VESTED METALS MARKET UPDATE

What's Inside

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DECEMBER MARKET UPDATE

Metals Trends: Titanium Prices Move Higher While Nickel Prices Testing Fresh Lows

Titanium Trends

Titanium demand remains strong heading into 2024 due both to aerospace strength and new demand from Apple's iPhone 15.

Aerospace Demand

TSA checkpoint volume momentum continues to build. As of 11/28/23 current year volume exceeds 2022 by 13%. Additionally, current year volume exceeds 2019 volume by 1% since January and by 5% in the last 90 days y/y. Globally, demand for travel is forecasted by Statistica to increase by 28% after 64% growth in 2022.

Airbus' commercial aircraft order net intake is up to 1,241 September YTD from just 647 in the same period prior year (+92%). According to the Airbus Q3 conference call, "Demand for our commercial aircraft is very strong with a continuing recovery in the wide body market. We expect the supply chain to remain challenging as we progress on the production ramp-up. In that context, we maintain our guidance for the full year."

Continues on Page 2

> Apple's new iPhone 15 includes 6-4 titanium for the first time which is expected to lift titanium demand by 3-4%.

Boeing's commercial business is gaining momentum as well. The company's September YTD backlog Y/Y increased by 19%. Boeing CEO David Calhoun on Boeing's Q3 conference call, "We all could go much higher, much faster if it were strictly a demand question but we have to listen hard to those constraints."

According to Chris Olin of North Coast Research the strong demand for commercial aircraft could have a greater than expected impact on titanium demand due to a favorable mix shift toward next-generation wide bodies. Additionally, Olin believes inventory levels could represent additional upside, "the rapid liquidation of excess aerospace supply chain inventory is one of the more surprising developments identified by our latest proprietary channel analysis."

iPhone 15 Demand

Apple's new iPhone 15 includes 6-4 titanium for the first time which is expected to lift titanium demand by 3-4%. Apple chose to use titanium versus stainless steel because of the material's high tensile strength and light wait. Note that titanium is already used on the Apple Watch Ultra and Ultra 2.

The iPhone represents approximately 50% of global smart phones. If a portion of the non-Apple smart phone makers elect to make a similar shift to titanium, long-term demand could see additional growth. Smart phones are approximately 10% of global consumer electronic spending ($1T total) which implies additional growth upside if other consumer electronics companies decide to imitate Apple's shift to titanium.

Nickel Trends

Nickel prices continue to drop in Q4 2023 as weaker than expected demand combined with increased supply. According to Argus Research, short positions held against Nickel are at near record highs in November.

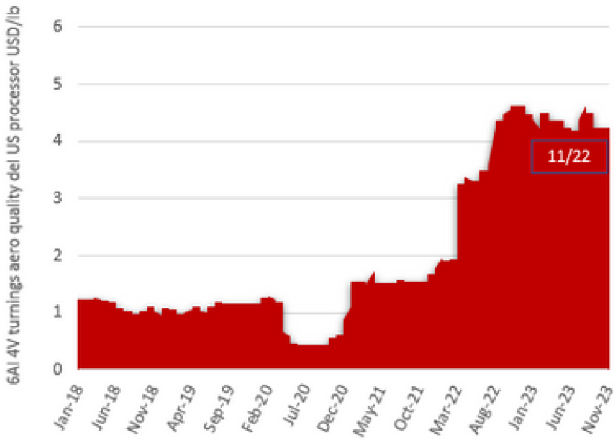
Going into 2023, analysts expected nickel prices to remain flat as rising EV demand was projected to match rising supply. Instead, demand remained weak and nickel prices dropped by close to 50%.

Argus Research on nickel dynamics (11-24-23): "The root cause of nickel's decline this year rests in the rising supply of metal, particularly of Class 1 and intermediate products. A new wave of Chinese high-grade production - partly made with nickel units from furnaces that previously produced pig iron - has added more than 250,000 t/yr of capacity to the supply mix against slowing end-demand."

