

THE MUSTANG MODEL



Proven Historical Precedents

In Support of Stavatti's Military Aircraft Development and Production Model

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Proven Historical Precedents

Stavatti Aerospace Ltd is a new aircraft company founded in 2019. Despite being two years old, the company traces its heritage to Stavatti Corporation, which was established twenty years earlier in 1994. Philosophically, Stavatti's business model is yet even older, pointing back to the golden age of military aviation of the 1930s when many of the great aircraft manufacturers were founded. This model draws from the heritage and case studies of major American aircraft manufactures including Douglas, North American Aviation, Curtiss, Grumman, Boeing, Chance Vought, Lockheed, Martin, Consolidated and Northrop.

Paying close attention to history, Stavatti's aerospace business models replicate, to as high of a degree as possible, the highly successful aircraft development and production models used from the 1940s through the 1970s. Recalling very specific, highly successful aircraft programs, herein is a summary of proven historical precedents that support the Stavatti military aircraft development and production model as well as an explanation of its direct applicability in solving specific customer requirements. By implementing approaches parallel to these models, Stavatti will develop and deliver next generation military aircraft that offer superior performance at an affordable price within total development cycles of 3 to 5 years.

The Mustang Model

Many of the worlds greatest fighter aircraft began with an order being placed for aircraft that at the time were purely concepts. This was the case with the P-51 Mustang, the infamous fighter that began as a conceptual alternative to the Curtiss P-40 Tomahawk.

Recalling the Mustang story, in April of 1940, James H. "Dutch" Kindelberger the President of North American Aviation, Inc was asked by Sir Henry Self, representing the British Air Purchasing Commission, if North American could produce the P-40 Tomahawk at their factory for the RAF under license form Curtis Aircraft. At the time the Royal Air Force (RAF) was flying the P-40 as a primary fighter against the German Luftwaffe.

Kindleberger's response was that rather than produce P-40s. North American could design an all new, superior fighter within the same time-frame required to put the P-40 into production. On April 10th the British Purchasing Commission accepted the North American proposal on the condition that the prototype for this new aircraft would be ready within 120 days from contract award. Supporting the proposal, the US Army Air Force (AFF) agreed not to block the North American sale provided two initial production aircraft would be delivered free of charge to the AAF for testing and evaluation. With the formal prototype development contract signed on 23 May 1940, the RAF issued a conditional contract to North American for 320 initial production aircraft, contingent upon the satisfactory flight testing of the prototype. Delivery of these first 320 aircraft was agreed to begin in January 1941.



The P-51 prototype, then designated the NA-73X by North American, emerged from the factory in Inglewood, CA only 102 days after contract signing, 18 days earlier than the 120 day deadline. In September 1940 the RAF increased their initial order for the aircraft to 620 and the first flight of what became the Mustang I was on October 30th. The first production Mustang I for the RAF flew on 23 April 1941, some months behind schedule due to the crash of the prototype on 30 November 1940 caused by a fuel management issue on behalf of the test pilot, who ran out of gas. In May of 1941 the AAF received there first two test aircraft. The first test aircraft for the RAF arrived in England in October 1941 where it along with the first 20 RAF Mustangs underwent testing, evaluation and trial equipment installations. Number 26 Squadron at Gatwick became the first operational RAF squadron to fly the Mustang I in February 1942 and the legend began.

In the case of the P-51, the RAF took a significant risk and placed an order for 320 new design aircraft based on a concept and a promise. The result was the production of 15,875 aircraft and what to many represents the greatest fighter aircraft ever built.

According to Malcom V. Lowe:

"Few warplanes can have had such a significant impact in warfare, or gained such enduring popularity, as North American Aviation's beautiful P-51 Mustang. Created as a private-venture project by a company that was not officially recognized in its own country as worthy of designing a fighter aircraft, the Mustang grew out of Britain's overwhelming need for large quantities of modern high performance fighters in the early stages of the Second World War. It was not, as incorrectly claimed by many published sources, the product of a British requirement or specification. Rather, it was one of the very few successful warplanes in history that was conceived without an official specification ever being raised before its creation. Indeed, it was born of the result of amicable and unofficial negotiations between North American's company officials and British Government representatives in the USA. The end result was one of history's great aircraft, which became a vital element of the growing and eventually overwhelming Allied aerial domination as the Second World War drew to its ultimately successful conclusion."

