Kraftwürx

PTO-P-2021-0032

DATE: Saturday, February 12, 2022

TO: Senators Tillis, Hirono, Cotton, and Coons

In 2011 the powers behind the America Invents Act began a marketing campaign on Facebook. After reading the proposed bill, I realized the problems that it would create. I began commenting on the posts on Facebook about the facts of the proposed bill and the impact it would have. It wasn't long before they banned me from commenting on the posts. No vulgarity, no names, just facts about the outcome of the bill. Considering that the AIA was a bill put forth by Senators Leahy and Smith, the notation that the actual powers behind the bill wanted to silence me appears to be political speech oppression. This is true considering that the outcome was exactly as I predicted.

The fact is that If you put patent grants and the appeals process for an issued patent under the control of the USPTO, you will get sued by outraged inventors and that is exactly what has happened. "Since the birth of our democracy, it has been well settled that government cannot take from its citizens without due process of law." – said Judge Barbara Linde and this statement holds true under the current patent granting and taking scheme. Patent Trial and Appeal board fees and bureaucratic processes are so tilted against the inventor that they are unconstitutional, as well as in violation of laws as has been proven repeatedly.

We have all witnessed the outcome of case law and decisions resulting from lawsuits. The case law slowly, over a period of nearly a decade, has undone much of the destruction caused by the AIA. For example; Software patents were all but stopped in 2013. Kraftwurx had a patent issued that was re-published to correct an attorney mistake of a single word. The Re-publication was held up for 5 years as case law slowly allowed software patents again and eventually all but removed the barriers much as it was pre-AIA. It is obvious, based on case law that has undone much of the damage, that Senators Leahy and Smith put forth a reckless bill that brought harm to America's innovators.

Case in point – The America Invents Act gave powers to the Patent Trial and Appeal Board that have been found Unconstitutional under the appointments clause. Even with the current circumstances of giving the director of the Patent Office the power to decide all patent validity cases I am certain this will also be changed in the future for several reasons. For example; the director cannot deny everyone an appeal. The director also cannot simply defer all appeals to the PTAB Administrative Law Judges. If the director fails to review every case and preside over appeals, then he will fundamentally be failing to discharge his duty of office under the current Supreme Court Decision. Eventually this will result in remanding cases to the Judicial Branch of Government as our founding fathers intended. In the interim, expect more lawsuits for administrative review since all decisions made by the PTAB are now invalid without appeal to and decision by the Director.

Additionally, the Director of the Patent Office also can defer cases to the Judicial branch. He can simply recuse himself and allow the Courts to hear the cases. In doing so he would be doing America a Great service by allowing Patent Owners to have their day in court with an appeal process as intended by the Patent Act.

The AIA has several provisions that dramatically undermine the patent system and inventors. There is no need to list them all as they have all been discussed ad-nauseum. Regardless, something must be done to correct the issues. The single best decision you could make would be to simply repeal the AIA and allow the courts to hear all patent cases. This will certainly solve the conflict of interest in separation of powers.

We urge you to seriously consider the repeal of the AIA and at least a significant correction to the patent eligibility requirements for software-based patents.

Please see the example of the impact of patent eligibility in the documentation provided below. Post AIA case law has taken nearly a decade to enable Kraftwurx to obtain the patents held by the company that would have all been granted prior to passage of the AIA. The delay caused investment harm in the business and delayed critical patents, enabling the DoD to circumvent our IP. Now with a mere 5 years remaining, we are finally obtaining the patents we had intended as demonstrated by a 2005 DoD Proposal regarding the inventions shown below. Meanwhile, the Government has poured billions into our competitors.

Regards,

Bryan C. Norman
2931 Barker Cypress Rd. Ste. 424
Houston, TX, 77084
832-574-5337

PTO-P-2021-0032

IN COMPLIANCE WITH STATUTE 35 USC § 287, YOU ARE NOTIFIED THAT DIGITAL FACTORY™ IS BOTH A PROPRIETARY BUSINESS MODEL AND MANUFACTURING PROCESS PROTECTED BY MULTIPLE US PATENTS AND PATENTS PENDING.

