HOUSE of REPRESENTATIVES

STATE OF MICHIGAN

Appropriations Requests for Legislatively Directed Spending Items

1. The sponsoring representative's first name:
   Greg

2. The sponsoring representative's last name:
   Markkanen

3. The cosponsoring representatives' names. All cosponsors must be listed. If none, please type 'n/a.' A signed letter from the sponsor approving the co-sponsorship and a signed letter from the member wishing to co-sponsor are required. Attach letters at question #9 below.
   Rep. Dave Prestin and Rep. Karl Bohnak

4. Name of the entity that the spending item is intended for:
   MTEC SmartZone

5. Physical address of the entity that the spending item is intended for:
   600 East Lakeshore Drive, Houghton, MI. 49931

6. If there is not a specific recipient, the intended location of the project or activity:
   N/A

7. Name of the representative and the district number where the legislatively directed spending item is located:
   Rep. Greg Markkanen – 110th District

8. Purpose of the legislatively directed spending item. Please include how it provides a public benefit and why it is an appropriate use of taxpayer funding. Please also demonstrate that the item does not violate Article IV, S 30 of the Michigan Constitution.
   The Michigan Tech Enterprise Corporation SmartZone, Inc. (MTEC) is a non-profit entity whose core mission is to accelerate high-tech business growth and foster a prosperous regional economy. A feasibility study and assessment formed the basis of a recommendation on the community's readiness for an Advanced Manufacturing and Materials Innovation Center (AMMIC). The AMMIC will provide pilot scale, high bay, manufacturing and material processing space, as well as a wet lab and Controlled Unclassified Information Center (CUIC). This resource will provide a vital transition for

emerging technology to advance from the lab bench to full industrial scale. The transition is typically framed as the "valley of death" for high-tech and advanced manufacturing startup companies. A comprehensive feasibility study was conducted and supports the overall determination that the proposed AMMIC has a solid market to draw quality clients. This project will implement a viable and sustainable plan, a vibrant and thriving ecosystem, a network of support resources, and partnerships, and strong community support – all critical factors in the success and sustainability of such an undertaking.
This funding request complies with Article IV, Section 30 of the Michigan Constitution, which prohibits state appropriations to private entities unless a valid public purpose is served. This project would provide funding to an over two-decade old non-profit organization and not a private entity.

9. Attach documents here if needed:
   Attachments added to the end of this file.

10. The amount of state funding requested for the legislatively directed spending item.
    17555898

11. Has the legislatively directed spending item previously received any of the following types of funding? Check all that apply.
    ["None"]

12. Please select one of the following groups that describes the entity requesting the legislatively directed spending item:
    Non-profit organization

13. For a non-profit organization, has the organization been operating within Michigan for the preceding 36 months?
    Yes

14. For a non-profit organization, has the entity had a physical office within Michigan for the preceding 12 months?
    Yes

15. For a non-profit organization, does the organization have a board of directors?
    Yes

16. For a non-profit organization, list all the active members on the organization's board of directors and any other officers. If this question is not applicable, please type 'n/a.'
    • Eric Waara (City of Houghton Representative - Chairman of the Board) • Mary Babcock (City of Hancock Representative – Board Secretary) • Andrew Barnard, Ph.D. (Michigan Tech Representative – Treasurer) • Jeff Ratcliffe (KEDA Representative – Board Vice-chairman) • Tom Merz (Michigan Tech Representative – Trustee) • Steve Zutter (Trustee)

• LeeAnn Keller (Trustee) • Allan West (Trustee) • Keith Meyers (Trustee) • David Nyberg (Trustee) • David Rowe (CEO) • Patrick Visser (Chief Commercial Officer) • Jason Mack (Vice President of Business Development) • Cheryl LeClaire (Vice President of Operations) • Grace Hsia Haberl (AMMP Program Director) • Annalina Van Hercke (Marketing Coordinator) • Mary Ahles (Marketing Manager)

17. "I certify that neither the sponsoring representative nor the sponsoring representative's staff or immediate family has a direct or indirect pecuniary interest in the legislatively directed spending item."
    Yes, this is correct

18. Anticipated start and end dates for the legislatively directed spending item:
    October 6, 2025 – June 30, 2026 (Anticipated Construction Period)

19. "I hereby certify that all information provided in this request is true and accurate."
    Yes

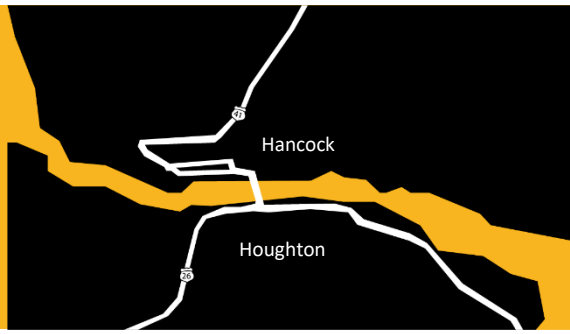
MTEC SmartZone℠

Advanced Manufacturing & Materials Innovation Center (AMMIC)

MTEC SmartZone with the support of Michigan Tech University Announce Economic Development Initiative

PROJECT: Pilot Flex-Space Facility to address nationwide gap in commercialization pathway

TOTAL ESTIMATED PROJECT COST = $17.5M



Michigan – Identified Commercialization Gap

Shared pilot facilities are open access test sites that bring innovations from the laboratory into industrial practice

- Currently no shared pilot-scale facilities in the region.
- Pilots are a critical stage of development towards commercialization
- State of Michigan has an opportunity to lead the way.

MTEC SmartZone & MTU Immediate Pilot Needs

We have the entrepreneurs but are missing the key physical space and shared facilities needed

- Six university spinout startups– plastic recycling, hardwood timber, med-tech, battery recycling, others
- A leading space-tech manufacturing company
- Controlled Unclassified Information Center
- Wet lab

We do not want to lose these companies to other states.

Solution – Flexible Pilot Manufacturing Facility

MTEC & Michigan Tech ($100M+ R1research) are pursuing development of an Advanced Manufacturing & Materials Innovation Center (AMMIC) to accommodate late-stage R&D, pilot-scale & commercial demonstrations.

MTEC SmartZone

MTEC SmartZone is one the most successful Smart Zones in the state commercializing new startup technology companies.

In the last year, our clients have generated $105.9 million in sales and $32 million in investment, with a total $597 million follow on funding since 2003.

Rendering of the proposed Advanced Manufacturing & Materials Innovation Center

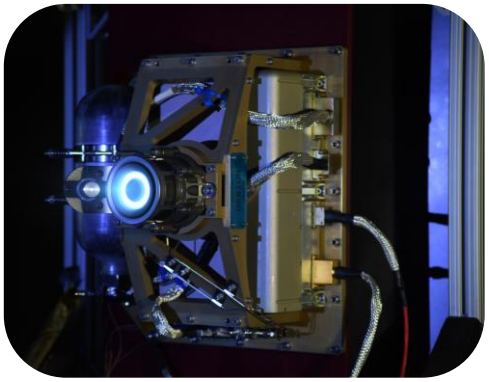
"This facility will not only create jobs, but also foster a vibrant ecosystem for advanced materials and advanced manufacturing companies. By leading this effort, we will support long-term prosperity for our community and for the state of Michigan"

David Rowe
CEO, MTEC SmartZone
mtecsz.com
drowe@mtecsz.com
(720) 252-4209

The Commercialization Gap - R&D / Pilot Facilities

The Upper Peninsula of Michigan has a strong base of small and medium size (SMEs) advanced manufacturing companies. In addition, Michigan Technological University spins out a consistent pipeline of manufacturing/materials startups through innovators from engineering, advanced materials, material processing and other disciplines.

MTEC SmartZone, serving both client bases, is consistently unable to provide one essential type of resource for these clients to enable successful commercialization - access to pilot and commercial demonstration facilities.



Facts [1]

While large firms often have their own in-house pilot lines, SMEs typically cannot spend their limited funds to build and operate their own pilot line. Thus, SMEs secure third party-controlled pilot line capacity to meet their testing and validation needs. This is not an option in the Upper Peninsula of Michigan.

- Shortage of shared pre-industrial-scale production facilities in the U.S. at both the R&D- and pilot-scale production capacity ranges.
- Extends product development and qualification timelines for producers at every step of the supply chain.
- There are currently no shared pilot-scale facilities of this nature in the U.S.
- Meanwhile, Europe has developed a robust ecosystem of shared pilot-scale production lines (LiPLANET).

Benefits & Impact

Federal/State Program Qualifications: Michigan HUB Zone; Michigan 48C energy community (per Metropolitan Statistical Areas); Justice40 adjoining area census tract. [2]

Economic Growth

Attracting new businesses, fostering innovation, and encouraging companies to establish local operations

Industry Collaboration

Facilitate collaboration between manufacturers including technology, best practices, processes, and more

Workforce Development

Enhance the skills of the local workforce through workshops, training programs, and certification programs.

A well-trained workforce is crucial

Applied Research & Development

Attracting new businesses, fostering innovation, and encouraging companies to set up local operations

Supply Chain Enhancement

Strengthen the supply chain for various industries, which is valuable during disruptions or market fluctuations and vital for national security.

Attracting Investment

Companies seeking to leverage advanced materials or explore innovative manufacturing methods

Sources 1) Li-Bridg 2) SBA HubZone Map: https://tinyurl.com/47tsk8af

MICHIGAN TECHNOLOGICAL UNIVERSITY

OFFICE OF THE PRESIDENT

April 16, 2025

Honorable Ann Bollin
Michigan House of Representatives
Michigan State Capitol
100 N. Capitol Ave.
Lansing, MI 48933

RE: MTEC SmartZone Advanced Manufacturing and Materials Innovation Center

Michigan Technological University is fully supportive of economic development activities that expand the vitality of the region and are pleased to partner with MTEC SmartZone on projects that drive innovation.

Michigan Technological University (MTU) has long established itself as a hub for research and innovation. In February, MTU was awarded R1 designation by the Carnegie Classification of Institutions of Higher Education, formally placing Michigan Tech among the top research universities in the United States. MTU houses eighteen research institutes and centers responsible for over $100 million in annual research expenditures from sources including the federal and state government as well as industry. MTU has strong entrepreneurship and commercialization programs. Research conducted on campus frequently culminates with the potential to commercialize new discoveries. This creates the opportunity for the emergence of innovative startup companies. Many of our alumni have created successful startups, with many being in advanced materials and manufacturing realm. Several have stayed in the Keweenaw to build their businesses. We have been partners of MTEC since its founding in 2002, including partnering with MTEC to coach and support MTU spinout companies.

Many MTU spinout companies need a pilot-scale space to successfully navigate the transition from the lab bench, or research scale, to full scale industrial advanced manufacturing or advanced materials processing. MTU programs housed in our Office of Innovation and Commercialization such as MTRAC, Husky Innovate, and the Enterprise Program will benefit from the proposed Innovation Center. Our incredibly strong technical experts, researchers, professors, and business experts within MTU will be valuable partners and resources for MTEC's Innovation Center. One of the strengths of this region is the strong collaboration between all our business initiatives.

We applaud MTEC SmartZone's pursuit of an appropriation to construct the Advanced Manufacturing and Materials Innovation Center and look forward to working with them in support of this endeavor.

Sincerely,

Richard J. Koubek
President

LONG PERFORMANCE ADVISORS

FEASIBILITY STUDY of an AMMIC (Advanced Manufacturing & Materials Innovation Center)

MTEC SmartZone

City of Houghton/Hancock, Michigan

May 8, 2024

Mark S. Long, President
Long Performance Advisors, LLC

FINAL Report

MTEC SmartZone

AMMIC Feasibility Study Report

Table of Contents

"We are late to the game on this one. We needed an AMMIC years ago."

-Interviewee Comment

Executive Summary

Engagement Scope

The MTEC SmartZone (MTEC) engaged the professional services of **Long Performance Advisors, LLC (LPA)** to evaluate the feasibility of an Advanced Manufacturing and Materials Innovation Center (AMMIC) to be strategically located in the Greater Houghton/Hancock, MI area.

The MTEC SmartZone core mission is accelerating high-tech business growth and fostering a prosperous regional economy in the UP. A feasibility study and assessment provide a **"go or no go" recommendation** on the community's readiness for an AMMIC. Readiness is determined qualitatively and quantitatively based on the engagement approach and methodology below. Still, it considers essential factors like quality and quantity of potential clients, sponsoring organization's readiness, likely ability to secure adequate capital and operating funding, community's awareness and support, likely ability to attract an anchor, programming synergies with the sponsoring organization, likelihood of long-term program sustainability, and community capabilities in the targeted industry sectors/clusters.

A comprehensive and compelling feasibility study supports an overall determination of whether the proposed AMMIC has a solid market to draw quality clients from, the likelihood of implementation of a viable and sustainable plan, a vibrant and thriving ecosystem, a network of support resources, and partnerships, and strong community support – all critical factors in the success and sustainability of such an undertaking. A phase 1 feasibility assessment does not provide a business plan or framework for implementing the Go/No Go recommendation.

LPA Engagement Approach

This feasibility/needs assessment study was undertaken to include a broad representation of the region/city, its citizens, and its goals and priorities for its future. This study sought the input of key community leaders, economic development officials, educational partners, public officials, and community/businesspeople to provide the broadest view possible of the entrepreneurial and economic development landscape in the potential service area and region.

LPA's Due Diligence efforts included:

- Primary analysis through direct interviews with community stakeholders, key leaders, and community champions to understand critical priorities, concerns, and unmet needs.

- A community-based survey assessed the community's understanding, awareness, and support for an AMMIC.

- Extensive discussions with economic and community development personnel to determine synergies, targeted industries, and support services for innovative companies in the region.

- Secondary analysis of critical demographic information, economic/entrepreneurial conditions, financial measures, metrics, population/educational attainment, and income levels both now and in the future that will drive utilization and interest in entrepreneurial programs and services through third-party data.

- Evaluation of essential best practices, benchmarking principles, and critical success factors for a targeted industry program or sector-based program.