What Stavatti is doing today parallels the P-51 story. We are following "The Mustang Model" and offering a better fighter than its nearest competitor. In essence we are promising to design, prototype, flight test and deliver superior combat aircraft within the same time-frame that it may take for a nation to receive delivery of a current, older design fighter due to industry production backlogs. Like North American in 1940, Stavatti has a team of aircraft designers, production personnel and ambitious leadership. Stavatti also has a 173,358 sq ft headquarters and aircraft factory in Niagara Falls, NY and a willingness to open new production and assembly lines both in the United States and within the boarders of nations that decide to become production partners. To that end, Stavatti is now in the process of acquiring a 1.8 million sq ft historic aircraft factory. With more than 11 new aircraft designs ready to enter prototyping, all of Stavatti's trainer, attack and fighter aircraft are far more developed than the P-51 was prior to the British Contract Award of April 1940. Stavatti aircraft including the SM-27, SM-28, SM-31, SM-33, SM-36, SM-39 and SM-47 are ready for immediate prototype development using a wartime emergency development model. In so doing, Stavatti can begin to meet the enormous need for mass produced, high affordable, next generation military aircraft. As an enterprise, te Stavatti Industry Team has built tens of thousands of aircraft and is now ready to apply that buisiness model to establish the Stavatti vision and brand.

Quoting The P-51 Mustang: A Case Study in Defense Acquisition by Alan Haggerty and Roy Wood:

"Why can't defense acquisition seem to tackle a modern-day project like the Mustang and be just as successful? The authors believe we can, but, over the past 40 years, we have allowed ourselves to grow accustomed to 10-year missile developments and 20-year fighter aircraft acquisitions. We've built a riskaverse bureaucracy that favors innovation-stifling oversight and rigid, failure-intolerant policies to responsible program risk taking and a sense of urgency in fielding weapons systems. The current acquisition system has become so unwieldy that any sense of urgency or spark of innovation is often lost or frustrated...We have to move from a system that imposes sweeping requirements to one where simpler is better, and good enough is, well, good enough. The first Mustang wasn't a war-winning pony, but had sufficient design margin to be adapted to evolving threats and changing operational assumptions. Today's systems should be designed and managed this way too. We cannot allow our acquisition system to continue to be so rigid and risk-averse that we lose the opportunity to adopt new technologies when they come along...We should study and learn from the lessons of history, like the Mustang story. From it, we can remind ourselves that Americans are, by nature, innovative and entrepreneurial. We must restore our self confidence in our ability to do remarkable things, remain steadfast in our resolve to improve our system, become intolerant of bureaucratic obstacles to innovation, and rededicate ourselves to the task of making our nation safer for ourselves and our children. The next acquisition success story is out there if we can muster the courage to succeed."

The success of the Mustang Model demonstrates the benefit to an Air Force that takes a risk on a favorable design concept offered by a relatively small company that has new ideas, engineering expertise and excess production capacity. Such a choice can prove highly successful and make history.

The Tomcat Model

Where the Mustang Model shows how a new aircraft can be quickly developed and produced to serve a an alternative to a competitor's aircraft, the Tomcat Model demonstrates how an alternative aircraft can quickly be developed and produced to fill the capability gaps associated with a predecessor aircraft. The F-14 Tomcat has its origins with Robert MacNamera's Tactical Fighter Experimental (TFX) program to develop a common aircraft to satisfy USAF Fighter/Bomber and USN Long Range Interceptor and Fleet Air Defense requirements.