Metal Price Trends

Metal Indicators of Interest - Argus Research Data

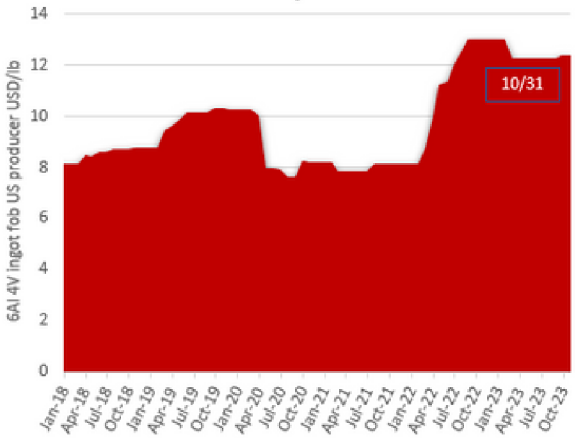
Titanium Scrap 6Al 4V Turnings Aero Quality Del US Processor USD/LB



Pricing Trend Commentary

Titanium 6Al-4V aero quality "chip" has shown significant stability through much of the end of Q3 and beginning of Q4. During a stretch from 09/14/23 - 11/16/23, 6Al-4V aero quality scrap remained stable at $4.25/lb. This price is a tick under the average market value of 6Al-4V aero quality scrap in the open market across the first half of this year.

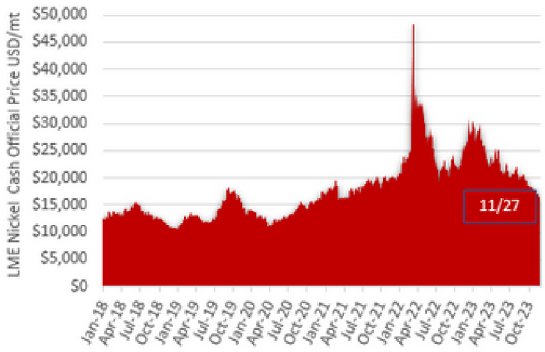
Titanium 6Al 4V Ingot Price USD/LB



Pricing Trend Commentary

Titanium 6Al-4V domestic Ingot is again showing signs of stability. There has been a small increase in prices from August's price of $12.25/lb to $12.375/lb through September and October. Overall, the prices of 6Al-4V ingot seem to be stable after the year of uncertainty that was 2022.

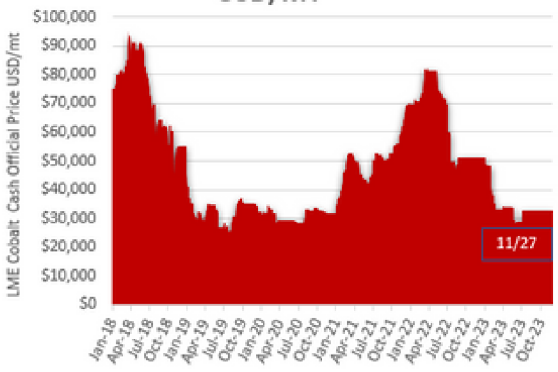
LME Nickel Cash Official Price USD/MT



Pricing Trend Commentary

Nickel markets experienced a steady decline over the 2nd half of 2023. 2nd half highs checked in at approximately $10.14/lb at the beginning of August, and lows at approximately $7.20/lb at the end of November. It seems that Nickel prices are gravitating towards the overall 5-year average after a period of high uncertainty experienced throughout 2022 in the supply chain markets for this material.

LME Cobalt Cash Official Price USD/MT



Pricing Trend Commentary

Throughout the 2nd half of 2023, Cobalt pricing has been stable at approximately $14.84/lb. Much like the Nickel market, Cobalt experienced a period of high uncertainty, price hikes, and volatility throughout the first half of 2022. We are currently experiencing a period of pricing that most closely resembles pricing through H2 2020 – H1 2021. For the time being, it appears the global market has found a period of equilibrium.

What We're Reading

Pickleball Injuries May Cost Americans Nearly $400 Million This Year, According to UBS

Community Spotlight

BOYS & GIRLS CLUBS OF AMERICA

Vested Metals is a proud sponsor of THE PLAYERS Championship Boys & Girls Club. Each year, the VMI team is given a chance to volunteer at their holiday party. The kids and teens enjoy songs, dinner and treats, gifts, face painting, and a special visit from Santa.
It is an event we look forward to each year and can't wait to help again this December.

The Boys and Girls Club's mission is "To enable all young people, especially those who need us most, to reach their full potential as productive, caring, responsible citizens." The club reached it's 60th anniversary this year, and we know it will see many more to come.