- Discussion and feedback with crucial MTEC SmartZone personnel with draft assessments, discussion, analysis, and interface regarding points of differentiation, commitment, community relations, university interests, and integration into broader strategic planning efforts.

- Alignment with regional, cross-regional, and statewide efforts to support and develop the advanced manufacturing and materials concept as part of a comprehensive and integrated economic development strategy.

Summary

Below is a synopsis of the critical favorable and unfavorable conditions for establishing an AMMIC in the Greater Houghton/Hancock.

Favorable Conditions

> "Local government has always had a seat at the table, but they don't bring money."
>
> **-AMMIC Interviewee**

\+ **Strong Community Ownership and Buy-in:** There was widespread support for the AMMIC, its need, and its likelihood of achieving targeted occupancy rates and attracting quality clients.

\+ **Need for Services:** Significant gaps in existing commercial spaces made a specialized facility like the AMMIC essential for increasing the number of startups and retaining future startups that might have to relocate outside the service area to find suitable space.

\+ **Sponsoring Entity:** There was near unanimous support for MTEC SmartZone to operate the AMMIC. MTEC's track record, existing work with startups, knowledge of

> **"Trusted partner and honest broker."**
>
> -AMMIC Interviewee

the area, and relationships with Invest UP, State of Michigan agencies, Michigan Tech, K-12 schools, and municipal government provide them with a credible track record of performance. Most, if not all, of these organizational entities are represented on the board of the MTEC SmartZone.

> **"Startups are becoming more important within the University and the community."**
>
> -AMMIC Interviewee

+ **Michigan Tech University:** The University is deeply committed to community and regional economic success in order to recruit and retain faculty and students in the area effectively. Through outreach and facilitated connections, the University works effectively across municipalities, SmartZones, and other stakeholders to create a thriving innovation ecosystem that supports its enrollment growth and strategic initiatives.

+ **Reasonable Expectations:** The expected economic impact and performance results were calibrated and reasonable for the entity. Long-term success and patient capital likely guide the strategic development of the Center, given that it is likely never to deliver, from an operational and facility perspective, superior financial returns.

Unfavorable Conditions

⇔ **Below Market Rates:** Many startups who have benefitted from MTEC SmartZone location assistance services have commented that one of the most attractive aspects has been the attainable below-market rates for the space occupied. The AMMIC will seek to achieve market rates in order to realize sustainable operations.

⇔ **IP Concentration:** MICHIGAN TECH is a tremendous community asset (especially as it evolves toward R1 status), and ongoing faculty recruitment continues to yield entrepreneurial faculty and researchers; however, a high dependency on the intellectual property from the University pipeline will create some risk for a center and program that needs to access a diversified deal flow. More startup activities are likely to flow from existing referral sources in the community versus attracting companies to relocate from outside the regional footprint.

> **"Our location, at times, is a real challenge. We do lots of work remotely."**
>
> -AMMIC Interviewee

⇔ **Remote Location:** The geographic remoteness (rural nature and large geography) of the Upper UP limits the suitability of some segments/sectors to overcome differentials in location costs, supply chain issues, and transportation costs.

- **Funding:** The speed at which an AMMIC could be designed, constructed, and opened is hampered by the need for likely legislative-based funding, whether in Michigan or federally. These funding appropriations are often on a fixed time-based cycle and unavailable on a rolling basis. Interviewees emphasized that no evidence of solid philanthropic funding was available to support this initiative meaningfully and substantially.

- **Stage-Specific Programming:** Even though the AMMIC is not envisioned to be an incubation program, beyond access to the physical space, there needed to be better-articulated programming needs/gaps except for capital access (initial access to state of Michigan innovation funds and the investor marketplace). While lack of housing was frequently shared as a difficulty for moving people to the area, most early-stage companies needed high bay/reinforced floors/wet lab space, access to specialized equipment, and flexible leasing terms (given significant changes or growth in their business).

- **Market Dynamics: The minimum size of a facility should be at least 30,000 gross square footage**. The project would be more favorable if a larger building footprint could be developed to create a lower break-even level for the AMMIC. There is the additional risk that the high-end market pricing was used for the financial analysis and, depending on economic conditions at the time of opening and other market vacancies, could put pricing pressure on the lease rates. If existing staffing can operate the facility, it would take pressure off the lease rates set at the high end of the market.

LPA Feasibility Recommendation

LPA Overall Feasibility Recommendation*[1]:

Long Performance Advisors, LLC. is providing a GO recommendation on the feasibility of an Advanced Manufacturing and Materials Innovation Center (AMMIC). *LPA recommends that MTEC SmartZone raise the funds required for initial construction and operations and develop a business plan for the Center.*

[1] Key reasons to conduct a feasibility study include but are not limited to (a) It is important to gauge community interest and support; (b) it is important to understand the roadmap to sustainability and success of a newly implemented program; (c)many funders, especially government funders, want to see evidence of the likely community support and leadership for an incubation program before providing funding resources; and (d) just as strategic programs must deliver value to their clients and assist them in creating sustainable and successful ventures, so must the program model the same business practices.

Background and Case for Support

MTEC – Principal Sponsor

Establishing a **Manufacturing Innovation and Advanced Materials Center** in the **City of Houghton/Hancock, Michigan, *would catalyze growth, innovation,*** *and* ***economic prosperity*** in the Upper West Peninsula of Michigan.

These advantages include, but are not limited to:

1. **Economic Growth**: Such a center could stimulate economic development by attracting new businesses, fostering innovation, and creating jobs. It would be a hub for research, development, and collaboration among manufacturers, entrepreneurs, and academic institutions.

2. **Industry Collaboration**: The center could facilitate collaboration between local manufacturers, helping them share best practices, adopt cutting-edge technologies, and improve their processes. This synergy could enhance overall competitiveness.

3. **Workforce Development**: By offering training programs, workshops, and certifications, the center could enhance the skills of the local workforce. A well-trained workforce is crucial for adopting advanced manufacturing techniques and materials.

4. **Applied Research and Development**: The center could support research initiatives related to advanced materials, sustainable manufacturing practices, and process optimization. This could lead to breakthroughs and innovations that benefit local industries and the broader community.

5. **Supply Chain Enhancement**: Focusing on advanced materials could strengthen the supply chain for various industries, including automotive, aerospace, and renewable energy. This resilience would be valuable during disruptions or market fluctuations and support leveraging the region's core competencies and capabilities.

6. **Attracting Investment**: A specialized center could attract private and public investment. Companies seeking to leverage advanced materials or explore innovative manufacturing methods might establish regional operations or partnerships to advance innovation projects, skunkworks, or other spinouts.

Likewise, it's essential to consider potential challenges and obstacles to the success of AMMIC (success is defined as operational and programming sustainability). These potential barriers and obstacles might include:

1. **Cost and Funding**: Establishing and maintaining such a center requires financial resources. Securing funding from government grants, private investors, and industry partnerships.

2. **Infrastructure and Facilities**: Developing state-of-the-art facilities, laboratories, and equipment is necessary. Ensuring the center has the required infrastructure for early-stage research and development activities is vital to reducing these companies' startup and speculative development risks.

3. **Community Engagement**: Engaging local communities, businesses, and educational institutions is essential. Building strong partnerships and ensuring the center meets regional needs and priorities will be crucial for its success.

4. **Sustainability**: The AMMICs long-term viability depends on its ability to adapt to changing technologies and industry trends. Regular assessments and adjustments are necessary to remain relevant.

The region substantially benefits from an economic powerhouse and engine that drives substantial applied research and commercialization efforts – Michigan Technological University (Michigan Tech).

Michigan Tech – Key Stakeholder

Michigan Technological University (Michigan Tech) has several important assets related to **advanced materials**. Michigan Tech's assets in advanced materials include research programs, expertise in material processing, and a commitment to addressing real-world market needs through innovative materials technologies. Connecting the underlying research to commercial applications provides a cradle-to-grave holistic approach from the initial characterization of the IP to the commercial launch of the entity to successful product introduction in the marketplace. Key activities with Michigan Tech include:

Entity	Focus	Examples
MTRAC Applied Advanced Materials Program	Provides resources to support materials-related projects with high commercial potential. Offers **research and development funding** for prototype development	Examples of applications include building materials, transportation, energy transfer, energy storage, and aerospace.

Entity	Focus	Examples
	and late-stage translational activities	
Material Processing Capabilities:	Translational research and funding of novel, commercially viable technologies	Examples include expertise in manufacturing science related to metals, ceramics, polymers, concrete, wood products, and composites.
MTRAC Advanced Applied Materials Innovation Hub	Funded through the **Michigan Strategic Fund** and administered by the **Michigan Economic Development Corporation (MEDC)**, this hub supports materials-based technologies.	Examples focus on novel materials and novel applications of conventional materials that address well-documented market needs.
Institute of Advanced Materials and Manufacturing	Advance the University's leadership and interdisciplinary capabilities in advanced materials development and manufacturing innovation	These projects cover a wide range of topics related to manufacturing and materials research. **These projects are likely to result in quality deal flow for the AMMIC.**

The investments and projects described by the MTRAC programs and Michigan Tech's Institute of Advanced Materials and Manufacturing indicate a strategic focus on advancing applied advanced materials technologies. These projects demonstrate the potential for significant advancements in materials science and hint at the creation of targeted manufacturing and materials sub-segments. Startups born from these sectors can drive innovation, sustainability, and economic growth within the advanced materials and manufacturing industries, offering solutions to some of today's most pressing challenges.

Here are some potential sectors and product categories that could be influenced or created based on the nature of these projects:

1. **Advanced Food Industry Applications**: The Polar Salt Process project has implications for the food industry, especially in the salt and seasoning segments. Startups could focus on producing and marketing high surface area refined salt, targeting health-conscious consumers and food manufacturers looking for low-sodium alternatives that do not compromise taste.
2. **Sustainable Energy and Recycling Technologies**: The Recycling of Lithium-ion Battery project addresses a critical need for sustainable energy solutions,

particularly battery recycling. This could lead to the emergence of startups specializing in the recycling of lithium-ion and other types of batteries, offering services to electronic manufacturers and electric vehicle companies.

3. **Advanced Coatings and Materials**: The project on a Low-Cost Fabrication Approach for Self-Cleaning and Smudge-Free Resistant Glass Panels could spawn startups focused on developing and applying advanced coatings for a range of industries, including automotive, solar energy, and construction. These coatings could improve the longevity and performance of glass panels and other surfaces.
4. **Flexible and Transparent Electronics**: The Scalable Ultra-Thin Metal-Based Transparent Conductors project points towards innovations in flexible and transparent electronics. Startups in this sub-segment could develop new touchscreens, flexible displays, and bright windows, leveraging the advancements in ultra-thin, conductive films.
5. **Optoelectronics and Advanced Displays**: Linked closely with transparent conductors, this area involves the development of optoelectronic devices such as LED displays, solar cells, and light sensors. The technology for scalable, ultra-thin metal-based conductors could lead to startups focusing on next-generation displays and lighting solutions that are more efficient and versatile.
6. **Sustainable Materials and Manufacturing**: Across all these projects, there is a clear emphasis on sustainability, whether through recycling, reducing resource use, or eliminating harmful substances. This could lead to a broader segment of startups dedicated to creating sustainable materials and manufacturing processes across various industries.

LPA Observations

- The AMMIC should focus broadly on manufacturing technologies and materials innovations that address quality, efficiency, and productivity in broad-based sectors that are important regionally and globally.
- While the AMMIC is not envisioned as a sector-based incubation program, there are natural support tools and programs offered by the MTEC SmartZone that are complementary and synergistic to the development of early-stage ventures envisioned to be assisted and supported through the AMMIC.

Municipal Support & Engagement

The cities of **Hancock** and **Houghton**, both located in Michigan, have compelling reasons to establish a **manufacturing and materials center**. An AMMIC manufacturing in Hancock and Houghton will likely drive economic prosperity, foster innovation, and create a dynamic ecosystem that benefits residents and businesses. These likely synergies also yield substantial tax base benefits and support to the State of Michigan.

Strong rationale exists for why the focused economic development activities would align with crucial community objectives and current activities are listed below:

Rationale	Comments
Economic Growth and Job Creation	A manufacturing and materials center can stimulate economic growth by attracting/retaining new businesses, creating jobs, and fostering innovation. By providing infrastructure and resources, these centers encourage companies to set up operations locally, leading to job opportunities for residents.
Technology Transfer and Innovation	These centers serve as hubs for collaboration between academia, industry, and research institutions. By facilitating technology transfer, they enable the commercialization of research findings and innovative ideas. Start-ups and established companies can benefit from access to cutting-edge research and development.
Talent Attraction and Retention	Establishing a center attracts skilled professionals, including engineers, scientists, and technicians. The promise of exciting projects, collaboration with universities, and exposure to emerging technologies
Infrastructure and Facilities	Manufacturing centers provide specialized facilities such as laboratories, workshops, and testing areas. These resources are essential for research, prototyping, and production, making the region an attractive destination for businesses.
Collaboration and Networking	Proximity to other companies, research institutions, and industry experts fosters collaboration and knowledge sharing. Networking events, conferences, and workshops held within the center create opportunities for partnerships and growth
Revitalization and Community Development	Transforming idle buildings into vibrant centers of commerce revitalizes the local community. Investment in infrastructure and renovation can prevent blight and enhance the overall quality of life. There is strategic focus on 2 of the 3 sites with outside Federal and local investments to build capacity at the Hancock Industrial Park site.
Government Support and Incentives	State and local governments often provide incentives, grants, and tax breaks to encourage the establishment of such centers. These incentives attract private investment and promote economic development.

Rationale	Comments
Success Stories and Role Models	Highlighting success stories of other SmartZones or manufacturing centers can inspire local entrepreneurs and investors. Demonstrating the positive impact of similar initiatives encourages community support.