Launched as a formal study in February 1961, in October 1961 an RFP was released to industry for a TFX that would feature variable geometry swing wings, twin afterburning turbofan engines and a two seat cockpit. In November 1962 General Dynamics was selected as the winner of the TFX contract resulting in the first flight of the prototype USAF configured F-111A on 21 December 1964. The USN variant, designated the F-111B first flew on 15 May 1965. The first six production F-111As were delivered to the USAF in July of 1967. Cited as being too heavy to serve as a Navy fighter and suffering performance shortfalls as well as failed test flights that killed Navy test pilots, in May 1968 the USN canceled the F-111B. While a total of 563 F-111 aircraft were produced for the USAF and the RAAF, following the cancellation of the F-111B the USN required an alternative Carrier Air Defense Fighter. The need for an F-111B alternative led to the release of a new RFP in July of 1968 by NAVAIR for the Navy Fighter Experimental (VFX) aircraft. Competing with McDonnell Douglas, in January 1969 Grumman was awarded the contract to build the F-14 as the VFX solution.



The Grumman aircraft, based upon their Model 303 design, featured variable geometry swing wings, twin engines, two seat tandem seating, a maximum level speed in excess of Mach 2.2, AWG-9 radar and the AIM-54 Phoenix as the aircraft's long range BVR missile. To expedite development, the F-14 program did not include a prototype focused Demonstration and Validation phase but rather focused solely upon a Full Scale Development (FSD) program. Flying 22 months after development contract award, the F-14 first flew on 21 December 1970 with the aircraft entering Initial Operational Capability (IOC) in 1973. Rapidly developed, the F-14 went from concept to IOC in four years. Production of the F-14 totaled 712 aircraft through 1991 with the aircraft remaining in service with the USN until 22 September 2006.

Development of the F-111A is estimated at costing a total of \$11.91 Billion in 2016 USD with the cost of the Navy F-111B being an additional \$2.205 Billion for a total TFX development program cost of approximately \$14.12 Billion in 2016 USD. The F-14 Development Program is estimated to cost a total of \$7.7 Billion in 2016 USD, or approximately half the cost of the TFX program. Originally projected to save the department of defense over \$1 Billion in development costs in then-year dollars, the TFX program actually cost more than the development of two independent F-14 programs while arriving at one aircraft that could not satisfy both USAF and USN needs. Ultimately the TFX program resulted in approximately \$2.2 Billion, or more, in additional spending.

The lesson learned by the Tomcat model is that it is possible to rapidly develop and deploy a superior fighter solution as a direct alternative and successor to a failing aircraft program without undo cost. This lesson is particularly applicable to the Joint Strike Fighter (JSF) program that followed a TFX style "one size fits all" approach to arrive at a common airframe for USN, USAF and USMC needs. While it is possible to have all three service branches fly the same aircraft, (as was demonstrated by the F-4 Phantom II) the problem with the JSFs stems from the expectation that the F-35 will replace a broad spectrum of different aircraft ranging from the F-16 to the A-10A to the F/A-18A/B to the VTOL AV-8B Harrier II. Rather than adequately replace all of those aircraft, the F-35 will likely only master one particular mission set, forcing the USAF and USN to procure additional mission specific aircraft, as was the case with the F-14.

Directly applicable to the present day, Stavatti is now following the Tomcat Model and developing specific families of aircraft including the SM-27 and SM-28 Machete, SM-47 Super Machete and SM-36 Stalma to "replace" the F/A-35, with the SM-27 and SM-28 serving as A-10 successors, the SM-47 serving as an F/A-18A/C successor and the SM-36 Stalma serving as an F-16 successor. The total combined development cost of these four aircraft does not exceed the total development cost of the F-35. This Stavatti solution is ultimately more affordable than developing a single aircraft to meet all mission needs.

The Stratotanker Model

Following a Boeing Model that begin with the development of the B-17 Flying Fortress in which Boeing literally bet the entire company on the privately sponsored development of revolutionary bomber based entirely on speculation, the KC-135 Stratotanker was created by Boeing as a private venture. Employing a commercial approach, Throughout the history of military aircraft, numerous successful aircraft programs were started as corporate initiatives, rather than contract initiatives. Focusing upon one specific example, it is best to quote a renowned source, General Curtis E. LeMay,

"It would be well to emphasize how much the American people owe to American Industry-how much the airplane manufacturers have actually contributed to our air power. Take the KC-135 for example. It has been around for quite a while now, and we are still (1999) depending on the KC-135s for much of our refueling. We have the Boeing Company to thank for this...We had a requirement for a jet tanker. We'd been using the KC-97's, but what we needed was a jet tanker to match the B-47 and the B-52. And there was always a shortage of money. We could never cram this oh-so-necessary tanker into the budget.