"We are grateful for the opportunity to bring a little extra Christmas joy to these kids. We're constantly in awe of the amazing work that THE PLAYERS Championship Boys & Girls Club does day in and day out to help serve the children and families most in need in the St. Augustine community."
-- Viv Helwig, Vested Metals President

To learn more, visit: www.bgcnf.org

What We're Reading

Surgeon Leader Touts the Benefits of Dedicated Orthopedic ASCs

Vested Metals Inventory Update

Featured Items

440A Stainless Bar:

- Used for its high corrosion resistance, high wear resistance, high hardness, and magnetic properties
- Principal applications include dental and surgical instruments, cutlery, cutting tools, and blades
- 440A is a AOD melted, high carbon martensitic stainless steel. It is developed to provide stainless properties, along with optimal hardness.

6Al-4V ELI Titanium Plate:

- The ELI (extra low interstitials) variant has moderately high tensile strength, good fatigue strength, and high resistance to general corrosion.
- Principal applications include medical implants, jet engines, rocket components, and automotive components.

In Stock - Ready To Ship

Titanium

- 6Al-4V ELI Plate & Round Bar
- 6Al-4V Plate & Round Bar

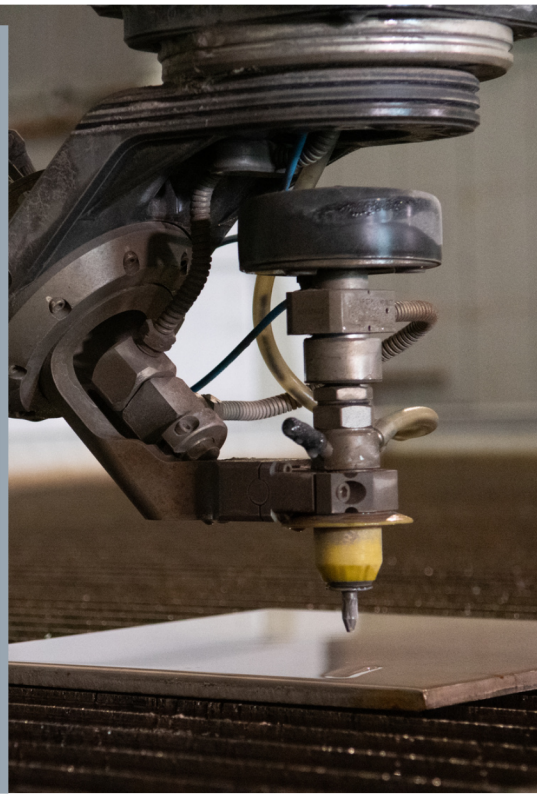
Stainless

- 316 LVM Flat & Round Bar
- 420 Mod/X15TN (UNS 42025) Round Bar
- 455 Round Bar
- 17-4 & 17-4 H900 Round Bar, Flat, Sheet & Plate
- C465 Round Bar
- CCM Round Bar
- 440A Round Bar

Waterjet Cutting

- Highly versatile - Waterjet machines can cut most metals up to 18 inches thick
- Tight tolerances - Some material/thickness: +0.0625 IN, minimum tolerance: +0.040 IN
- Clean edges, no burns
- For in house material we can fill orders as quickly as 2 days

→ **Click To See Vested Metals Line Card**



CLICK TO SEE THIS MONTH'S PROMOTIONAL OFFERINGS

What We're Reading

Thanksgiving travel: TSA breaks record for highest number of daily passengers

Metallurgy Minute

Passivation of Stainless Steel Parts

The importance of a proper passivation procedure cannot be overlooked. Even if the machined parts are in tolerance, the correct raw material is used, there is proper heat treatment, and all the mechanical properties are in the correct ranges, your material can still be ruined by improper passivation procedures.

What is Passivation?

Passivating involves subjecting the formed part to an acid for a length of time and temperature, sufficiently ridding the surface of impurities and rendering the surface passive (which means a creation of a fresh Chromium Oxide file).
Stainless steel receives its oxidation and corrosion resistance by nature of a thin chromium oxide film. The Chromium oxide surface can be formed rather quickly upon exposure to air right after machining or grinding. Passivating the surface promotes a tenacious Chromium Oxide film which would be considered more uniform than a non passivated surface. This film really can't be accurately measured but by a lot of industry accounts, it's in the microns.