AMMIC– Critical Success Factors (CSFs) Matrix

The core dimensions of the likely success of an AMMIC depend on the following categories. The Houghton/Hancock, MI area readiness to undertake an AMMIC initiative of this magnitude is summarized below using the following rating system:

- **Community Strength (S)** – One or more critical competitive advantages can be exploited.
- **Neutral (N)** – It could become a strength with stronger emphasis and resources.
- **Needs Improvement (NI)** – A significant gap or concern is evident.

Category	Rating	Comments
Innovation Ecosystem Dynamics	**N**	A high degree of coordination, alignment, and collaboration among existing players; gaps in network access and capital access; good regional alignment around economic development imperatives. Out-of-market support resources (service providers and resource partners). Good private/public engagement.
Adequate Infrastructure	**NI**	Known gaps in industrial innovative space for high potential manufacturing technology innovations. Remote geography pushes specific viable client business models (high value-added, high margins) to offset logistics & pricing challenges. Several suitable site locations for the AMMIC exist in the community, yet there are differing opinions as to which site is best.
Pipeline of suitable high-quality startups	**S**	Michigan Tech and community innovators who want to be in the region create adequate opportunities for an AMMIC to succeed. Local second-stage companies are champions and supportive of community-based efforts.
Sponsoring Entity/ Organization	**S**	Reputation, efforts to source manufacturing startups today to appropriate office/lab/production space, and track record of solid and consistent leadership make MTEC SmartZone the right fiscal sponsor.
Sustainability	**S**	There is interest from several more prominent companies in potentially anchoring an AMMIC. This would allow the facility to grow, gain operational efficiencies, and better manage stakeholder/community expectations and impact. The proposed sponsor (MTEC SmartZone) is activating a business accelerator with a strong track record of obtaining grants.

Category	Rating	Comments
		Revenue streams and debt service will likely not permit a below-market lease rate strategy. Clients will need to be calibrated to this expectation. There are some concerns about the timing of outside federal funding given the US Senator's retirement and limited budget flexibility/constraints for earmarks both in the MI Statehouse and US Congress.
Reasonable Stakeholder Expectations	**S**	Sponsor has the right outlook and patience for meaningful outcomes – 10+ years. -Sponsor and stakeholders have reasonable economic and community impact goals and clarity around likely success metrics (e.g., # of jobs, # of businesses that grow out of the center into the community, # of young people who stay or start businesses in the AMMIC.) Champion is well-respected and well-positioned in the community to execute this strategy and has been actively involved with the companies and university spinouts to place them in space and deliver services in the community. The mix of likely success metrics align with the core purpose of creating an AMMIC. Compelling value-proposition to build and grow the economic base of a thriving rural community with place-based entrepreneurial services. A programming gap remains in what support mechanisms and value-added services could be combined with the physical space to advance the growth and development of these innovative manufacturing businesses. Most potential prospect needs were around testing equipment and hiring non-technical businesspeople.

LPA CSF Recommendations:

The MTEC SmartZone is positioned well to capitalize on many of the strengths required to operate and sustain successfully an AMMIC. With a long-standing track record of working with innovative companies, a community-based governance model, and substantial entrepreneurial-centric programming and funding, the MTEC SmartZone has the credibility, prior venture success, established programs, support mechanisms, and stakeholder support to be the primary sponsor of the AMMIC.

Early efforts of the AMMIC should focus on:

- **Anchor Commitment:** Committing one or more anchors to enlarge the core footprint of the AMMIC (based on several companies' interests, this could double the size of the AMMIC and make it a more commercially viable and attractive building to finance by local financial institutions).
- **Site Selection:** Determining which of the three sites is likely to be the AMMIC location, the Houghton airport park is expected to provide the best overall value for the construction and operation of the facility. Unfortunately, the purchased buildings from Finlandia University are not purpose-built, require significant rehab expenses, and are not likely to provide the type of flex space needed for the targeted and prospective client companies.
- **Expanding Network:** Working on building out the resource partners and service providers network to ensure companies can access cost-effectively the trusted advisor/support services required to establish and grow their innovative startups in the Greater City of Houghton/Hancock Area.
- **Success Metrics:** Establishing upfront the likely impact results to be tracked and measured (# of companies attracted and grown out of the AMMIC to the community and # of jobs and investment $ attracted by companies in the AMMIC.)
- **Program Alignment:** Fine-tuning likely programmatic aspects to support the space occupancy of the clients attracted to the AMMIC. This might include SBIR/STTR grant assistance, early funding for prototyping, and talent sourcing from high schools and regional universities.
- **Funding Commitments:** Securing early funding commitments to build momentum as the sponsor works through the legislative appropriation and NOFA process to raise the substantial capital required for construction, initial equipment, and early years of operational funding.
- **Facility Planning:** Complete the early schematic design phase (and cost estimating) of A&E to enable a more reliable business model to be produced to determine financial constraints and likely financial performance of a purpose-built facility.

Implementation Plan

Activity	Responsibility	Comments
Accept the draft report.	**MTEC/ LPA**	Provide timely feedback and suggestions for moving the draft report to the final report
Secure 1 or more anchors to the AMMIC	**MTEC**	Finetune interest and obtain non-binding letters of commitment for space in or attached to the AMMIC
Work with A&E or Design Builders to establish renderings and basic design and business model of the AMMIC	**MTEC**	With committed anchors fund or obtain voluntary professional support for the development of the schematic design and programming of the space. Determine and fine-tune the construction cost estimates, anticipated design-build construction and opening timetable.
Narrow down site selection and option the proposed acreage.	**MTEC**	Determine if Airport or Business Park is best suited for the proposed AMMIC Project.
Conduct a capital campaign or complete a case fort support for legislative and philanthropic support	**MTEC**	Determine if an outside fundraising consultant is needed. Begin the process of discussion on legislative appropriations. Seek out EDA construction funds assistance.
Revise the financial modeling to develop a 5-year financial plan for a debt-free building	**MTEC**	Determine on how the building project can secure adequate capital to construct (debt-free) and determine how operating support subsidies can be obtained to fund the gap between operating costs and ramp-up of occupancy over a three-year period.
Complete a business plan for the building/program	**MTEC**	Determine if MTEC will write the business plan with the above inputs or seek out a business consultant to write the business plan.
Commence a marketing and awareness campaign	**MTEC/ Outsourced Marketing Agency**	Begin recruitment of initial clients for the AMMIC. Goal is 60% pre-leasing (excluding anchor clients).
Competitively bid or award contract to a Design/builder or pursue traditional design-bid-build contractor	**MTEC/ Board**	Once funding is secured or committed, complete competitive bidding process and award contract. Commence site development and construction.

Business Climate

The Western UP Prosperity region* comprises the following counties: Baraga, Gogebic, Houghton, Iron, Keweenaw, and Ontonagon. Using a custom-designed region in collaboration with youreconomy.org, the following business dynamics were identified:

- The average size of stage 1 (2 to 9 jobs) establishment was 3.9. This could be a likely benchmark for potential early job creation for startups located in the AMMIC.
- The overall CAGR% for 2005-2022 was +.45 in small 2 to 9 jobs and -.55% in SMEs (10 to 99 jobs). Job and establishment growth lagged during the period. The impact of COVID-19, supply dislocations, and other factors likely drove the negative growth rate.

Business Stage	2005	2010	2015	2020	2022	2005-2022 CAGR%
Total Business Establishments (#)	**4,247**	**4,106**	**4,100**	**4,303**	**4,344**	**+.14**
Total Establishment Jobs (#)	**35,465**	**33,963**	**34,136**	**36,076**	**36,003**	**+.09**
# Average Jobs/Establishment	**8.35**	**8.27**	**8.33**	**8.38**	**8.29**	**-.05**
Establishments:						
Self-employed	**702**	**760**	**704**	**802**	**784**	**+.69**
Small 2 to 9	**2,768**	**2,633**	**2,680**	**2,738**	**2,802**	**+.08**
SME 10 to 99	**734**	**669**	**674**	**718**	**713**	**-.18**
Jobs:						
Self-employed	**702**	**760**	**704**	**802**	**784**	**+.69**
Small 2 to 9	**10,282**	**9,845**	**9,952**	**10,617**	**11,045**	**+.45**
SME 10 to 99	**17,102**	**15,202**	**15,190**	**15,993**	**15,665**	**-.55**
Jobs Per Establishment						
Self-employed	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	
Small 2 to 9	**3.7**	**3.7**	**3.7**	**3.9**	**3.9**	
SME 10 to 99	**23.3**	**22.7**	**22.5**	**22.3**	**22.0**	

*LPA has provided county-level patterns in a data Excel sheet labeled Western UP Prosperity Region
** Total business establishments and total jobs include all stages of companies (stages 1 to 4 and include sole proprietorships)

Labor Studies

In May 2023, TIP Strategies completed an **Upper Peninsula Labor Market Study**. This study acknowledged the twin importance of higher education and career and technical education (CTE) to the future talent development and pipeline for the community. There was a recognition that the demand for talent exceeded the supply, and to increase and diversify the labor participation rate, more focused efforts would need to be made to upskill and resell for current market conditions. Current market conditions reinforced the following key attributes of the region for an AMMIC:

Benchmarking Successful Center Practices – The best *manufacturing technology innovation and advanced materials centers* share common characteristics:

1. Multi-disciplinary collaboration
2. Long-term vision and commitment
3. Invest in strategic partnerships.
4. Operate with adaptability/ flexibility to business conditions.
5. Enable effective resource management.
6. Ensure Industry relevance.
7. Develop education & workforce linkages.

1. 20-25% of all completion awards in the region are in engineering fields (180 degrees among the three universities - Michigan Tech, Northern Michigan University, and Lake Superior State University.)
2. There is widespread acknowledgment that talent retention and attraction efforts are needed and that there needs to be more supply of quality workforce housing options. Additionally, regional employers realize they need to increase their wages and benefit competitiveness to retain graduates and recruit successfully to the region.
3. Key strategies identified and recommended by TIP included:
    a. Recruiting tech-based businesses to the UP.
    b. Aligning workforce needs to future economic development priorities.
    c. Cultivating an entrepreneurial ecosystem through commercialization, success planning, and offering customized workforce development programs.

Entrepreneurial Support Network Coordination

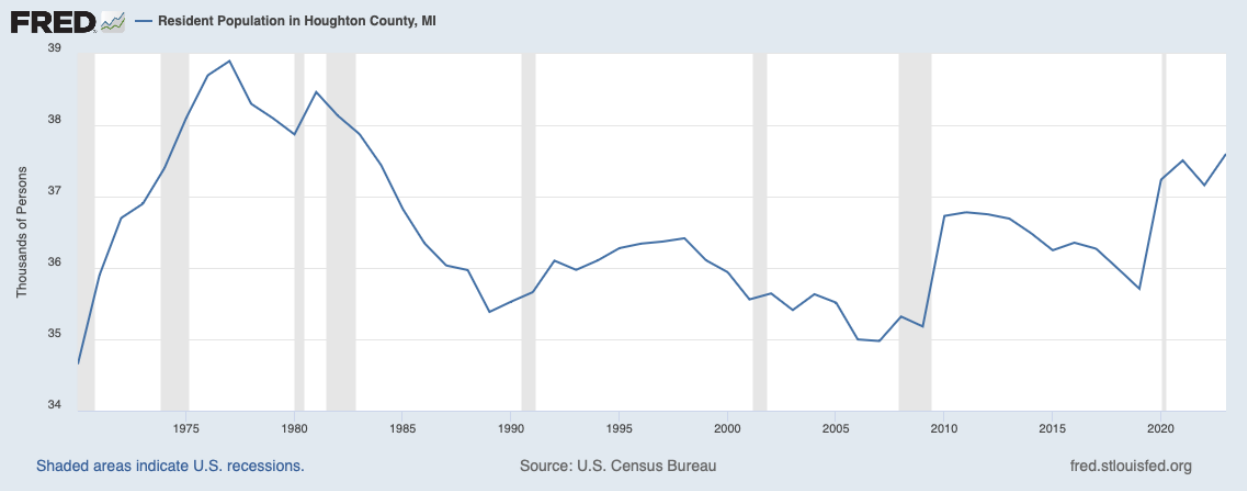
The MTEC SmartZone and InvestUP provide wayfinding, navigation, and entrepreneurial support to emerging startups and early-stage companies. Through InvestUP's website navigation (https://www.investupmi.com/index.php/up-data-center/), potential entrepreneurs and innovators can use the business finder online resource to locate entrepreneurial assistance, funding, SmartZone, housing, education, banking municipal and other business-building support. **LPA would recommend relocating the business resource finder to a more prominent and easier-to-find place on the website**.

Target Industries/Core Clusters

The InvestUP identifies the following core industries as regionally competitive: **advanced manufacturing, defense & aerospace, cold weather/rugged terrain testing, medical devices, natural resources/land management, and technology & engineering.** The AMMIC should support any manufacturing and materials innovation concept or venture regardless of its likely vertical market or customer. Rural sector programs like the AMMIC can only make a sector bet if they cast a wide net for potential quality deal flow. They should be open to supporting a wide range of mixed-use technologies and innovations in a broad spectrum of innovation categories.

Economic Vitality & Sense of Place

Population Trends



https://fred.stlouisfed.org/series/MIHOUG1POP

- The population is rising post-COVID but not to the pinnacle of the high population watermark in the late 1970s.
- Population growth improved from 35,214 in 2020 to 37,414 at the end of 2022.