The Boeing Company understood our need. More than that, they saw our future need for a jet transport. So, completely on speculation, and employing their knowledge they had gained in the B-47 and B-52 projects, they built a jet transport. This was the father of the KC-135. We bought it as a tanker, making only a few basic changes. This was a calculated risk taken by the industrialists, and a wonderful example of free enterprise.

Normally, it would have been the other way around. We would state our needs to the aircraft industry. The various companies would compete, each with its own design. We would then evaluate the designs from every angle-both a technical evaluation and an operational evaluation-to decide whether it was a good tool for the user. And we wold evaluate the company, judging their capability to produce what was needed. Then, and only then, would a development contract be let from the Air Force to the company, to develop that airplane. Once it was developed and tested, and it looked like it was going to be a success, we could offer them a production contract. Almost every modern airplane was built according to that pattern. Quite frequently-perhaps even usually-a commercial version followed. The whole Story of the Boeing 707 was a reversal of manufacturing and procurement history. We bought it for a tanker. Thus, leaning on Boeing's initiative, we were ahead of the game."

As noted by LeMay, the KC-135 served as the basis for Boeing's first commercial jet transport, the 707. Believing that the future of commercial transport rested with jet aircraft, in May of 1952 Boeing President William Allen convinced the Boeing Board of Directors to invest \$16 Million, which was 2/3rds of the company's cash reserves into building a single prototype of the four engine 707 prototype then known as the Dash 80. Entering service years before the Douglas DC-8, Boeing took the risk of developing an airplane prior to receiving customer orders, which enabled Boeing to demonstrate the economical value of jet airliners. In so doing, Boeing gained a lead in jet transport sales over their significant competitor, Douglas.

Not only did Boeing beat its competition by using this bet the company strategy with the 707, it firmly established itself as the leading manufacturer of commercial jet aircraft worldwide. From its introduction in 1958 until 1994 the 707 product line earned Boeing a total of \$1.011 Billion which corresponds to a 5.46 fold Return on Investment over its total development cost of \$185 Million. The 707 followed in the success of the B-17 Flying Fortress which was developed beginning in 1935 when the Boeing Board of Directors committed \$275,000 to prototype the bomber which ran \$150,000 over budget. With a total development cost of \$425,000 the B-17 was created at a time when Boeing had an outstanding loss of \$266,000. Boeing Bet the Company on the B-17 and in so doing, created one of the most effective bombers of WWII. The Boeing tradition of commercial investment into new aircraft development signifies the value of embracing risk and "selling what you make," hallmarks of the Stavatti approach.

The Northrop Model

In 1939 John K. Northrop founded Northrop Aircraft, incorporated in Hawthorn, California. Initially capitalized through a stock offering arranged by investment bankers orchestrated by Wall Street Financier LaMotte Cohu, Northrop began with the construction of a new, fully equipped aircraft plant in Hawthorne. Shortly after incorporation, three friends of Cohu aided Northrop in drawing the attention of the Norwegian government to the new company and in March 1940 Northrop was awarded a contract from the Norwegian Buying Commission to design, prototype, qualify and produce 24 new single-engine, monoplane patrol/bomber seaplanes. Designated the N-3PB, in less than eight months Northrop's first production aircraft took to the air in November 1940. As Germany invaded Norway in April 1940, completed N-3PBs were delivered in 1941 to the Royal Norwegian Naval Air Force, which was operating in exile with the RAF in Iceland.