1. **US8515826B2 Made-To-Order Digital Manufacturing Enterprise**
2. **USRE46807E1 Made-To-Order Digital Manufacturing Enterprise (Alice/Mayo post AIA re-issue)**
3. **US10089662B2 Co-Design & Print Preparation for Additive Manufacturing**
4. **11,010,800 - Commercial Software system for Production Planning & Scheduling System**
5. **17/163,522 Digital Traveler™ - Part Marking and Identification for Additive Manufacturing**
6. **17/197,038 Tray (BIN) Packing for Additive Manufacturing**
7. **17/214,844 End-To-End Digital MES for Additive Manufacturing**

See Appendix for additional information regarding the patents.

Regards,

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2931 Barker Cypress Rd. Ste. 424
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DoD SBIR/STTR SUBMISSION HELP MAIN MEN

Digital Reality, Hutto, TX

UPLOAD TECHNICAL PROPOSAL

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Made-To-Order Rapid Manufacturing Enterprise

(1) IDENTIFICATION AND SIGNIFICANCE OF THE PROBLEM OR OPPORTUNITY.

RAPID MANUFACTURING IS THE FUTURE

The viability of Rapid Manufacturing as an innovative paradigm in the next generation of manufacturing processes is undeniable. RM has staggering implications to improve manufacturing competitiveness, increase cost effectiveness and eliminate design constraints in producing goods however, few companies are utilizing the technology today. Many experts acknowledge the concept to be at the "cusp" however, most also agree that the absence of widespread use lies in the lack of infrastructure; including software, controls & systems needed to bridge the gaps between Rapid Prototyping hardware and CAD/CAM/CAE software to make the technology available to the mass market. With the proper application of the technology driven through innovative manufacturing systems-level software tools, there is creation of opportunity to fundamentally drive changes to the production and order fulfillment process, inventory requirements & end user product selection.

TOOLS ARE THE CHALLENGE

In the 2004 Wohlers report, Terry Wohler's stated that: "Perhaps the most restrictive aspect of designing for rapid manufacturing is the limitation of advanced design tools". For example, CAD systems have been developed with conventional manufacturing in mind. These software tools are not capable of taking advantage of the design freedom, graded materials, and customer input that will be important to RM. Many other well known and respected experts in the field of Rapid Prototyping and Manufacturing agree with him. For example; Dr. Andrew C. Layton and Dr. David W. Rosen of the Rapid Prototyping and Manufacturing Institute stated; "Tools must be developed that enable customers to specify their desired product, including whatever customizations they desire. New types of design tools and user interfaces are needed to enable customers or technicians to describe the specifications of a product and have those specifications converted into operating instructions for an RM system". Today's RM applications use crudely developed tools to drive production of mostly similar items manufactured in small lots.

DIGITAL REALITY HAS THE SOLUTION

Digital Reality, Inc. has conceived the framework considered my many experts to be necessary for widespread deployment of commercially viable Rapid Manufacturing in Industry through software tools and infrastructure, developed from the ground up for use in rapid Manufacturing. This framework, coined Made-To-Order Rapid Manufacturing Enterprise or MTO-RME, consists of a comprehensive suite of software tools and modules designed to bridge the gap between today's restrictive CAD/CAM/CAE systems and Rapid Prototyping hardware in an intuitive, user friendly and cost effective manner. The premise behind the MTO-RME framework is to transform the processes used in traditional manufacturing into digital "tools" that automate the entire manufacturing process in the digital workspace.

NEAR TERM BENEFITS TO BMD & INDUSTRY

Perhaps the most dramatic benefit offered through the MTO-RME technology is the dramatic production cost and cycle time reductions offered by an all digital production system that eliminates many of the tools and equipment required for production using current manufacturing processes, as well as environmental benefits provided by additive freeform fabrication.