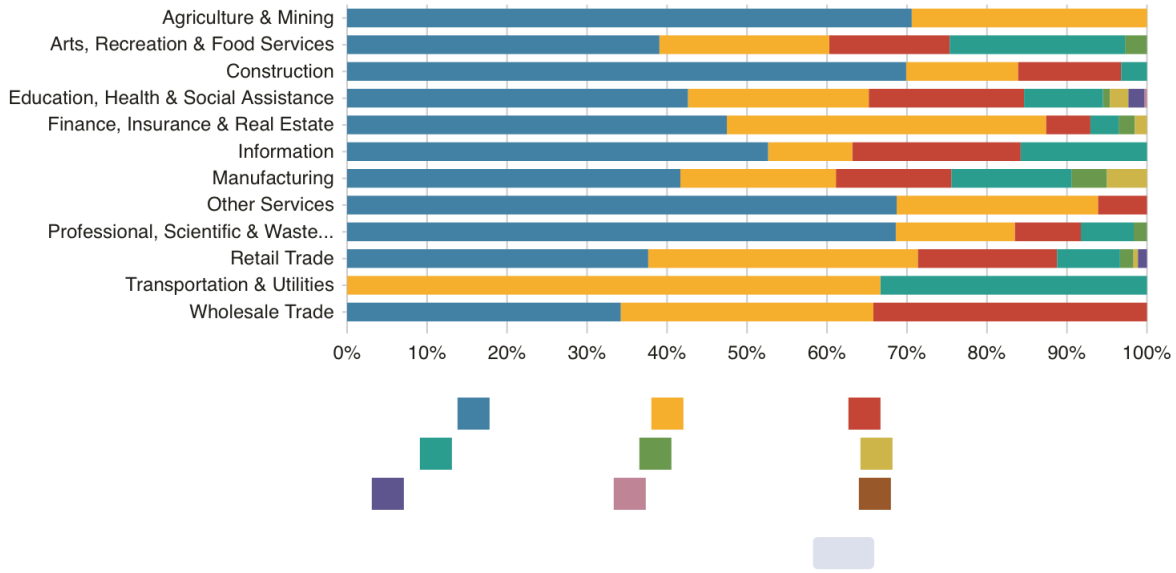
Houghton, MI Composite Stats*

Characteristic	Statistic	Comment
Population	37,414	37,599 estimated for July 1, 2023
Median Age	31.9	Lower by 8 years than state of Michigan as a whole
Population of 18-64	63%	Foreign born % is 5.8% of population
Ethnicity	93.9% - White	
Per Capita Income	$29,173	Median Household income of $52,736
Mean Travel time to Work	15.8 minutes	Shorter commute than Michigan overall (24.5 minutes)
Geographic Mobility	19.7%	>1.5 x average of Michigan
Educational Attainment (bachelor's or higher)	35.8%	20% higher than Michigan overall
Veteran Status	7.1%	10% higher than Michigan overall

*https://censusreporter.org/profiles/05000US26061-houghton-county-mi/
https://www.census.gov/quickfacts/fact/table/houghtoncountymichigan/PST045222

Establishments by Size

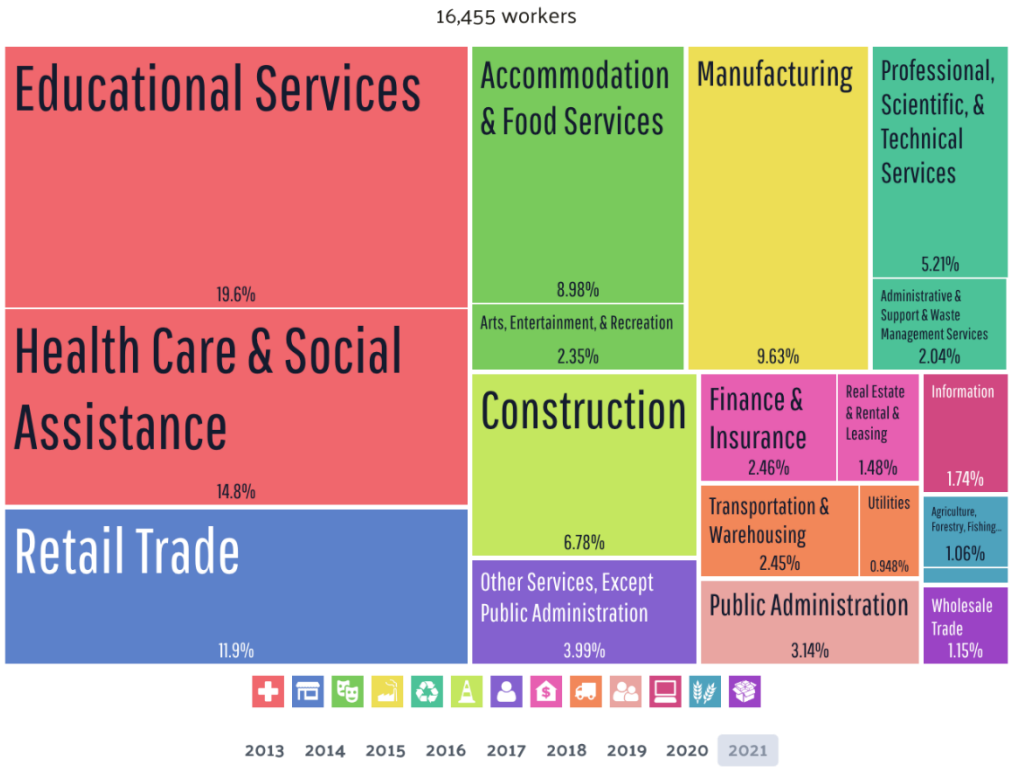
- 180 manufacturing companies
- Strong cluster – employment, payroll, and growth in payroll in the sector



Source: https://datausa.io/profile/geo/houghton-county-mi/

Employment by Industry

- The strong and dominant manufacturing sector has 1,585 (2021), with average wage rates of $64,641.



Source: https://datausa.io/profile/geo/houghton-county-mi/

SWOT ANALYSIS

The **SWOT** (Strengths, Weaknesses, Opportunities, and Threats) for the AMMIC in a **geographically remote rural community** carries specific challenges and opportunities. An overall assessment of the advantages and drawbacks are highlighted below:

Strengths	Weaknesses
• Track record of likely sponsor (MTEC SmartZone) in finding funds, recruiting, and operating the program • There is a significant gap in the commercial market for suitable space for AMMIC clients. • Stakeholders buy-in/community engagement. • Research collaborations with the three local universities and especially Michigan Tech with its R1 status. • Robust pipeline of talent (trades and professional) • Cost advantages on the market rate for space in UP versus other MI/national locations • Strong alignment of all impacted stakeholders • Engaged public schools in Career and Vocational Tech Ed	• Funding commitments • Infrastructure gaps that could hinder transportation and logistics. • Access to expertise near AMMIC location • Market reach (focus must be on high value-added, high margin products to offset transportation/supply chain costs) • Lack of suitable housing options for professionals • Dependence on Michigan Tech innovation stream • Expensive capital equipment required to provided shared use equipment to clients
Opportunities	**Threats**
• Strengthen the resource partners/service provider network. • Potential incentive offerings (government or investment funds) • Ability to target niche markets. • Retain/create more innovative AM&M-type startups. • Attract and develop broader and larger industry partnerships.	• Client recruitment outside the region may be difficult due to remoteness and rural setting. • Sustainable funding streams outside of client rent • Potential competition with local developers who may see and execute on the opportunity. • Outmigration to other more populated and easier to get to locations.

LPA Assessment:

The MTEC SmartZone is well positioned to capitalize on the opportunity given its diversified community support, existing relationships with Michigan governmental and federal agencies, and its role in facilitating business development and support for innovative companies.

Programming Alignment & Gaps

There was dissonance between what entrepreneurs/founders said in direct interviews and what was disclosed as potential gaps in the online survey. In direct interviews, entrepreneurs/founders primarily focused on the lack of suitable space (high bay, reinforced floors, specialized electrical), early innovation capital to fund proof of concept and prototyping, and more human capital/HR management support. Contrast this perspective with the online survey of community members, and there was a strong identification of a lack of wet lab space, specialized test equipment, and high bays.

The most valued business assistance by entrepreneurial companies was finding money, mentors, and the business accelerator program, so leveraging and aligning existing programming from the MTEC SmartZone to potential advanced manufacturing and materials startups has some seamless mapping. While the AMMIC is not an incubator, there are business-building programs that should be augmented with vertical market-specific support that enhances the overall value of program participation, aids in de-risking technologies, and improves the likelihood that a client can survive the early stage of its entrepreneurial journey to go on to become a sustainable and viable business.

Program	Alignment
SmartStart	Offer as part of outreach/awareness to recruit early clients, the 7-week process of validating and growing business ideas but with a focus on a manufacturing technology or advanced materials innovation.
Transformative Technologies	Offer this accelerated program of mentorship and access to markets and investors with a vertical market slant to manufacturing technology innovations and advanced materials. This could be offered as a part 2 after a company successfully completed Smart Start.
TalentBridge	Recruit established manufacturing technology innovations and advanced materials businesses to set up satellite offices within the proposed AMMIC and have their business unit execs mentor nascent startups.
NSF i-Corp Site Program	An important feeder program to early qualified applicants for the AMMIC. Create a partnership with Michigan Tech to create opportunities for non-university faculty to participate in a version of the program to access mentoring, funding, training, and networking or embed a light version of this program into Smarter Start.
BAF	Widen the use of BAF to de-risk early-stage ideas and enhance offerings to recruit early clients to the AMMIC. Administer funds faster and support more targeted investment in manufacturing and materials innovation startups. More innovation funding targeting early de-risking is critical to starting ventures.
SBIR/STTR Support	Augment and ramp-up support outside of university affiliated researchers to increase the # of proposals for funding across agencies.

Location/Site Selection Evaluation

The evaluation of potential locations for a renovation or new construction of an AMMIC should consider various strategic and competitive factors, including proximity, construction costs versus renovation costs, ecosystem impact, community engagement, limitations on infrastructure, talent attraction, and market reach.

Three locations were considered prime potential destinations for the AMMIC. One of the locations would be a renovation, and two would be new construction.

For a new construction center, considering the specific needs and nature of construction businesses, the five most important attractiveness features for its location would be:

1. **Proximity to Resources and Key Assets:** The location should be close to vital resources such as restaurants, bars/social venues, professional services, and assets like universities, colleges, or research parks. This proximity facilitates easy access to interstate or major roads, necessary services, collaboration opportunities, and access to talent pools (faculty, students, campus core labs, and shared equipment.)

2. **Accessibility and Parking:** The facility must be easily accessible to clients and their customers, ensuring the road infrastructure can handle the traffic. Adequate parking is essential, as manufacturing and material innovation businesses may have a high demand for parking due to the nature of their work and the need for visitor parking.

3. **Layout and Flexibility:** The center's internal layout should support prospective businesses' unique needs, providing space worth the rental fees. It should offer flexibility for future growth, accommodating changes like adding lines for communication or modifying spaces as businesses evolve. Adequate broadband connectivity, high bay, specialized power, and ample bay space must be planned in an open floor plan.

4. **Storage and Special Features:** Manufacturing and material innovation businesses often require materials, specialized equipment, digital/SW and hardware tools, and storage. The center should offer centralized, secure, and suitably sized prototyping, lab, and storage areas. Additionally, features like access points and corridors sized for moving large equipment and specialized facilities like loading docks are crucial.

5. **Security and Communications Infrastructure:** Ensuring the protection of the premises and providing robust communications infrastructure are essential. A secure environment where clients feel safe and access is controlled 24/7 is necessary, along with high-speed Internet access to support the operational needs of manufacturing and material innovation businesses.

3 Strategic Options – 2 New Construction and 1 Renovation location

Option(s)	Pros	Cons
Houghton County Memorial Airport Industrial Airpark	-Internet bandwidth -Available land (2,400 acres with a 204-acre industrial park) -Accessible from Highway 41 -Other complementary companies in proximity (KRC, ThermoAnalytics) -Redevelopment ready (infrastructure and utilities) -Likely uses are manufacturing, R&D, distribution etc. -Cost effective land	-Not perceived to have a ton of suitable spaces; not viewed as where the entrepreneurial energy or startups are located but could have future potential. -Potential capacity issues for infrastructure (utilities in place)
Hancock Business & Tech Park	-Near the high school with an existing industrial/trades program -Connected on the West side -Very accessible (favorable logistics) -Potential tax breaks -Broadband access -EDA funding to implement flood-resilient infrastructure -Cost-effective land (City owns 40 acres) -Focus on attracting tech/light manufacturing businesses -Proximity to Michigan Tech	-Distance to downtown, lack of nearby restaurants/entertainment options. -Not directly linked to the SmartZone -Capacity issues for infrastructure -Covenants for businesses entering the park not fully formulated
Finlandia University (3- Halls)	-Strong community narrative to revitalize and repurpose area hurt by shuttering of the University	-Special purpose buildings (largely classrooms and residence halls) -Significant remediation/deferred maintenance costs (cracked foundations) -Not designed for intended AMMIC purpose (lack high bays – low ceilings and not possible to put them in cost effectively and poor layouts of buildings) -Trucking concerns -Age and condition of buildings (costly to renovate and bring up to code)

LPA Assessment:

Depending on build-out costs and land availability, either the Hancock Business & Tech Park or the Houghton County Memorial Airport Industrial Airpark are suitable locations for a potential greenfield site for the AMMIC. Given the school district's location for Trades, The Business and Tech Park offers a compelling location, but the more accessible location might be the Industrial Airpark. However, either location is acceptable for site selection.

Organizational Framework

Element	Recommendation	Comments
Sponsoring Entity	MTEC SmartZone	Universally believed to be in the best position to be the fiscal sponsor and operator
Size of Facility	30,000 gross square footage + anchor	The recommended size is independent of an anchor organization that might double the gross sq footage
Desired Location	Houghton County Memorial Airport Industrial Airpark	Momentum and existing clustering to other R&D assets edge out Hancock Tech Park. It should be noted that Hancock Tech Park was the most frequently reported site for the AMMIC.
Parking Ratio	3 per 1,000 sq (Gross sq ft)	Industry standard
Mix # of likely. Clients Spaces	3 @ 5,000 gross = 15,000 3 @ 2,500 gross = 7,500 5 @1,500 gross =. 7,500 11 active clients (max)	A balanced portfolio of companies requiring physical space for R&D, prototyping or rapid experimentation. Community deal flow analysis suggested 4-8 with 5-7 companies range probable.
Legal Entity Type	A program within the existing MTEC SmartZone portfolio	No separate legal entity or governance structure is necessary for the program to operate effectively.
AMMIC Goals	Nurture young businesses through their early growth stage. Initiate more businesses in targeted innovative sectors important to our community	Community survey indicates these are the top 2 reasons for advancing the AMMIC concept
Success Metrics	Occupancy % # of graduates moving into commercial space $ of Investment & Grants # of Jobs (See Success Metrics on pg.34).	Existing SmartZone metrics are completely aligned with the long-term outcomes of the AMMIC. Expectations should be in a ten-year period commencing facility opening.