The N-3PB was swiftly followed by the design and production of the P-61 Black Widow for the USAAC, which began as a submission in December 1940 that became a development contract in January 1941. The first US night fighter to incorporate radar, the P-61 entered service in January 1944. In May 1946 Northrop Received a contract to develop the F-89 Scorpion night fighter, which entered production in 1949 and remained in production until 1958 when work began on the T-38/F-5A. The T-38/F-5A led Northrop into wide-spread global success as a fighter/trainer manufacture well into the 1980s when the F/A-18 and B-2 continued Northrop's legacy.

The Northrop model demonstrates how a brand-new aircraft company with experienced personnel from Douglas (now Boeing) and Lockheed that is guided by a visionary leader can be established and within record-time, begin mass producing extremely effective military aircraft. Producing its first major aircraft within two years of incorporation, the success of Northrop relied upon two key factors:

- 1) The availability of start-up capital from the investment banking community
- 2) The award of a design, development and production contract from a customer willing to embrace risk in exchange for innovation, capability and reliability.

The Stavatti model parallels that of Northrop. An innovative enterprise led by a visionary Chairman & CEO, Stavatti has drawn creative talent from the ranks of Boeing, Lockheed Martin, Northrop Grumman, the USAF and the USN to assemble an extremely experienced and talented team, just as Northrop did. Like Northrop, Stavatti began by focusing upon raising the necessary start-up capital from private investors, investment bankers and investment houses.

Looking specifically at Stavatti's fighter projects, our SM-36 Stalma and SM-39 Razor share significant business model commonality with the F/A-18. The F/A-18 was originally a product of McDonnell Douglas and Northrop, derived from the Northrop YF-17. The YF-17 itself was developed entirely by Northrop from their internal, commercially sponsored P-530 Cobra project, itself derived from the work performed on the N-300, a project which began around 1965 to replace their F-5. The F-5, which was a commercially developed light weight fighter that resulted in the sale of over 2,246 aircraft worldwide, including Canada. The F/A-18 is a direct result of Northrop's vision and commercial risk taking to develop a next generation light-weight fighter. The legacy and heritage that led to the creation of the F/A-18 was again both the willingness of a customer (Norway) to place an order for a then start-up military aircraft manufacturer coupled with a desire by Northorp to undertake new aircraft development as a private-venture.

While private investment capital could finance the development of the new Stavatti military aircraft in their entirety, the best "investor" in any new product is the customer for they best understand the need for the prompt creation of a new advanced fighter. Once Northrop received their contract from Norway, the corporation was able to develop and deliver a new, innovative combat aircraft in less than two years. Although today's combat aircraft are significantly more advanced than the N-3PD, our knowledge of aeroscience and our advanced design and modeling tools, permits next generation fighters to be developed and enter production well before the desired service date. Stavatti is poised to follow the Northrop path of success whereby a production contract was awarded to an unproven aircraft manufacturer in an environment dominated by established competitors. Norway's award of a contract to Northrop, followed by the USAAC contract for the P-61 lead to the creation of a company which today employs over 120,000 producing a range of products from UAVs and stealth bombers to aircraft carriers and airborne radar.

Applicability to Today's Air Forces

The proven acquisition and development models indicated in this paper provide a demonstrated pathway by which nations may quickly procure superior military aircraft with very limited risk. Stavatti is committed to providing military aircraft that can serve as exceptional successor to and replacements for existing types in Air Forces worldwide, as well as new types that broaden overall air arm capabilities.

Specifically focusing upon the combat aircraft business, Stavatti is now offering new design solutions for Attack and Close Air Support (SM-27 and SM-28 Machete), Supersonic Training and Light Weight Fighter (SM-31 Stiletto), Air Defense Fighter (SM-47 Super Machete), Single Engine Multi-Role Fighter (SM-36 Stalma) and Twin Engine Air Dominance Fighter (SM-39 Razor). Stavatti also has transport aircraft solutions (SM-100 Twin Engine Tactical Transport) and a host of additional new design aircraft ranging from Micro UAVs to Piloted Heavy Lift, to be introduced over the coming decades. Concentrating solely upon fighter aircraft for this particular example, Stavatti is now presenting the SM-36 Stalma Multi-Role Fighter (MRF) to a variety of allied nations as well as the domestic air defense arms of the USAF, USN and USMC. The SM-36 Stalma is a new design aircraft for which Stavatti is seeking orders, in the form of Letters of Commitment (LOC) or Letters of Intent (LOI), to provide the basis for the development of the aircraft, from prototype to production launch, by the investment, venture capital and financial community.