The adaptive design freedom that MTO-RME provides may translate into a reduction in part counts for the BMD program in a product or assembly. Parts that require joining with traditional manufacturing may be produced as single parts using MTO-RME and additive

manufacturing. Adaptive designs are geometrically "flexible" parts which are modified virtually before RP output. For example, the complex assemblies produced by Aerojet propulsion systems could benefit from the design freedom provided by RM. Complex conduits such as those used in platelets could be easily manufactured with near net shape additive manufacturing at a considerable cost savings. The most likely early benefit for the BMD program would be discrete, small-scale and complex parts to which existing RP hardware lends itself however; larger machines are being introduced.

Contrary to many assumptions, high strength and high-heat resistant parts are currently producible using systems such as those from 3D systems or Optomec whose RP hardware can produce parts using the LENS process or SLS technology directly in Stainless Steel, Inconel and titanium with yield strengths to 973 MPa or 141,000PSI. Material science has progressed considerably and materials including steel and titanium to high-strength polymers can be directly used to produce additive free-form manufactured parts. Advances continue at a staggering rate.

Aside from mechanical component manufacturing, RP is emerging with electronic circuit manufacturing processes that jet conductive pastes and or polymers such as Copper Polyamide to create circuit boards and microelectronics without designing masks for photo etching. The process is in its infancy but several companies are making great strides in functional use of the concepts. Litrix for example is manufacturing organic LED's or Oled systems via printing or jetting technology and Optomec manufacturers the M^3D system which can directly "jet" or print embedded electronics down to 10 microns. Electronics might be producible directly for the BMD by using the process including flexible circuitry and integrated into the supply chain through Digital Reality's MTO-RME.

Digital Reality's MTO-RME software "enables" the integration of RM technology into production facilities without them having to develop proprietary software to do so themselves. MTO-RME takes a novel approach in creating useful tools for production and will ultimately set the stage for creative and functional uses of Rapid Manufacturing in a manner that will help shift industry mentality toward further integration of the technology.

CONCEPTS FOR DEPLOYMENT

In the MTO-RME framework, parts desired for production use are added to a virtual parts queue regardless of the design facility where they are made. The parts are routed automatically for RM based on output intent and desired production criteria. Parts are tracked in the MTO-RME system with virtual traveler information that follows the product through RP output, providing the manufacturing facility with shipping information. The traveler can also include any information including part number, lot number, revision, designers name manufacturing location, date of manufacture or any other information desired. The information or portions of it are physically printed on the part itself, a "plate" or tag in the dimensions specified by the designer. This is but a sampling of the extensive tools that are used to configure the behavior of the MTO-RME system.

Parts that cannot be directly Rapid Manufactured may be producible with indirect RM in processes such as low-cost rapid tooling or patterns for casting or other operations which reduce the need to store and manage the complex infrastructure required for production. This is especially useful in low volume, high-mix production environments.

(2) PHASE I TECHNICAL OBJECTIVES.

Phase I research will focus on investigational software processing and manufacturing techniques in-line with DoD/BMD "Innovative Manufacturing Process Improvements" interests. – An intelligent, flexible and adaptive virtual manufacturing enterprise system designed to automate and optimize the manufacturing of complex products as production

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level components and assemblies utilizing Rapid Manufacturing. This should allow Digital Reality to develop the framework for deploying the Made-To-Order Rapid Manufacturing Enterprise suite of software tools and modules in a manner that enables the BMD agency to take advantage of Rapid Manufacturing in an efficiency-multiplied manner. The objectives that must be accomplished during phase one are:

1) **Determining what BMD hardware components are the most challenging and costly to manufacture** and which lend themselves to production through the MTO-RME process framework to reduce cost and or complexity as well as increase productivity. Techniques utilized will include "Value engineering".

   This will be accomplished through interaction with BMD contractors and program personnel and include an extensive analysis of part designs, materials being used, production costs and detailed reviews of all BMD related manufacturing processes being utilized.