Element	Recommendation	Comments
Specialized Test Equipment	A pool of funds should be allocated for purchases based on applications/needs of initial residential clients	It is unclear what equipment will be most valuable by likely participating clients. A pool of funds will help to more strategically allocate the funds to the items of greatest need and use.
Wet Lab	A shared wet lab space might be incorporated in the AMMIC design	There was demand but probably not sufficient to allocate a substantial spec wet lab space. A lab coworking space might be more appropriate like Santa Fe Business Incubator's space and offered on a bench space basis.

Sample Basic Building Layout & Planning

Sample Building Planning Framework

A sample basic building layout and planning approach is outlined below:

Element	Recommendation	Comments
Total Size and utilization	30,000 gross square footage @ 70% utilization rate (21,000 net square feet)	Higher utilization rates are necessary to obtain reasonable rental income for facility sustainability
Work bays	1@5,000sf gross (anchor) 4@2,500sf gross (with adjoining doors connecting at least 2 spaces) 4@1,200sf gross (19,800sf total leasable)	20' high ceilings in each bay, reinforced sealed concrete flooring, adequate electrical (120V/240V/ potential for 208 3-phase) – recommended electric on cable trays for expansion potential
Office spaces	6@100sf gross (600sf gross) 4@150sf gross (600sf gross) (1,200sf total leasable)	Single offices of 100sf plus potential "double" offices of 150sf
Shared Equipment Space	1,000 sq (Gross sq ft *non-leasable*)	Space configured per equipment installation
Conference Rooms	1 large training room @ 450sf 1 small meeting room @200sf (non-leasable)	Wireless internet & audio-visual capacity (large-screen video), flexible configuration for large room
Administration	1 office, reception area (350sf total, non-leasable)	Reception seating area, secure entry, Director's office
Ancillary Space	Restrooms, break room, janitorial closet/maintenance office, storage, loading dock area, hallways, storage, etc.	As required per building codes
Additional requirements	Back-up generator Building security	Items to be added per client requirements

Expected Capital Outlays and Budget

Base Assumptions:

- Five (5) acres are required for a 30,000 gross sq ft bldg., and 10 acres are needed for a 60,000 gross sq ft if an anchor is committed to the project.
- The decision to move forward (2024) and assumes Design-Build (9-12 months construction period)
- Pursue funding and capital appropriations (2025)
- Building commences construction in (mid-2026)
- Ideal Grand Opening and Certificate of Occupancy (2027)
- Assumes no debt service.
- Assumes Gross to be net leasable at a minimum of **70%**.
- Assumes the entity operating AMMIC meets the mission and exempt purpose test, so the project is exempt from property and sales taxes.

Base Building (Pro Forma) *

$	Cost Element	Comments
$7,290,000	Construction Cost excluding land acquisition costs**	$225/sq in 2024 $; 6% higher each year or $243/sq in 2026 construction
$50,000	Land Acquisition Costs	$5,000/ acre @ 10/Acres
$500,000	Furniture, Fixtures, and Non-Shared Equipment (FFE)	Common area furniture and fixtures required
$500,000	Shared Test/Common Equipment (Pool of funds to be allocated based on tenant needs)	Equipment purchases to be guided by initial clients
$1,000,000	Site Development/A&E/Other Professional & Project Fees (Licenses etc.)	The high-end of likely range until Schematic design is completed
$730,000	Project Contingency	10% of construction
$10,070,000	**Total Project Cost**	Likely range is $10.1 MM to $12.5 MM (if additional shared test equipment can be secured).

*Does not include the anchor of an additional 30,000 sq ft or an anchor's requirements if located in the primary building footprint.) The facility's layout should include a shared equipment lab, limited conference rooms/workspace, reinforced floors, high bays, open workspace for bench work, and specialized power options.
**Construction estimates do not include the cost of a co-lab for wet lab research. Pricing would be higher if plans were to offer this service.

Target Annual Operating Costs for 30,000 sq ft Flex/industrial/R&D

$	Cost Element	Comments
$200,000	Staffing & Fringe Benefit Costs	1 FTE AMMIC Program Manager and 1 Maintenance/technical services person
$68,000	Utilities (gas, water, electric)	$1.25 (office); $2.25 (industrial/flex)
$240,000	CAM- Taxes, insurance, Maintenance	$8per sq ft.
$60,000	Marketing & Other Support	$2/sq ft
$60,000	Accounting, professional services, and other misc expenses	$2/ sq ft.
$628,000	**Sub-total of Operating Expenses**	
$63,000	Contingency Expenses	5% of sub-total expenses
$691,000	**Total Operating Cost (annually- cash basis)**	

Annualized Operating Revenue $ At Full Occupancy

- Expected occupancy should be more robust than traditional incubators (60% at inception, 80% by end of year 2, and 100% by end of year 3).
- 5-7 companies in annual deal flow were probable; the balance of companies would need to be identified annually through MTEC's referral network, lead generation program, and partnering organizations.
- The ramp-up of occupancy will create a funding gap that will need to be provided for in the business model ($240K – year 1; $120K year 2 or $360,000 total)

$	Cost Element	Comments
$600,000	Market Rate Leases – 30,000 sq ft @ $20/sq all in (21,000 net leasable with indirect sq ft allocated to tenants)	Assumes: No leasehold improvements and minimum 3-year lease term
$100,000	Grant/Subsidies for Programming and Operating Support	Required annual fundraising to support break-even financial performance of program
$10,000	Other- Misc (Shared Services)	2% of revenue (approx.)
$710,000	**Total Annual Revenue - AMMIC**	

Shared Equipment Commonly Found in AMMIC-Type Centers*

1. **Advanced 3D Printers and Additive Manufacturing Machines**:
   - These machines allow for rapid prototyping and production of complex geometries using various materials, including metals, polymers, and ceramics.
2. **CNC (Computer Numerical Control) Machines**:
   - CNC mills, lathes, and routers enable precise parts machining from raw materials such as metal, plastic, or wood.
   - They are essential for creating custom components and prototypes.
3. **Materials Testing Equipment**:
   - Tensile testers, hardness testers, and impact testers assess material properties like strength, elasticity, and durability.
   - These tests guide material selection and quality control.
4. **Scanning Electron Microscopes (SEMs)**:
   - SEMs provide high-resolution imaging of material surfaces and structures.
   - Researchers use them to analyze microstructures, defects, and material composition.
5. **X-ray Diffraction (XRD) Machines**:
   - XRD machines determine crystal structures and identify phases in materials.
   - They are valuable for studying crystalline materials and their properties.
6. **Spectrometers**:
   - UV-Vis, IR, and Raman spectrometers analyze material composition and chemical bonds.
   - They help identify unknown substances and monitor chemical reactions.
7. **Environmental Chambers**:
   - To test material performance, these controlled environments simulate extreme conditions (e.g., temperature, humidity, pressure).
   - Useful for aerospace, automotive, and electronics applications.
8. **Cleanrooms** (focus on mobile within existing spaces)
   - Cleanrooms maintain low particle levels to prevent contamination during material processing and fabrication.
   - They are crucial for semiconductor manufacturing and nanotechnology research.
9. **Laser Cutting and Engraving Machines**:
   - These versatile tools precisely cut or engrave materials like metals, plastics, and fabrics.
   - Ideal for creating intricate designs and prototypes.
10. **Electron Beam Lithography (EBL) Systems**:
    - EBL systems use focused electron beams to pattern materials at the nanoscale.
    - Essential for developing microelectronics and nanodevices.

*Depends on the vertical market, cluster, or venture segments served by the manufacturing technology innovation or advanced materials centers. A pool of funds should be available to support early clients.

Risk Planning and Mitigation Strategies

Probable Risks	Mitigation Strategies
MTEC SmartZone has successfully placed early-stage ventures in below market rate space	Sponsor will need to level-set expectations that with likely AMMIC capital stack, rates will be higher than what is offered today. This could blunt deal flow demand or create sticker shock for the venture Founders.
BAF funding often takes too long and is restricted in use (non-product development funding)	Additional access to capital mechanisms needs to be addressed to fund the gap and shortfall. More work with MEDC and MTEC SmartZone is required to move awards faster (<60 days from application to funding if approved). Allocate or target support for companies in the manufacturing technology or advanced materials space.
Most potential startups felt existing ESO programs met their needs; new programming wasn't clearly identified to address any perceived or known gaps	Curate and connect Founders and their teams to resources across the ecosystem and state to support their ongoing growth and scaling needs.
Accelerators often focus on products and not company formation. Connecting the continuum of support from product>venture>launch will be essential to moving the companies forward	Implement the Federal funding awarded for the accelerator program/boot camp. Offer physical space support for graduates to enter the AMMIC. AMMIC may need to diversify mix from true startups to second stage companies to better balance rent expectations.
Insufficient and lack of housing	The only county in the state of Michigan to see a population increase at the last census; retaining a skilled workforce means the development of middle-income housing. Existing housing stock is perceived as old and fixer-uppers. Continue to work with MSHA and others to develop attractive products for retaining/recruiting young talent in the community.
Professional risks associated with moving to a small remote town; Hard to attract mid-career talent	Must address well-educated, experienced trailing spouses both in traditional employment opportunities and in the startup

Probable Risks	Mitigation Strategies
	ecosystem. Labor and "business opportunity" thickness must afford trailing spouses meaningful employment opportunities.
Operational Funding Gap During first Three Years Of Launch	Sufficient capital must be raised to ensure a debt-free building over time. Ramp-up of occupancy will need to be accelerated from 5 years to 3 years to reduce outside gap funding required to meet operational expenses.
Pre-launch AMMIC Staffing Requirements	Accelerating the hiring of the AMMIC Director to build a quality pipeline, to grow the linkages and support to Michigan Tech faculty working in targeted areas and to oversee the design, development, construction, and opening of the Center is critical. This early recruitment and staffing cost is not addressed in the pro forma budget.
Undersized shared equipment budget included in Pro Forma's	Programs like the AMMIC have initial large, shared equipment budgets (tens of millions) and offer an impressive and expansive equipment offering including 3D printing, AR/VR, robotics, digital manufacturing tools.

Success Metrics

Likely, governmental funding will require tracking the economic impact of the clients served by measuring # of jobs created and retained, $ value outside investment, payroll, and revenue over the time in the facility. The gold standard would also be to track this information for companies completing time in the facility for five years after departure. A balanced scorecard is likely to incorporate some of the following dashboard metrics. Success factors may be dictated by funding source, required by MEDC as part of SmartZone designation, and others are important community indicators of momentum and success.

# of Companies Served	The total count of startups that have gone through the AMMIC. A higher number indicates a broader impact and is evidence of a compelling market need. Measure venture survivability and business retention rates of companies served.
Employment Generation	Evaluate how many jobs the resident companies have created compared to the benchmarks provided in the secondary market analysis section in the full report. Job creation is a positive sign of economic impact.
Infrastructure and Facilities	Assess the quality and availability of resources provided by the AMMIC, such as office/flex space, labs, and equipment. Identify and measure entrepreneurial blind spots through client surveys of the services and programs most valuable to them.
Networking and Engagement	Measure the level of interaction/collaboration between companies, mentors, investors, and industry experts. Strong networking enhances growth opportunities and indicates a more thriving, engaging, and inclusive entrepreneurial community (signals a positive and welcoming entrepreneurial culture). Examine # of deals done and total investment $ raised.
Sustainability	Consider the financial stability of the AMMIC. Sustainable funding models ensure consistent and long-term support. Measure the revenue streams, and growth in the streams.
Fundraising Success	Track the amount of external funding (investments, grants ,etc.) secured by the resident companies. Higher funding indicates investor confidence in fundable deals. Successful fundraising also contributes to job growth and long-term economic impact in the community, justifying the public sector investment in the AMMIC.
Transparency and Visibility	How well does the residents of the AMMIC communicate its activities, achievements, and impact to stakeholders and the public? Sharing entrepreneurial success stories, publishing, and tracking impact build long-term visibility and support for the incubation process and its critical job-creating programs and services. Do we keep graduates in the area?

Community Stakeholder Interview Synopsis

Themes

The following themes were expressed in the Critical Success Factor Matrix (CSF) analysis:

- The area is rich in innovation and entrepreneurs. AMMIC is an intentional technology-based economic development strategy to leverage intellectual and human assets to create jobs and local companies.
- UP's entrepreneurial efforts align with Michigan's strategy and emphasis on quality of life.
- Innovative companies can find the startup resources they need locally and throughout the state. Most existing companies had solid networks and access to support services to find initial professional assistance in legal, accounting, capital, and mentorship. They appear well connected and able to traverse the state of Michigan to find the business-building tools and resources needed to launch and grow their companies.
- The consensus was that there was a lack of appropriate and suitable "ready to go" space (amount often needed 3-5,000 sq ft per company), and configuration of space (high bay, open areas, and price) hindered potential startups in the pipeline.
- Typically, smaller communities, especially rural ones, don't make sub-sector bets within significant clusters. They are open to innovation within a broader cluster or targeted industries or technologies.
- There is solid and vibrant energy throughout the stakeholders to depart from "an old mining town" to a community on the move (with swagger).
- With the companies interviewed, there needed to be more demand or desire for permanent wet lab space. There was more interest in a limited amount of flex wet lab space.
- Establishing a manufacturing culture and vocational education (trades) mindset early in the K-12 educational system is highly evident.
- The consensus of stakeholder feedback indicates that the site location for the AMMIC should be the Hancock Business and Technology Park, with a preference for new construction over renovation.
- There is support for securing the required funding to move forward with the AMMIC. Still, timing alignment may be challenging with funding champions (upcoming US Senator retirement, limitations on directed congressional spending).
- Most early and growth-stage startups continue to bootstrap or are "adequately capitalized" versus raising outside capital.

