most efficient use of money will probably be around $600,000 to get to a production prototype. I'm expecting a market of up to 100 units a year at a retail price of around $350,000. My first choice at the moment for prototype and initial production would be Caid Industries in Tucson, but any good fab shop could build it.

Can you be of any help in finding funding for this project? It will probably need to be private money, as our government has been rendered dysfunctional by severe bureaucratic alzymers, and is currently being dismembered with nothing to replace it with but incompetence and corruption.