2) Working with the BMD program personnel and suppliers to expand the scope of the MTO-RME environment and **develop the comprehensive software "tool set" to meet BMD program goals for production of BMD-related hardware**. Note: Manufacturing Industry wide applications for the software will also be considered for development since manufacturing Industry contractors manufacture hardware for the BMD and other channels in the economy.

   This task will be accomplished through extensive collaborative efforts with BMD program personnel, assigned company representatives from BMD suppliers, and Digital Reality's P.I.

3) Forming a panel of experts, including BMD personnel and contractors, as well as experts from industry to **evaluate acceptance and usefulness (functionality) of the software tools proposed for development,** accept feedback for improvement to the tools (prior to coding in phase II) to promote a more robust implementation of each software module and or tool. In essence developing the concepts of how someone would interact with the software tool conceptually and use them to accomplish production-related operations in setting up a virtual factory environment.

   The BMD program personnel and supplier representatives will become members of the panel of experts. The panel will also include Digital Reality's direct staff, expert consultant Todd Grimm and other manufacturing industry representatives from the Society of Manufacturing Engineers including the Manufacturing Enterprise Council, Rapid Technologies & Additive Manufacturing Community and other sources as needed.

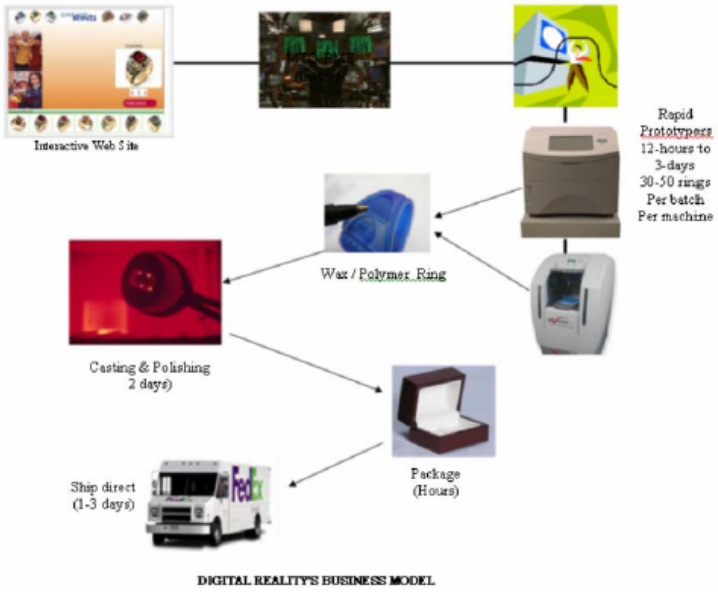
4) To **solidify the framework** for Digital Reality's first commercial software application built around the comprehensive list of tools developed and approved to meet the BMD program's needs as well as the entire manufacturing community as an enabling instrument for widespread Rapid Manufacturing. Note: The initial product name has been tentatively dubbed "Digital Factory" v1.0.

   The output of this iterative process will be an extremely comprehensive suite of software tools designed to meet industry needs, since industry will have had a say in its development.

(4) RELATED WORK.

Digital Reality, Inc. was formed by P.I. to take advantage of a particular commercial application for RM and to use the technology developed for the mass customization of jewelry. Digital Reality has spent two years developing the framework for the automated assembly engine and visualization system to allow consumer driven design and production of custom jewelry using the Parasolid parametric 3D modeling kernel and Digital Reality's proprietary wrapper and user interface.