Another effect of passivating involves removing embedded metallic debris from the surface. An example of this is during a machining operation (before passivation), whereas microparticles from the cutting tools remain on the surface. If left unattended to, the ferrous tool particles will show red rust over time. Passivating helps burn those particles away, without any effect on the surface of the stainless part. In other words, a proper passivation procedure and acid does not attack and cosmetically change the Stainless Surface.

Why different passivation procedures?

The best Industry reference is found at ASTM A 967. This specification details the how and why of passivating different stainless steels. The Austenitic, Martensitic, and Ferritic Stainless steels can have different % of Nitric or Citric acid and different Pre Passivation Cleaning and rinsing procedures depending on the grade being used.
What can happen with improper Procedures?

It is very important to use a reputable passivator who can assure you that the bath being used is fresh and clean. Commonly passivators have a bath for 300 series stainless, and a bath for 400 series stainless, and also use different procedures for free machining stainless steels like 303. Failure to check passivation acid chemistry on a regular basis can result in chemical “etching” which attacks the surface of the stainless parts and looks rough and grey looking. This is most always the cause of the passivation bath being poorly maintained.

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Partner Spotlight

Fred McMann

VMI Metallurgist

Fred McMann retired from his 35 year career as Metallurgist at Carpenter Technology in 2015. He currently works as a Metallurgist consultant for Vested Metals.

Metallurgy Minute

Cleaning prior to Passivating is mandatory!

Let's be clear... Passivating is NOT a cleaning procedure. It is intended to promote a fresh chromium oxide film and also burn away ferrous microparticles so you don't get false positives via rust spots at some point. The parts MUST be cleaned preferably by alkaline cleaners and rinsed in DI water Prior to passivating. And (especially with free machining steels containing sulfur) proper rinsing to remove and neutralize the remaining acid with an alkaline rinse finished with DI water. Failure to clean off oil and debris will have a negative effect on the efficiency of your passivated surface.

It's proper to question your passivator as to what their procedures are and to explain them to you. It is not good practice to simply note on a part print, “passivate” when there is so much to it. It's best to know what your part is being subjected to. And to recognize etched or blotchy surfaces after passivating and ask questions and investigate why? Improper bath? Dirty parts? Wrong passivation procedure? 300 series parts put into a 400 series bath? Free machining parts not alkaline cleaned before and after passivating? These are very good questions to remember.

A great resource is from Carpenter Technology. Very lengthy but extremely informative: https://www.carpentertechnology.com/blog/passivating-stainless-steel-part

Hopefully this has helped shine light on the passivation process and can help you discuss in detail with your source when necessary.

Passivating the Non-Free-Machining Stainless Steels

GRADE	PASSIVATION
Chromium-nickel grades (300 Series) Grades with 17% chromium or more (except 440 Series)	20% by volume nitric acid at 120 to 140° F (49 to 60° C) for 30 minutes
Straight chromium grades (12 to 14% chromium) High-carbon/high-chromium grades (440 Series) Precipitation-hardening stainless	20% by volume nitric acid plus 3 ounces per gallon (22 g/liter) sodium dichromate at 120 to 140° F (49 to 60° C) for 30 minutes, OR 50% by volume nitric acid at 120 to 140° F (49 to 60° C) for 30 minutes

Passivating the Free-Machining Stainless Steels

(Including AISI Types 420F, 430F and 440F, and Carpenter Project 70 stainless Types 303, 416 and 182FM)