General Observations

- **100%** of the interviewees believed sufficient demand exists to support and sustain a Manufacturing Technology Center (AMMIC).

○ "Absolutely, unequivocally, yes."
○ "Descent manufacturing base with large, growing companies."
○ "This is an amazing opportunity in a unique community."
○ "Yes, and yes. We need it, and we have the demand for it."
○ "There is a need. We need classical flexible space in this market."
○ "There's no lab space or pilot production space here."
○ "We are late to the game on this one. We needed an AMMIC years ago."
○ "An AMMIC is the biggest thing we lack in the community."

- **100%** of the interviewees felt that the "area could benefit from having an AMMIC." A perceived gap was that suitable space was unavailable for innovative AMMIC-driven companies to start and stay in the local area.
- **Nearly 100%** of the interviewees were confident and believed that MTEC SmartZone was the right fiscal sponsor to spawn and operate the AMMIC.

○ "Trusted partner" and "honest broker."
○ "Results-driven".
○ "Key driver to getting things done."
○ "Initially, they are more likely to develop companies from ideas in the community than recruit and relocate companies out of the region."
○ "The organization to go to get things done."
○ There was some concern over the confused branding of the SmartZone as both an "incubator" and an "accelerator."
○ "The SmartZone has had much success up here. Great staff. Connected. He gets things done. Well respected."
○ "They have done a great job of starting and supporting the growth of local companies."
○ "SmartZone is at the top of the list of best choice for sponsors."
○ "Please, no death by committee. A strong leader with a small, nimble, and connected board is preferred."
○ "No question, the MTEC SmartZone are the right people to lead and do this."

- MICHIGAN TECH is believed to be very open and capable of supporting community growth, given its enrollment growth goals and other strategic aspirations.
- There was strong and broad community understanding and engagement from the initial concept of an AMMIC to the completion of the stakeholder interviews.

Appendix 1| Stakeholder Interview Summary Results

Comments in the sections below are verbatim or summarized from the various stakeholder interviews to convey an understanding of the comment in the context of the question. Recurring themes are aggregated into representative statements reflecting that point of view.

Why an AMMIC?

- "Nothing like it in the area to support pilot processes., advanced materials, or advanced manufacturing companies from lab bench to pilot production."
- "When asked what resources were needed to move our innovative companies faster, many startups described the exact type of facility contemplated by an AMMIC."
- "This type of space is missing. Companies can bootstrap but can't find this type of space."
- "If we had this type of space, some of our successful and more established companies could have scaled much faster and be at least five years ahead of where they are now."

How many companies need this flexible space, and what will likely be generated from the community versus the university? (Projected Annual Deal Flow Consensus from interviewees).

Total Companies	Community-Generated (Low to High Range)	University Sponsored (Low to High Range)
4-8 (likely: 5 to 7)	2-4	2-4

Given the space demands of companies like these manufacturing and technology enterprises, a 20-25,000 sq ft facility is probable. However, 30,000sq ft is likely a minimum size for sustainability. An additional anchor could complement the space and increase the overall footprint to 50-55,000 sq ft.

What are the strengths and opportunities for improvement for Michigan Tech University as a partner in commercialization efforts in the community?

Strengths	Opportunities for Improvement
Startups are becoming more important within the University and to the community at large	Entrepreneurship differs from the researcher's comfort zone; many feel someone might steal their idea.
i-Corps as feeder program to startup pipeline	Bureaucratic and slow (at times, difficult to do business with and perceived as competing in areas that should be left to the private sector)

Strengths	Opportunities for Improvement
Good community partner at the table	
Improved professor interest in wanting to move IP forward	Lack of structure and process to bring these ideas from research to commercialization
Using and accessing equipment is straightforward.	Using professors/students is not time driven (may have to fit into academic cycle)
Reclassified to R1 institution in 2024	Without a research park, commercialization process is not seamless so AMMIC could be the destination place for these next level services
Growing sponsored program grant funding, strong graduates placed in jobs	Doubling enrollment, priority focus areas in advanced materials and manufacturing

- "We are pushing hard to change the culture at Tech."
- "Our standard contracts are online and straightforward."
- "Michigan Tech has no kind of system to allow me to come in and use a scanning electron microscope."
- "Founding charter includes advancing the effectiveness of industry."
- "Encourage faculty to move to the next level of commercialization and startups."
- "Faculty see a strong ecosystem here for technology development and innovation."
- "By leveraging commercialization, there will be a synergistic and catalytic effect around it, and it will broaden the impact on the community."
- "Responsiveness and ability to commit to a schedule are frustrations with using MICHIGAN TECH labs."

How aligned are local and regional governments, and how supportive are they with initiatives and concepts like the AMMIC?

- "City leadership in Houghton and Hancock are very supportive."
- "Senator Stabenow's office and team thought it was a great idea."
- "Strong ecosystem has been developed locally with smaller, high-tech companies creating great labor jobs."
- "Local government wants to build momentum away from tourism and the forest industry."
- "They seem excited about it but don't have adequate resources to devote to it."
- "Local government has always had a seat at the table, but they don't bring money."

If an AMMIC is built, where should it be located?

Three primary locations were identified as potentially suitable for the AMMIC. Two would require new construction (NC), and one area would be renovated in an existing building.

- Houghton County Memorial Airport Industrial Airpark (NC) – 2400 acres and hosts a 204-acre industrial park with shovel-ready utilities and infrastructure.
- Hancock Business & Technology Park (NC)
- Defunct Finlandia University buildings (Nikander, Mannerheim and Wargelin Halls)

Option(s)	Pros	Cons
Houghton County Memorial Airport Industrial Airpark	-Internet bandwidth -Available land -Accessible -Other complementary companies in proximity -Redevelopment ready	-Not perceived to have a ton of suitable spaces; not viewed as where the entrepreneurial energy or startups are located, but could have future potential
Hancock Business & Tech Park	-Near the high school with an existing industrial/trades program -Connected on West side -Very accessible (favorable logistics) -Potential tax breaks -Broadband access	-Distance to downtown, lack of nearby restaurants/entertainment options.
Finlandia University (3- Halls)	-Strong community narrative to revitalize and repurpose area hurt by shuttering of the University	-Special purpose buildings (largely classrooms and residence halls) -Significant remediation/deferred maintenance costs (cracked foundations)

Option(s)	Pros	Cons
		-Not designed for intended AMMIC purpose (lack high bays – low ceilings and not possible to put them in cost effectively and poor layouts of buildings) -Trucking concerns -age and condition of buildings (costly to renovate and bring up to code)

- "I can't think of a better spot than Hancock Park unless you could build it on the MICHIGAN TECH campus."
- "Hands down, the Houghton Industrial AirPark."
- "Our location, at times, is a real challenge. We do lots of work remotely."
- "No bad location. All three can work."
- The most frequently recommended site location was Hancock Business & Tech Park.

What segments, sectors, or clusters exist that should align with the AMMIC scope?

- Advanced materials and Advanced Manufacturing
- Aerospace
- Battery reclamation
- Medical applications
- Computational computing
- Mining
- The focus must be on high value, with small volume due to transportation costs, rather than on a particular cluster or industry segment.
- Natural resource manufacturing (forestry)
- Cross-laminated timber
- "No targeted industry or cluster studies done in the region."
- Quality

1. Efficiency
2. Productivity ("Cost containment pressure is enormous for Houghton area employers. There are escalating raw material costs and wage inflation/salary pressures.")

What is the landscape for service providers, resource partners, and entrepreneurial support organizations to support and sustain potential clients of the AMMIC?

- "Local companies have been adept at navigating and finding the support they need to grow their companies."
- "The Michigan Outdoor Innovation Fund opens possibilities around outdoor recreation. Only EDO in the state will a seed fund, and the fund is statewide."
- "Coordinated services exist to support growing existing businesses- at the County EDO level in coordination with the SmartZone, University, and the MEDC."
- "I've had both favorable and unfavorable interactions with the SBDC."
- "SBTDC was helpful."
- "Fleury, Singler & Company, PC" or Makela, Toutant (CPA)
- "Strong legal in Butch Quinn and Lewandowski in Escanaba and Marquette."
- "We can find whatever we need to find anywhere."
- "We have an incomplete ecosystem depending on what you are looking for."
- "We can support lab to market – testing, and expertise – these would be two cornerstones of MICHIGAN TECH value to the community."

How should the AMMIC measure success? (Metrics, KPIs, & impact)

Qualitatively	Quantitatively
Level of community self-confidence	# businesses (5 and 10 years from opening)
Level of interest of HS and college grads to stay in region post-graduation	# employees
Move the needle in risk-taking for 21–39-year-olds who stay in the area	# businesses graduated to space in the community (business retention rate)
Sharing local community success stories of companies that go through the AMMIC program	Full occupancy %
More young people have interest in vocational training/trades	# of companies on the wait list
More offers are made locally to employ local workforce versus recruiting outside region	# of businesses assisted
Entrepreneurial vitality of the area	# of MICHIGAN TECH grads staying in the area post-graduation

Qualitatively	Quantitatively
Building and location must be visible (change the character of the town and move the needle)	Growing and attractive wage rates and benefits
# of high school grads entering skilled trade fields	Population growth

A key component for long-term AMMIC sustainability is to attract an anchor client to provide operational cost subsidy and mentorship to companies located in the AMMIC? Were there any potential anchors?

- "Orbion Space Tech (Whatever the size of the AMMIC, double it, and we would be interested, or we would be interested in as much as 30,000 sq ft, depending on location)."
- "Attracting an anchor like Orbion could be synergistic to attracting precision machining companies."
- "Earmarks live in Michigan."
- "Limited philanthropy here with some foundations like Portage Health Foundation and Keweenaw Foundation. There isn't much philanthropic cash here locally."

What is the likely or most realistic implementation timeline to secure funding and community buy-in to the AMMIC strategy?

Milestone	Time Period	Comments
Decision to move forward with AMMIC	**2024**	Finalize business plan. Secure funding commitments
Pursue Funding/Capital Stack for construction and operations	**1Q25**	EDA - 1Q25 Federal State matches
"Ideal Grand Opening"	**2027**	

What is the likely draw radius/service area for the AMMIC to find qualified company prospects and for the workforce to drive daily to the AMMIC?

- "Everyone in this area is used to driving to get where they are going."
- "We are uniquely suited to make this happen in the middle of nowhere."

The consensus view was:

Service Area/Draw Radius	Miles	Time Estimate
Desirable	**20-30**	30 mins

Service Area/Draw Radius	Miles	Time Estimate
Range		
Probable Range	**30-40**	45-60 mins

Are there supplemental entrepreneurial programming or infrastructure needs to address known or perceived gaps for M&T innovation early-stage companies?

- Scale engineering expertise.
- Graphic design and development
- Sophisticated and expensive test equipment
- Clean space with high bays
- Management expertise and talent acquisition in resource-constrained environments
- Affordable health insurance for startup employees (lack legitimate options)
- "Getting a fume hood recertified is a three-hour trip – no in-market vendors."
- "MI Bio program saved us lots of money with VWR and other discounts."
- Navigating the plethora of State programs and resources to decide what makes the most sense for my business.
- Quality system implementation support
- Federal SBIR/STTR grant support and grant writing.
- HR services a challenge for small employers

How vibrant and thriving is the access to capital for startups in the community?

- "There's a relatively small angel capital investment community- not the active groups you typically see in Maryland or the West Coast."
- "The network is smaller here."
- "Raising more than $500K may be difficult here."
- There is a gap in regional private banking and private client resources.
- "Technology is difficult to lend against."
- "Entrepreneurial-friendly banks, if they exist, would be Superior National Bank and Huntington Bank. None of the banks get technology businesses."

How aligned are the workforce development efforts with community vocational education and skilled trades? K-12 educational support?

- "Employers have had to adjust wages. No young person will work for less than $15 an hour with quality benefits."
- "ISD does a great job working with local manufacturing to do training and education. Recent examples include grants to teach circuit board technology."
- "Local schools are exceptional -truly exceptional."
- "Too many small school districts for the size of Houghton."

Who are the likely community leaders to whom potential entrepreneurs would be referred for entrepreneurial support?

- "I don't rely on state agencies for help, and I'm not sure of the quality of their resources."
- MTEC SmartZone
- "Everything I need, I must go downstate to get it."
- Michigan Tech Office of Innovation and Commercialization (while it supports University innovators, it was viewed as a resource that would help non-university innovators)
- Invest UP
- MEDC programs
- John Julian, Jed Wuebben, Andy Moyle, and Michael Nardi were called out by name.
- Keweenaw Economic Development Alliance (Jeff Ratcliffe)

What is the market outlook for physical space like what the AMMIC would offer?

- "Very transitory right now."
- "Lack of affordable options."
- "No options for these types of companies."
- "There's no excess of commercial space."
- "There's no suitable space for at least 300 miles."
- "We continue to attract smart, well-educated climate refugees from all over the US."

What are the key design components in the type of manufacturing space desired by startups in the community?

- An anchor of 20-30,000 sq ft
- 5-7 active clients at any one time (with 3-6,000 sq ft each) or 20,000 sq ft (gross)
- High bays (range provided were 15-20' ceilings to 20-24' ceilings)
- Strong HVAC with environmental and humidity controls

- DI water
- Specialized electric (240 V, 3 phase, 440V)
- Heavy, reinforced floors open spaces)
- Lifts
- Specialized test equipment (waterjet, lasers, sheet metal forming, CNCs, 3d printers)
- Office space with shared conference rooms (many did not see a need for a large amount of fixed office space)
- Some fume hood requirements (but short-term) and mobile clean rooms

Who are the most important Founding Partners to make this AMMIC concept a reality?