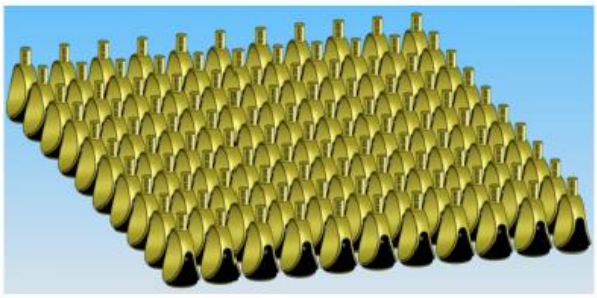
Digital Reality's direct model for MTO-RME process utilizes the internet, a 3D viewer technology, Digital Reality's adaptive digital assembly engine (module one under the proposed technology for development) and interactive controls on a web site to allow consumers to directly affect the digital representation of their individualized product. Adaptive features and constraints are designed into the product. What can be modified is defined by the developer. The resultant product is visually displayed in near real-time on the interactive web site. The significance of the difference of Digital Reality's approach is that the software is designed from the ground up to allow simultaneous use by multiple input users. The software is designed to allow automatic load balancing, distributed processing and automatic failover as well as automated production scheduling, parts nesting and adaptive or intelligent output.



DIGITAL REALITY'S BUSINESS MODEL

Users can interactively rotate and manipulate their jewelry product and drive changes to the design through the controlled parameters defined in the tools to modify their homogenous product including shape, text, finger size or other features. The 3D representation of the customers ring or other jewelry is accurate with respect to color, stones and other features such as antiquing. The model displayed is a low resolution version of the actual model that will be used for production. In essence, customers are manipulating and editing the digital representation of their physical product remotely.

Upon customer approval and payment, the MTO-RME system digitally routes the 3D model of the product for part nesting, routing, stacking and queuing the product for production on the next available thermo-jet rapid prototyping machine (Module four under the proposed technology proposed for development).



Tracking of order numbers (a digital tracking method) is realized as a numerical sequence, barcode or 2D-Datamatrix along with other information imprinted automatically on a sprue that is printed along with the ring for casting operations. The order information remains with the ring indefinitely through the manufacturing process however the feature is suppressed for visualization purposes on the consumer side.

A comparison of Digital Reality's MTO-RME system with traditional custom jewelry manufacturing shows a 70-80% reduction in labor costs along with a 40% improvement in sales margins at comparable prices to competitors. Obsolete or old designs can be forever digitally stored and upon request, replacement rings can be produced with ease.

RELATIONSHIP WITH FUTURE RESEARCH OR R&D

Phase I research establishes the framework for the development, coding & testing of the fully functional Rapid Manufacturing Enterprise software modules based on BMD part and assembly needs. The framework & project development schedule created and submitted at the end of phase I research will be used for coding and beta testing of each SW tool based comprehensively on the agreed Product Feature Guide (PFG) drafted directly from the requirements dictated by the panel of experts.

During Phase II work, Digital Reality will hire additional programmers, lease or purchase rapid prototyping equipment for limited output of samples to validate the software tool's functionality by manufacturing limited prototypes of BMD hardware parts using Digital Reality's software modules validate the MTO-RME process and drive iterative improvements in the process.

Digital Reality will also code the software modules Digital Reality's earlier research and development deemed necessary as an enabling tool for widespread use of Rapid Manufacturing. The progress of the software's coding and deployment will be shared with selected members of the panel of experts and BMD program personnel assigned to the program based on those personnel in section 4.3 of the Phase 1 work plan or others as mandated by BMD requirements and Digital Reality's guidance.

Digital reality may, include the Mobile Parts Hospital, EXADS or other SBIR program companies working on projects that could benefit from the RM software offered for development at Digital Reality's digression and approval by the BMD however, the primary focus will be on fully comprehending and developing the software tools to create the MTO-RME framework and enable the BMD program to begin widespread use of Rapid Manufacturing.

The modules listed below were conceived as necessary for a functional RM application through Digital Reality's earlier work. These tools are proposed for development along with additional tools conceived and designed through the research proposed herein:

1. **Automatic, Physical Realization of an adaptive homogeneous design:** In essence this tool provides the "core" for a distributed processing engine for combining 3D geometry of multiple parts into single entities for output. It also allows "adaptive" or morphing of geometry without direct user input but based on designer or consumer manipulation of the virtual representation of their "actual" physical product.