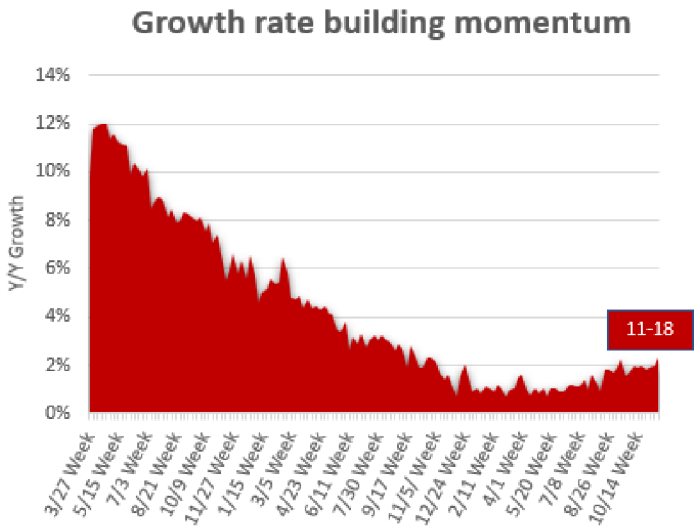
1. 5% by weight sodium hydroxide at 160 to 180° F (71 to 82° C) for 30 minutes.
2. Water rinse.
3. 20% by volume nitric acid plus 3 ounces per gallon (22 g/liter) sodium dichromate at 120 to 140° F (49 to 60° C) for 30 minutes.
4. Water rinse.
5. 5% by weight sodium hydroxide at 160 to 180° F (71 to 82° C) for 30 minutes.
6. Water rinse.

Fig. 2. Acid bath and procedure for passivating varies, depending on grade of stainless steel.

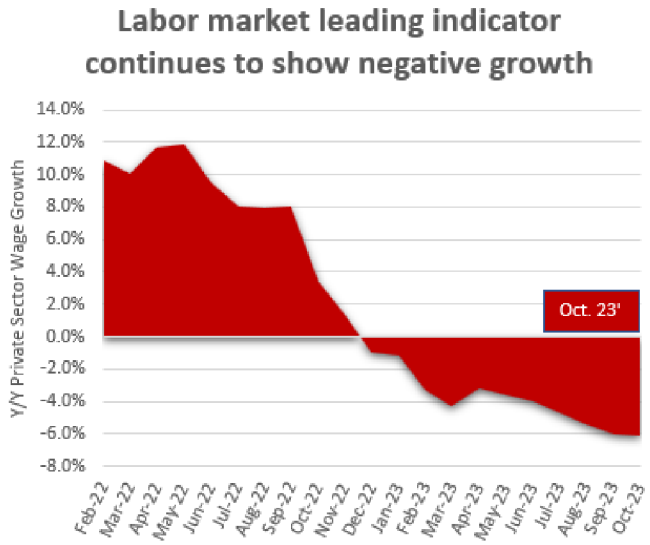
What We're Reading

A recession might have been simpler than what awaits the U.S. economy

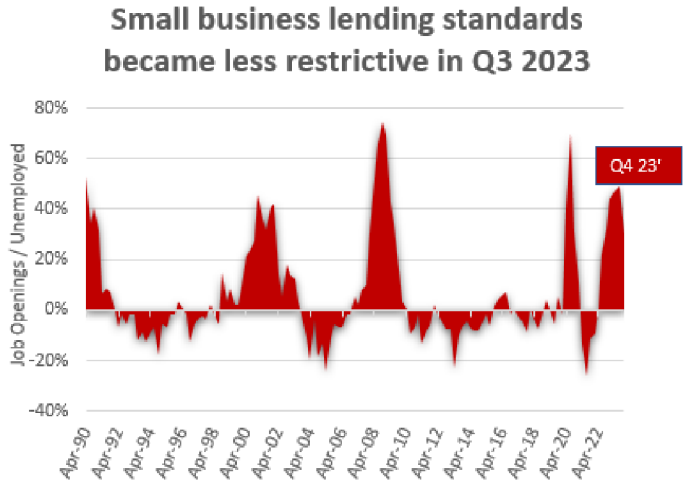
The Weekly Economic Index is composed of ten daily and weekly indicators of real economic activity and is directionally comparable to U.S GDP growth.



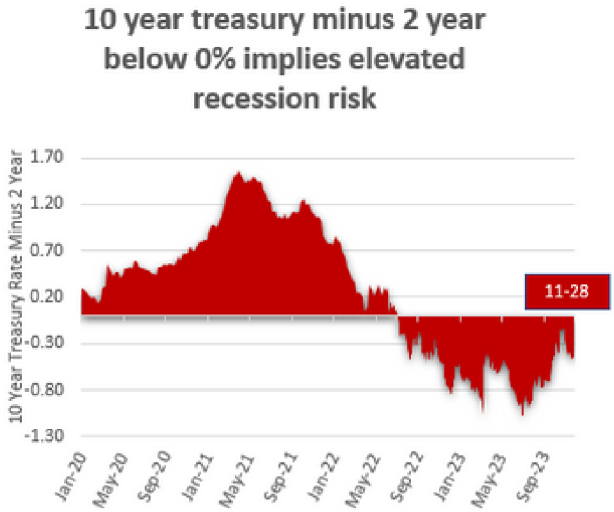
Temporary Help Services measures the number of jobs in the United States employed on a temporary basis.