- MTEC SmartZone (fiscal and lead sponsor)
- Invest UP
- MEDC
- MICHIGAN TECH
- Keweenaw Economic Development Alliance
- ISD

What are likely construction costs and lease rate estimates for space comparable to the AMMIC? *More rate information will be collected and included in the final feasibility assessment.*

- Prices continue to rise post-covid. $225 sq ft (exclude land costs) for masonry and bar joist (expandable facility with lobby, offices, mezzanine, high bays); 2027$ escalation of 6%/year from the $225 sq ft base figure in 2024.
- Lease rates of $16-20 per sq or $6-12/sq plus renovation costs (in a mall-type space)
- No personal guarantees
- 3-year minimum term with no leasehold improvements and ten years with retro to suit
- Design-build 9-12 months (best case) for new construction (add 6-9 months for traditional building construction approach [design>bid>build])
- The footprint of the building would ideally need 10 acres per acre, and the costs at the airport are $4-5K/acre.
- Utilities: $1-1.25 sq ft (office bldg.); $2.25 sq ft (gas, water, electric); and $8-10 for taxes, common area maintenance, insurance, etc.

Appendix 2| Community Climate Survey Results

General Characteristics

- There were 23 responses, with 3 of 23 (13%) submitted from diverse respondents.
- Response rate: 23/70 electronic surveys completed (33% completion rate with four retargeting emails to improve response rate).
- 30% of total responses were from entrepreneurial or small business owners (an additional 13% were from home-based business owners)
- 30% of the respondents were from technology or biotech-related entities, and 17% were from manufacturing.
- 57% of the responses were from respondents who have lived in Upper UP for ten or more years (69% had lived in the UP area for 5+ years.)

Key Insights/Takeaways

General Overview:

- The UP business and entrepreneurial climate are not conducive for startups, and finding funding, people, and affordable locations are perceived as obstacles/worries for potential individuals who want to start a new business.
- Finding an affordable location is highly ranked in worries, making affordable physical space a critical strategic goal for growing home-grown businesses.

Entrepreneurial Programming:

- There is strong perceived support for the need and benefit of a purpose-built AMMIC facility/program in the UP. The MTEC SmartZone's most valuable services are aligned with the purpose/charter of the AMMIC.
- Entrepreneurs did not convey significant programming needs in the 1:1 interview. Still, there were consistent themes in the online surveys: innovation & commercialization services, access to specialized equipment, and capital assistance were highly rated.
- More work must be done to improve/strengthen the service provider and resource partner network locally and regionally. Ratings were relatively low for existing local partner options in the UP. Building a strong referral network in and outside the UP will be essential to advancing and strengthening value-added support services for AMMIC-related ventures.

Mission/Priority Areas:

- The most important goals for an entrepreneurial-centered strategy should focus on nurturing young businesses through their early growth stage (65%) and initiating more businesses in targeted innovative sectors critical to our community (61%). The high-

priority technology sectors were (1) manufacturing and transportation, logistics and distribution services, (2) professional services, and (3) general technology.

- Entrepreneurs were optimistic about the startup vibrancy of the UP and saw a greater need and benefit than the overall stakeholders. Entrepreneurs rated the business and entrepreneurial climate higher than the overall stakeholders.
- There are significant differences in the most critical services needed (entrepreneurs were focused more on physical infrastructure (wet lab space and access to shared-use equipment), and overall responses were more focused on business building services (capital and commercialization services).

Entrepreneurial Classification – Response Differences

The completed surveys were filtered for entrepreneurs of all sizes (excluding home-based businesses). A few of the most significant differences are covered below.

Survey Question Description	All Responses N=23	Entrepreneurs Only (Non-home-based businesses) N=7
Would the UP benefit from an AMMIC	78% - To a Great Extent	86% - To a Great Extent
Does UP need an AMMIC	65% - To a Large Extent	86% - To a Large Extent
Top 3 "In Demand" Services (desired, wanted/needed) – Ranked by % of Most Important Responses	1. Support for finding money (57%) 2. Innovation and commercialization services (43%) 3. Access to shared-use specialized test equipment (43%)	1. Wet lab space (86%) 2. Access to shared-use specialized test equipment (71%) 3. Support for finding money; innovation services; and finding customers (all -43%)
Top Entrepreneurial Support Organizations (ESO) – Today Offering and Delivering Assistance Services	• MTEC SmartZone • MEDC • Michigan Tech University	• MTEC SmartZone • SBTDC, Michigan Tech and MEDC (tied)
The UP Start-up Environment is best described as:	Challenging and Frustrating – Access, Affordability, and Red Tape are big problems here! (52%)	Challenging and Frustrating – Access, Affordability, and Red Tape are big problems here! (71%)
Quality of entrepreneurial resources	None were rated top-notch. Very Good was Bankers (26%) and Bookkeepers (22%) and Resource Providers (22%)	None were rated top-notch. Top-notch was insurance agents (33%)
Ratings: (highest is a 10)		

Survey Question Description	All Responses N=23	Entrepreneurs Only (Non-home-based businesses) N=7
The business climate for starting a business in the UP The entrepreneurial climate in the UP	**6.2** **5.3**	**7.2** **6.8**
Next 5 years, the most needed types of business.	1. Manufacturing and/or transportation, logistics and distribution services (70%) 2. Professional Services (52%) 3. Technology (48%)	1. Manufacturing and/or transportation, logistics, and distribution services (57%) 2. Biotech, professional services, and services (43%)
The vibrancy of the Startup Environment in the UP	More startups today but they tend to be more home-based (39%) and there are lots more startups today than when I moved her (39%).	There are lots more startups today than when I moved here (43%).
When seeking outside capital ($50K), where would you go first?	My personal savings or retirement nest egg (30%). Only 9% of respondents had previously raised private equity funding.	Community bank, personal savings and MEDC all tied (29%)
Big worries in starting a business	1. Securing funding (48%) 2. Finding people to hire (43%) 3. Finding an affordable location (35%) and transportation or logistics issues (35%)	(All 4 tied- 43%) 1. Securing funding 2. Finding people to hire 3. Finding an affordable location 4. Transportation or logistics issues
Top 3 "Most Attractive Sectors" for Launching New Companies	1. Advance materials and advanced manufacturing (65%) 2. Batteries (43%) 3. Timber or forestry-related products (41%)	1. Advance materials and advanced manufacturing (71%) 2. Medical applications and aerospace/ defense (57%)
Top 3 "Most Valuable Resources" offered through the MTEC SmartZone	• Extremely valuable: Finding money and mentorship (43%)	1. Finding incubation space (57%) 2. Mentorship (43%)

Survey Question Description	All Responses N=23	Entrepreneurs Only (Non-home-based businesses) N=7
	• Business accelerator program (41%) • Finding incubation or coworking space (39%)	3. Finding an affordable location (43%)
Top AMMIC business goals for judging its success	1. Nurture young businesses through their early growth stage (65%) 2. Initiate more businesses in targeted innovative sectors important to our community (61%)	1. Create employment opportunities for residents (86%)

Overall
Survey Response Summaries (N=23)

Survey Question Description	All Responses	LPA Comments
Would the UP benefit from an AMMIC	78% - To a Great Extent	Only 4% said no, not at all.
Does UP need an AMMIC	65% - To a Large Extent	Only 4% were unsure and % were no, not at all.
Top 3 "In Demand" Services (desired, wanted/needed) – Ranked by % of Most Important Responses	• Support for finding money (57%) • Innovation and commercialization services (43%) • Access to shared-use specialized test equipment (43%)	Wet lab space ranked as most important was 39% of responses.
Top Entrepreneurial Support Organizations (ESO) – Today Offering and Delivering Assistance Services	• MTEC SmartZone • MEDC • Michigan Tech University	The likely AMMIC sponsor (MTEC) is already a top "go to" organization for ESO-type services
The UP Start-up Environment is best described as:	Challenging and Frustrating – Access, Affordability, and Red Tape are big problems here! (52%)	Focus on reducing red tape and making services more easily accessible and transparent.
Quality of entrepreneurial resources	None were rated top-notch.	More work needs to occur on building a service provider

Survey Question Description	All Responses	LPA Comments
	Very Good was Bankers (26%) and Bookkeepers (22%) and Resource Providers (22%).	network with favorable startup pricing and expertise.
Ratings: (highest is a 10) The business climate for starting a business in the UP. The entrepreneurial climate in the UP.	**6.2** **5.3**	Entrepreneurial climate includes mentors, talent recruitment, resources, and funding. More sharing of success stories is needed.
Next 5 years, the most needed types of business.	1. Manufacturing and/or transportation, logistics and distribution services (70%) 2. Professional Services (52%) 3. Technology (48%)	The need for more qualified small business service providers in the region is aligned with the ratings of these service provider types.
The vibrancy of the Startup Environment.	More startups today but they tend to be more home-based (39%) and there are lots more startups today than when I moved her (39%).	General belief that there is greater startup activity in the region.
When seeking outside capital ($50K), where would you go first?	My personal savings or retirement nest egg (30%). Only 9% of respondents had previously raised private equity funding.	Bootstrapping mentality is aligned with interviewee feedback from successful entrepreneurial founders.
Big Worries in starting a business	1. Securing funding (48%) 2. Finding people to hire (43%) 3. Finding an affordable location (35%) and transportation or logistics issues (35%)	Supply chain dislocations and logistics issue weight higher than affordable location likely influencing the entrepreneurial climate rating.
Top 3 Most Attractive Sectors for Launching New Companies	1. Advanced materials and advanced manufacturing (65%) 2. Batteries (43%)	These 3 sectors dominated the high priority ratings.

Survey Question Description	All Responses	LPA Comments
	3. Timber or forestry-related products (41%)	
Top 3 of most valuable resources offered through the MTEC SmartZone	• Extremely valuable: Finding money and mentorship (43%) • Business accelerator program (41%) • Finding incubation or coworking space (39%)	Valuable resources align with the proposed scope of AMMIC charter/purpose.
Top AMMIC Business goals for judging its success	• Nurture young businesses through their early growth stage (65%) • Initiate more businesses in targeted innovative sectors important to our community (61%)	Economic diversification and stage-specific services to assist advanced manufacturing and material type companies with appropriate space and support.

Appendix 3| Benchmarking & Other Resources

- **A3-1:** Excel Spreadsheet: Western UP Prosperity Establishment and Jobs Data by County and Total
- **A3-2:** Excel Spreadsheet: Advanced Manufacturing Location Program Assessment/Benchmarking
- **A3-3:** PDF document highlighting select programs, resources, partners, and focus areas for advanced manufacturing and materials centers.

CITY OF
HANCOCK
ESTABLISHED 1863

April 16, 2025

Honorable Ann Bollin
Michigan House of Representatives
Michigan State Capitol
100 N. Capitol Ave.
Lansing, MI 48933

RE: MTEC SmartZone Advanced Manufacturing and Materials Innovation Center

Dear Chairwoman Bollin,

As the Manager of the City of Hancock, I endorse MTEC SmartZone's proposal to obtain an appropriation from the State of Michigan to construct an Advanced Manufacturing and Materials Innovation Center in the Houghton/Hancock area.

With the presence and leadership of MTEC SmartZone and Michigan Technological University, the City of Hancock is emerging as a host to a thriving high-tech startup ecosystem. Much of this can be attributed to the advent of several small high-tech and advanced manufacturing startup companies. A growing concern is the lack of amenities, such as industrial space and incubator facilities, to attract, retain and support the development and growth of innovative companies.

The City of Hancock has established a business and technology park that would serve as an excellent site for the Advanced Manufacturing and Materials Innovation Center. Such a facility will be helpful in stimulating the startup of new technology companies and attract talent and manufacturing businesses to the area. Startup companies frequently need pilot-scale space to successfully navigate the transition from product conception to full-scale industrial advanced manufacturing or advanced materials processing.

MTEC SmartZone has an incredibly strong record of helping innovators and founders advance their technology and business ideas along the path from conception, to product development, to funding and finally to commercialization. Their goal is to build upon this success via collaboration with the City of Hancock and the surrounding communities. The Innovation Center will foster the creation of successful companies which, in turn, will create meaningful career opportunities and economic growth for the area. In conclusion, I fully support MTEC SmartZone's pursuit of an appropriation to construct the Advanced Manufacturing and Materials Innovation Center.

Sincerely,

Mary Babcock, City Manager
City of Hancock

CITY OF HOUGHTON
BIRTHPLACE OF PROCESSIONAL HOCKEY

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16 April 2025

Honorable Ann Bollin
Michigan House of Representatives
Michigan State Capitol
100 N. Capitol Ave.
Lansing, MI 48933

RE: MTEC SmartZone Advanced Manufacturing and Materials Innovation Center

As the Manager of the City of Houghton, I endorse MTEC SmartZone's proposal to obtain an appropriation from the State of Michigan to construct an Advanced Manufacturing and Materials Innovation Center in the Houghton/Hancock area.

Through the presence and leadership of MTEC SmartZone and Michigan Technological University, the City of Houghton is emerging as a hub in a thriving high-tech startup ecosystem. Houghton is the Upper Peninsula's fastest growing city with expanding business and employment opportunities. Much of this can be attributed to the advent of several small high-tech and advanced manufacturing startup companies. A growing concern is the lack of ready industrial space and incubator facilities to support these innovative companies.

The City of Houghton is willing to collaborate with MTEC to help them realize their goal of establishing an Advanced Manufacturing and Materials Innovation Center. Such a facility will be helpful in stimulating the startup of new technology companies and attract talent and manufacturing businesses to the area such as that which we have seen with Orbion Space Technology. Startup companies frequently need pilot-scale space to successfully navigate the transition from product conception to full-scale industrial advanced manufacturing and materials processing. MTEC SmartZone has an incredibly strong record of helping innovators and founders advance their technology and business ideas along the path from conception, to product development, to funding and finally to commercialization. Their goal is to build upon this success via collaboration with both the cities of Houghton and Hancock and the surrounding communities. The Innovation Center will foster the creation of successful companies which, in turn, will create meaningful career opportunities and economic growth in our area and beyond.

In conclusion, I fully support MTEC SmartZone's pursuit of an appropriation to construct the Advanced Manufacturing and Materials Innovation Center.