2. **Product identification and part tracking module:** This software module provides a significant improvement to the automatic, physical realization engine The module provides an adaptive placard for order tracking and management by attaching said "traveler" information (defined by user intent) to a location of choice on the 3D model for output. The information on the placard is printed with the part. The data can be textual, barcode, 2-D data-matrix in either human readable or encrypted formats and is driven from database information derived from the part numbers and BOMS of the vendor deploying the software.

3. **Digital production scheduling and routing module:** This module provides an extensive suite of automatic production routing and scheduling functionality including intelligent part nesting, automatic adaptable part routing, real-time feedback, estimated production times, system status, in-process order tracking**.** Electronic submission of job completion notifications and more. This module will adapt many traditional manufacturing supply chain tools in a manner consistent with the concepts of an all digital production system.

4. **Intelligent adaptive thermal compensation:** This module provides adaptive compensation for thermal properties, coefficients of thermal expansion and end part dimensions. The module removes the need for designers to consider thermal properties from the design cycle by placing the burden on the MTO-RME system.

5. **Intelligent, novel slicing & support methodologies for additive fabrication:** This module incorporates adaptive slice geometry manipulation into the MTO-RME system. It includes novel slicing methodologies to improve production throughput and/or adaptive orientation for surface finish optimization. The module considers feature contours in developing the slice geometries and uses an adaptive or learning fuzzy logic system to improve product output based on design intent.

6. **Automatic adaptive intent-based RP Technology matching:** This module incorporates user-defined parameters of available output technologies to select the appropriate RP technology for "optimized" additive fabrication based on design intent. The module also incorporates an adaptive, technology-based "definition engine" similar to color-match technology for digital photography that adapts the design and chosen output technology for bureau-based distributed rapid manufacturing.

7. **Mass Customization Module:** The mass customization module incorporates a framework for the direct user manipulation of pre-defined flexible design criteria built into a product by a designer. This module opens the door for mass customization or manipulation of products without the need for the customer to have the complex knowledge typically required to interact with and influence the design of a product. It includes an extensive suite of API calls into the software to integrate it with other portions of a company's infrastructure.

8. **Automatic, Physical Realization of an adaptive materially graded heterogeneous or discrete design:** This software module adapts the knowledge-based system supporting interoperability between the design tools and an adaptive-assembly-engine to create and manipulate materially-graded or homogeneous objects or complex assemblies. It also coordinates output activities of complex products and assemblies by automatically routing components of an assembly to an appropriate piece of RP hardware.

9. **Materially Graded Production Module:** This module includes concepts around "Voxel" modeling or adaptations or materially graded solid object manufacturing such as parametrically defined materially graded products as opposed to "Voxel" models to define boundaries of graded materials.

10. **Various modules including undefined needs:** Many concepts and needs for full deployment of MTO-RME for the BMD are undefined and will be impossible to define without looking at the processes and products used in the BMD program. With this in mind Digital Reality intends to consult with some of the top minds in the RP, RM & traditional manufacturing world including:

(5) COMMERCIALIZATION STRATEGY

The true realization of the benefits to the MDA in funding the development of Digital Reality's MTO-RME software will be the injection of useful components of the software throughout the BMD program, at BMD contractor's facilities, to enable the widespread integration of low-cost, highly effective Rapid Manufacturing to manufacture any component or assembly that can realize benefit directly from the technology, for production-level, flight-worthy hardware. Commercialization of the MTO-RME software developed during a Phase II project will be undertaken in a phase III commercialization plan to provide a software tool to the BMD and the US industry as a whole that enables the adoption of Rapid Manufacturing as a process to manufacture production-level materials for consumers. Digital Reality's MTO-RME software "enables" the integration of

reducing the reliance of American industry on cheap foreign labor which forces production facilities offshore and increases U.S. reliance on imports, thereby reducing U.S. Manufacturing jobs. Digital Reality's software technology is therefore an enabler of Rapid Manufacturing.