Currently undertaken as a privately funded Internal Research and Development (IR&D) effort, the SM-36 Stalma development program may also be funded, in whole or in part, through the direct award of a procurement contract for Stalma fighters by an Air Force, or a development contract/development partner-ship with a potential customer. Moving forward with the SM-36 Stalma opportunity, it becomes evident that this all new design aircraft is being offered as a solution that parallels past aircraft procurement models including those of the P-51 Mustang and the F-14 Tomcat.

Proposing aircraft that have been designed as private-ventures to address anticipated future market needs, the Stavatti Stalma as offered to allied nations concentrates upon developing an all new aircraft that is superior to currently available aircraft within a five year time-frame, including two years until prototype first flight followed by two years of flight testing and qualification that concludes with the start of Low Rate Initial Production during the fifth year. This new aircraft will provide both superior performance and greater affordability then its competitors which include the F-35A, the F/A-18E/F and the F-16C/D. To rapidly advance Stalma development Stavatti requires potential end-users to issue a conditional contract or LOC to Stavatti for a specified number of production aircraft, contingent upon the satisfactory flight testing of the aircraft prototype and a meeting of specific performance goals. Under this contract structure, Stavatti is responsible for the cost of developing the aircraft, including design, prototyping, flight testing and certification/qualification with the potential purchaser government being responsible for the purchase of aircraft per contract specifications only if the prototype aircraft meets the specific performance requirements as specified within the contract.

Failure to meet specific design or performance goals will result in financial penalties to Stavatti or the potential cancellation to the contract in its entirety. Possible penalties to Stavatti for the failure of the SM-36 Stalma production article to meet specific contract or performance requirements may include:

Empty Weight: \$2,500,000 For Each 100 lbs Overweight

Acceleration: \$2,500,000 For Each Second Slow

Tactical Radius: \$5,000,000 For Each 10 Nautical Miles Short

Approach Speed: \$5,000,000 For Each Knot Fast

Level Speed: \$2,500,000 For Each 0.10 Mach Number Slow

Maintainability: \$2,500,000 For Each Extra Maintenance Man-Hour Per Flight Hour

Delivery: \$25,000 For Each Day Late

Employing this type of new design aircraft purchase structure parallels both the approach that Britain took in their purchase of the original 320 Mustang I aircraft from North American Aviation while also incorporating elements found in NAVAIR's original development and acquisition of the F-14 Tomcat.

To arrive at a positive solution to today's military aircraft procurement needs, Stavatti desires to work with potential customers to employ acquisition methods that not only succeeded in the past, but resulted in

great aircraft including the P-51 and the F-14. Focused upon significant acquisition reform and recalling that some of the most sophisticated aircraft in the world, including the F-117 Nighthawk, had very brief design requirements and specifications (totalling only 62 pages), Stavatti encourages customers to focus upon defining "what" is to be accomplished not "how" it is achieved with only critical performance parameters specified within requirements documentation. Secondary standards and specifications must be defined as guidelines, rather than requirements, to as great of degree as possible. Encouraged to follow a "Skunk Works Style" acquisition approach, Stavatti customers must be focused upon taking delivery of products that satisfy a specific, concise mission and not the bureaucracy associated with having a bloated procurement approach.

Capable of satisfying any new military aircraft development and manufacturing program, today Stavatti owns a production focused 173,358 sq ft aircraft development and manufacturing facility located on 20 acres at the Niagara Falls International Airport in Niagara Falls, NY. Able to design, prototype, flight test and mass produce advanced combat aircraft, Stavatti can provide immediate affordable solutions to the benefit of allied air forces worldwide. Dramatically expanding Stavatti over the years to come, Stavatti will establish significant new aircraft manufacturing capability in the United States and in allied nations abroad to ensure the delivery of truly capable aircraft that are aesthetically pleasing, highly affordable and overall the best in their class.

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