Net Percentage of Domestic Banks Tightening Standards for Commercial and Industrial Loans to Small Firms is an indicator of bank lending standards.



10 Year Treasury Rate Minus 2 Year is an indicator that tends to go below 0% 6-18 months before a recession begins.



What We're Reading

Atlanta Fed projects nearly 6% GDP growth in third quarter

Reader's Corner

The Goal

by Eliyahu Goldratt and Jeff Cox

The Goal is a classic business operations book creatively set as a novel that focuses on explaining the theory of constraints and bottleneck management.

Notable Quotes:

"The entire bottleneck concept is not geared to decrease operating expense, it's focused on increasing throughput"

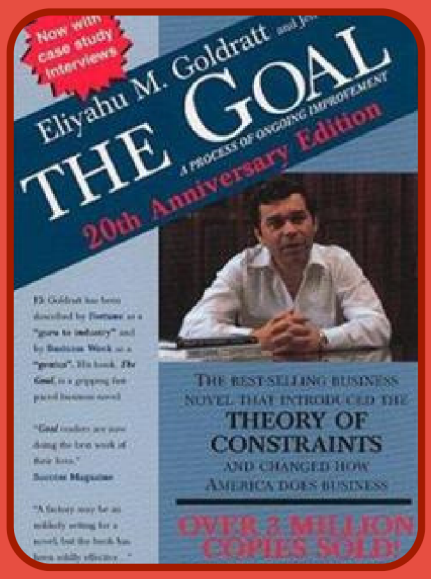
"What you have learned is that the capacity of the plant is equal to the capacity of its bottlenecks"

"What I'm telling you is, productivity is meaningless unless you know what the goal is"

"When you are productive you are accomplishing something in terms of your goal"

"What is needed is just the courage to face inconsistencies and to avoid running away from them just because "that's the way it was always done'"

December Book Spotlight



Top 25 Most Influential management books - Time Magazine - 2011

Vested Metals Overview

Vested Metals International is a certified customer centric metals supplier focused on locating hard to find metals. We provide various grades of titanium, stainless steel, and a range of other metals. Industries we serve include medical, industrial, defense, and aerospace.

Vested Metals is also an SBA 8(a) certified organization and is open to teaming agreements that can expand a company's ability to compete for government contracts.

Contact Vested Metal's Leadership Team To Learn More

VIV HELWIG
President
P: 904-495-7278
E: vhelwig@vestedmetals.net

Viv founded Vested Metals in 2014 and has 10+ years of experience in the metals industry.

Under Viv's leadership, Vested Metals earned a spot on Inc. Magazine's 5000 fastest growing companies list four years in a row (2019-2022). In 2019, the Jacksonville Business Journal named Viv to its "Ultimate CEO" list.

He earned his bachelor's degree from Flagler College where he was also awarded an honorary "Doctor of Laws" degree.

RIC SNYDER
VP of Business Development
P: 260-443-2204
E: rsnyder@vestedmetals.net

Ric has 15 years of industry experience with a focus on orthopedic bar. As a product line manager he developed significant material and technical expertise in a range of raw material products.

He received his MBA from Indiana Wesleyan University and his BA from Indiana University-Purdue University at Fort Wayne.

TOM ZUCCARINI
Chief Commercial Officer
P: 724-263-6739
E: tzuccarini@vestedmetals.net

Tom joined Vested Metals in 2022 after 37 years of experience at Carpenter Technology. He has global experience across multiple end markets and products.

He received his Bachelor of Science from Kutztown University of Pennsylvania and his MBA from Aquinas College - Grand Rapids.

JOHN PULLIAM
Chief Operating Officer
P: 317-450-1832
E: jpulliam@vestedmetals.net

John is one of Vested Metal's founding investors and has 10+ years of experience as a financial professional including 5 years of experience successfully managing a hedge fund.

He received his MBA from Columbia Business School and has experience investing in commodities including copper, oil & gas, and precious metals.

SBA 8(a) CERTIFIED

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