DoD contractors are in many instances also commercial organizations selling products to private citizens and businesses in free-trade. The development of Digital Reality's MTO-RME software will translate into direct usability for private sector use including small businesses. Considering that RM eliminates much of the equipment and labor needed for traditional manufacturing, the net result may be a leveling of the playing field for America's small businesses against foreign imports produced with cheap labor

The commercialization of the software developed during the Phase II project will be to inject useful components of the software throughout the BMD program to manufacture hardware at BMD contractor's facilities to manufacture any component or assembly that can realize benefit directly from the technology. Digital Reality will ultimately offer for sale a non-proprietary software package tentatively named "Digital Factory v1.0." Digital Factory will encapsulate most, if not all of the software developed in this program and will be intended to be purchased by Rapid Prototyping bureaus, corporations, or individuals seeking to streamline and automate much of the operations required for Rapid Manufacturing in a virtual, factory-less production environment.

Digital Reality will make the software available to contractors of the BMD program including Raytheon, Lockheed Martin, Northrop Grumman, Aerojet and others. The intent will be to expand the use of Rapid Manufacturing for real products manufactured for insertion and integration into the BMD program. Digital Reality will also assist suppliers in making successful transitions to use of RM in their production facilities where applicable to the BMD program.

Digital Reality will also use the Digital Factory software in a spin-off company to manufacture class rings and other custom jewelry per the business plan described in section five. The class ring industry alone exceeds $1.5 billion annually and the custom jewelry industry collectively is $52 billion dollar annual industry. Using the MTO-RME software in this manner provides validation of the use of the software to the manufacturing community and shows that Rapid Manufacturing en-mass is no longer the topic of research.
A byproduct of the jewelry operation will be an infusion of needed capital to sustain Digital Reality and allow expansion of the software including further research & development. Digital Reality's planned exit strategy is to offer the jewelry operation for sale. With new found confidence and cash reserves, Digital Reality will focus on further software development. The commercial success of the product will also provide Digital reality with opportunity for promotion including; technical journals, industry magazines, news and media coverage etc.

COLLEGE OF ENGINEERING
THE UNIVERSITY OF TEXAS AT AUSTIN

Department of Mechanical Engineering • ETC II 5.160 • Austin, Texas 78712-1063
Telephone (512) 471-1131 FAX (512) 471-8727

October 12, 2005

MDA SBIR 2005.3
MDA05-019, Missile Defense Agency

To Whom It May Concern:

We write to express interest in and support of the proposal by Digital-Reality, Inc., entitled "Development of Made-To-Order Rapid Manufacturing Enterprise Systems," that has been submitted to the Missile Defense Agency's SBIR Program *Innovative Manufacturing Process Improvements*. As researchers in the Solid Freeform Fabrication area, we are particularly interested in applications for which SFF can serve as the manufacturing process rather than a prototyping method. We believe SFF offers the possibility of providing regional, on-demand manufacturing capability in the USA that can offset some of the migration of manufacturing capacity overseas. Coupled with the Internet, Digital-Reality's business model offers the customer what he wants – custom manufactured products – while reducing inventory and overhead. The jewelry fabrication business described in this proposal seems like a natural application of SFF. One of the strengths of SFF techniques is the fact that geometric complexity and diversity has little effect on manufacturing cost. Jewelry is a highly personal product, and we believe offering the customer to the ability to customize rings represents a competitive advantage over current leaders in the sector. Digital-Reality has recognized that the manufacturing components of the business are technologically feasible and available commercially. What is needed, and what they propose to develop, is the Internet-based interface to the customer, and the software infrastructure to support the manufacturing operation.