Very truly yours,

Eric T. Waara, P.E.
City Manager

INVESTUP™

April 21, 2025

State Representative Ann Bollin
Michigan House of Representatives
Michigan State Capitol
100 N. Capitol Ave.
Lansing, MI 48933

RE: MTEC SmartZone Advanced Manufacturing and Materials Innovation Center

Dear Chairwoman Bollin,

On behalf of InvestUP, along with its Board of Directors, which represent eleven industry sectors across Michigan's Upper Peninsula (U.P.) and do business in each U.P. county and across the state and nation, I would like to express our support for MTEC SmartZone's proposal to obtain an appropriation from the State of Michigan to construct an Advanced Manufacturing and Materials Innovation Center in Houghton County.

As the regional economic development organization for the Upper Peninsula, our organization believes the proposal is positioned to drive prosperity for the region because is well designed to take advantage of trending opportunities that are matched to regional strengths, such as 1) targeting supply chains to be re-shored to the U.S., 2) fostering business and talent attraction to remote locations, and 3) supporting innovation and high-tech startups in the region through public-private sector collaboration.

Further, an Advanced Manufacturing and Materials Innovation Center also is well aligned with some of the region's strategic growth industries, such as 1) technology research, development and testing, 2) advanced precision manufacturing, 3) large equipment manufacturing, 4) outdoor research and testing, 5) and strategic metal/mineral recovery and processing. This alignment will not only provide economic development opportunity to the region but strengthen Michigan's economy and enhance the nation's security and supply chains.

That is why InvestUP is excited to provide support to and collaborate with the MTEC SmartZone to help them realize their goal of establishing an Advanced Manufacturing and Materials Innovation Center. We are confident that this Innovation Center will be a game-changer for the region and stimulate the startup of new technology companies and attract talent and manufacturing businesses to the area.

Startup companies frequently need pilot-scale space to successfully navigate the transition from product conception to full-scale industrial advanced manufacturing or advanced materials processing. MTEC SmartZone has an exceptional record of helping innovators and founders advance their technology and business ideas along the path from concept to product development, to funding and to commercialization.

In fact, since 2003, MTEC has helped companies realize $597 million in follow on investment. In the last year alone, MTEC clients have generated $105.9 million in sales and $32 million in investment. MTEC's goal is to build upon this success through a collaborative approach to serve the best interest of our small businesses and startups to ensure their success. The Innovation Center will foster the creation of successful companies which, in turn, will create meaningful career opportunities and economic growth for both the Upper Peninsula and the State of Michigan.

The significance and range of the return on investment that this appropriation would realize to the region and to the State, from driving economic prosperity, to providing career opportunities, to enhancing national security and supply chains, sets it apart from other directed spending requests and justifies an investment from the State, which is why we ask that you look with favor upon the request.

Of course, if you have any questions regarding InvestUP's outlook and its support of this difference-making request for an appropriation to construct the Advanced Manufacturing and Materials Innovation Center, please call on me any time at 906-280-7800.

Sincerely,

Marty Fittante,
CEO, InvestUP

KEWEENAW ECONOMIC DEVELOPMENT ALLIANCE
Leading Economic Development in the Keweenaw

April 16, 2025

Honorable Ann Bollin
Michigan House of Representatives
Michigan State Capitol
100 N. Capitol Ave.
Lansing, MI 48933

RE: MTEC SmartZone Advanced Manufacturing and Materials Innovation Center

Dear Representative Bollin:

On behalf of the Keweenaw Economic Development Alliance (KEDA), I endorse MTEC SmartZone's proposal to obtain an appropriation from the State of Michigan to construct an Advanced Manufacturing and Materials Innovation Center in the Houghton/Hancock area.

KEDA is committed to fostering business growth in the region, improving infrastructure, aiding the revitalization of our communities, developing/attracting talent, and enhancing the cultural and recreational opportunities for our residents. The business ecosystem in the Keweenaw is characterized by innovation, competitive labor, world class STEM research and talent, and a welcoming business environment. KEDA's membership of 113 companies and entities represents twelve communities in the region. With the presence and leadership of MTEC SmartZone and Michigan Technological University, the Keweenaw region is emerging as a host to a thriving high-tech startup ecosystem. Much of this momentum stems from the rise of small high-tech and advanced manufacturing startups. A growing concern is the lack of amenities, such as industrial space and incubator facilities necessary to attract, retain, and support the development and growth of innovative companies.

The Advanced Manufacturing and Materials Innovation Center would be extremely helpful in stimulating the startup of new technology companies and attracting talent and manufacturing businesses to the area. Startup companies frequently need pilot-scale space to successfully navigate the transition from product conception to full-scale industrial advanced manufacturing or advanced materials processing. I frequently work to connect founders with suitable facilities for their operations. MTEC SmartZone has a strong record of helping innovators and founders advance their technology and business ideas along the path from conception to product development, to funding and finally to commercialization. Their goal is to build on this success through continued collaboration with the Cities of Houghton and Hancock, as well as surrounding communities. The Innovation Center will foster the creation of successful companies which, in turn, will create meaningful career opportunities and economic growth for the area.

In conclusion, I fully support MTEC SmartZone's pursuit of an appropriation to construct the Advanced Manufacturing and Materials Innovation Center.

Sincerely,

Jeff Ratcliffe
Executive Director

MTEC SmartZone
Advanced Manufacturing & Materials Innovation Center

The Michigan Tech Enterprise Corporation SmartZone, Inc. (MTEC) is a non-profit entity whose core mission is to accelerate high-tech business growth and foster a prosperous regional economy. A feasibility study and assessment formed the basis of a recommendation on the community's readiness for an Advanced Manufacturing and Materials Innovation Center (AMMIC). The AMMIC will provide pilot scale, high bay, manufacturing and material processing space, as well as a wet lab and Controlled Unclassified Information Center (CUIC). This resource will provide a vital transition for emerging technology to advance from the lab bench to full industrial scale. The transition is typically framed as the "valley of death" for high-tech and advanced manufacturing startup companies. A comprehensive feasibility study was conducted and supports the overall determination that the proposed AMMIC has a solid market to draw quality clients. This project will implement a viable and sustainable plan, a vibrant and thriving ecosystem, a network of support resources, and partnerships, and strong community support – all critical factors in the success and sustainability of such an undertaking.

"We are late to the game on this one. We needed an AMMIC years ago."
AMMIC Feasibility Study Interviewee Comment

The feasibility/needs assessment study was undertaken to include a broad representation of the region, its citizens, and its goals and priorities for its future. This study sought the input of key community leaders, economic development officials, educational partners, public officials, and community/businesspeople to provide the broadest view possible of the entrepreneurial and economic development landscape in the potential service area and region. The study included direct interviews with community stakeholders, key leaders, and community champions to understand critical priorities, concerns, and unmet needs. It also included a community-based survey to assess the community's understanding, awareness, and support for an AMMIC. Extensive discussions were conducted with economic and community development personnel to determine synergies, targeted industries, and support services for innovative companies in the region. An evaluation of essential best practices, benchmarking principles, and critical success factors for a targeted industry program or sector-based program was undertaken. Alignment with regional, cross-regional, and statewide efforts to support and develop the advanced manufacturing, material processing, and the onshoring of critical/advanced manufacturing and critical supply chain materials is crucial to a comprehensive and integrated economic development strategy.

Summary of Feasibility Study Findings:

Strong Community Ownership and Buy-in: There was widespread support for the AMMIC, its need, and its likelihood of achieving targeted occupancy rates and attracting quality clients.

Need for Services: Significant gaps in existing commercial spaces made a specialized facility like the AMMIC essential for increasing the number of startups and retaining future startups that might have to relocate outside the service area to find suitable space.

Sponsoring Entity: There was near unanimous support for MTEC to operate the AMMIC. MTEC's track record, existing work with startups, knowledge of the area, and relationships with Invest UP, State of Michigan agencies, Michigan Tech, K-12 schools, and municipal government provide them with a credible record of performance. Most, if not all, of these organizational entities are represented on the board of the MTEC SmartZone.

Michigan Tech University: The University is deeply committed to community and regional economic success in order to recruit and retain faculty and students in the area effectively. Through outreach and facilitated connections, the University works effectively across municipalities, SmartZones, and other stakeholders to create a thriving innovation ecosystem that supports its enrollment growth and strategic initiatives.

> **"Startups are becoming more important within the University and the community."**
>
> -AMMIC Interviewee

Reasonable Expectations: The expected economic impact and performance results were calibrated and reasonable for the entity. Long-term success and patient capital likely guide the strategic development of the Center, given that it is likely never to deliver, from an operational and facility perspective, superior financial returns.

Background and Case for Support

The Advanced Materials and Manufacturing Innovation Center in the Cities of Houghton/Hancock, Michigan, would catalyze growth, innovation, and economic prosperity in the Upper Peninsula of Michigan and Northern Michigan. These advantages include:

1. **Economic Growth**: Such a center could stimulate economic development by attracting new businesses, fostering innovation, and creating jobs. It would be a hub for research, development, and collaboration among manufacturers, entrepreneurs, and academic institutions.
2. **Industry Collaboration**: The center could facilitate collaboration between local manufacturers, helping them share best practices, adopt innovative technologies, and improve their processes. This synergy could enhance overall competitiveness.
3. **Workforce Development**: By offering training programs, workshops, and certifications, the center could enhance the skills of the local workforce. A well-trained workforce is crucial for adopting advanced manufacturing techniques and materials.
4. **Applied Research and Development**: The center could support research initiatives related to advanced materials, sustainable manufacturing practices, and process optimization. This could lead to breakthroughs and innovations that benefit local industries and the broader community.
5. **Supply Chain Enhancement**: Focusing on advanced materials could strengthen the supply chain for various industries, including automotive, aerospace, and renewable energy. This resilience would be valuable during disruptions or market fluctuations and support leveraging the region's core competencies and capabilities.
6. **Attracting Investment**: A specialized center could attract private and public investment. Companies seeking to leverage advanced materials or explore innovative manufacturing methods might establish regional operations or partnerships to advance innovation projects, skunkworks, or other spinouts.

Michigan Tech – Key Stakeholder

The region substantially benefits from an economic powerhouse and engine that drives substantial applied research and commercialization efforts – Michigan Technological University. Many of the clients MTEC serves are founders of startups emanating from research at Michigan Tech. Others are alumni of Michigan Tech who founded startups and located them in the area. Tenants of the AMMIC will include entities from Michigan Tech utilizing this space to house and operate the equipment necessary to complete sponsored research projects. Michigan Tech has several important assets related to advanced materials. Michigan Tech's assets in advanced materials include research programs, expertise in material processing, and a commitment to addressing real-world market needs through innovative materials technologies. Connecting the underlying research to commercial applications provides a cradle-to-grave holistic approach from the initial characterization of the IP to the commercial launch of the entity to successful product introduction in the marketplace. Key activities with Michigan Tech include:

Entity	Focus	Examples
MTRAC Applied Advanced Materials Program	Provides resources to support materials-related projects with high commercial potential. Offers **research and development funding** for prototype development and late-stage translational activities	Examples of applications include building materials, transportation, energy transfer, energy storage, and aerospace.
Material Processing Capabilities:	Translational research and funding of novel, commercially viable technologies	Examples include expertise in manufacturing science related to metals, ceramics, polymers, concrete, wood products, and composites.
MTRAC Advanced Applied Materials Innovation Hub	Funded through the **Michigan Strategic Fund** and administered by the **Michigan Economic Development Corporation (MEDC)**, this hub supports materials-based technologies.	Examples focus on novel materials and novel applications of conventional materials that address well-documented market needs.
Institute of Advanced Materials and Manufacturing	Advance the University's leadership and interdisciplinary capabilities in advanced materials and manufacturing innovation	These projects cover a wide range of topics related to manufacturing and materials research.

The investments and projects described by the MTRAC programs and Michigan Tech's Institute of Advanced Materials and Manufacturing indicate a strategic focus on advancing applied advanced materials technologies. These projects demonstrate the potential for significant advancements in materials science and hint at the creation of targeted manufacturing and materials sub-segments. Startups born from these sectors can drive innovation, sustainability, and economic growth within the advanced materials and manufacturing industries, offering solutions to some of today's most pressing challenges.

Here are some potential sectors and product categories that could be influenced or created based on the nature of these projects:

1. **Sustainable Energy and Recycling Technologies**: The Recycling of Lithium-ion Battery project addresses a critical need for sustainable energy solutions, particularly battery recycling. This could lead to the emergence of startups specializing in the recycling of lithium-ion and other types of batteries, offering services to electronic manufacturers and electric vehicle companies.
2. **Critical metals/minerals and onshoring critical supply chain components.** MTEC has clients who are engaged in novel approaches to recycle mine waste to extract critical metals and minerals. These clients would benefit from this facility.
3. **Advanced Coatings and Materials**: The project on a Low-Cost Fabrication Approach for Self-Cleaning and Smudge-Free Resistant Glass Panels could spawn startups focused on developing and applying advanced coatings for a range of industries, including automotive, solar energy, and construction. These coatings could improve the longevity and performance of glass panels and other surfaces.
4. **Flexible and Transparent Electronics**: The Scalable Ultra-Thin Metal-Based Transparent Conductors project points towards innovations in flexible and transparent electronics. Startups in this sub-segment could develop new touchscreens, flexible displays, and bright windows, leveraging the advancements in ultra-thin, conductive films.
5. **Sustainable Materials and Manufacturing**: Across all these projects, there is a clear emphasis on sustainability, whether through recycling, reducing resource use, or eliminating harmful substances. This could lead to a broader segment of startups dedicated to creating sustainable materials and manufacturing processes across various industries.

Municipal Support & Engagement

An AMMIC manufacturing in Hancock and Houghton will drive economic prosperity, foster innovation, and create a dynamic ecosystem that benefits residents and businesses. This facility will foster the creation of a variety of meaningful career opportunities for individuals in semi-skilled, highly skilled and technical trades, as well as college educated individuals. These likely synergies also yield substantial tax base benefits and support to the State of Michigan. Strong rationale exists for why the focused economic development activities would align with crucial community objectives and current activities.