While the jewelry business model is appealing, perhaps more intriguing is the proposed software itself. Many of the tools that Digital-Reality will develop are generic to the layer-based manufacturing industry. Of these, the part identification and tracking module is particularly novel, yet seems like an obvious problem in need of an intelligent. It is also encouraging to see that Digital-Reality plans to formalize certain aspects of layered fabrication, such as compensation for thermal expansion, that are now done experientially. Coupled with the scheduling and routing module customized for layered manufacturing, we believe these tools will find a ready customer base among current SFF service bureaus. Digital-Reality clearly has the potential to complement the jewelry business with sales of its support software for SFF.

The Laboratory for Freeform Fabrication at The University of Texas at Austin has a history of innovative research in SFF. We have performed research in several of the areas of development planned by Digital-Reality. We strong supporters of small business development in general, and in the SFF area in particular, and we believe that economic development in the state of Texas is an important mission of UT Austin.

Because of the proximity of the university and Digital-Reality, and because of our shared interests, opportunities for collaboration will likely arise. We welcome this collaboration if the company finds that the university can be of service in their business development.

We believe Digital-Reality has identified an important need in the SFF industry, and has a viable plan to meet that need. With proper execution, the company will be very successful. This SBIR award represents an important step in that success. We urge you to support this proposal.

Sincerely,

Joseph J. Beaman
Professor and Chair
Ernest F. Gloyna Regents Chair
in Engineering

Richard H. Crawford
Professor
Temple Foundation Endowed
Faculty Fellow No. 3

ADDITIONAL LETTER OF SUPPORT

SUPERIOR ROBOTICS INC.

41A Industrial Park Cr.,
Sault Ste. Marie, ON, Canada
P6B 5P3
705.253.0875
866.509.1460 Sales@SuperiorRobotics.com

MDA SBIR 2005.3
MDA05-019, Missile Defense Agency

Monday, October 10, 2005

This is in regards to Digital Reality Inc.'s application for: Innovative Manufacturing Process Improvements MDA SBIR 2005.3 - Topic MDA05-119.

Digital Reality's MTO-RME (Made-To-Order Rapid Manufacturing Enterprise) is an innovative new process solution that will greatly benefit both manufacturers and consumers. Utilizing the existing, proven technology of rapid prototyping, I believe Digital Reality's MTO-RME is a major advancement in component manufacturing.

Incorporating rapid prototyping with their proprietary enterprise software will give manufacturers and consumers a new platform to visualize, prototype, and manufacture new and existing components with minimal risk, investment and time as compared to current design and manufacturing processes. The software will give small companies and consumers a cost effective method of bringing new ideas to market quickly and efficiently and large companies a method of reducing costs by eliminating overhead of tooling design, manufacturing equipment and personnel. The use of MTO-RME software will allow companies to keep their manufacturing within North America, maintaining greater control over their product quality, consistency and lead times.

In summary, I strongly believe that Digital Reality's MTO-RME is a new and innovative process solution that will change the future of manufacturing.

Highest Regards,

Blaine H. Wallace
Chief Technology Officer
Superior Robotics Inc.

(9) PRIOR CURRENT OR PENDING SUPPORT OF SIMILAR PROPOSALS OR AWARDS.

There is no prior, current, or pending support for the proposed work.

(10) CONCLUDING SUMMARY

Digital Reality, Inc. is offering the Ballistic Missile Defense Agency the development of the Made-To-Order Rapid Manufacturing Enterprise system as a comprehensive suite of software tools that will lead to the integration of Rapid Manufacturing of critical component parts and assemblies at significant cost reduction through greatly simplified manufacturing operations that reduce labor and improve productivity. Digital Reality has demonstrated that we have been working on this concept for a considerable amount of time prior to this SBIR submission and have come to realize that the implications of our original commercialization intent have far greater application in the manufacturing sector as a whole. Digital Reality will utilize its' connections throughout the manufacturing community and technical experts selected and included in this proposal, as well as BMD personnel and vendors to guarantee that what Digital Reality develops meets or exceeds expectations. The result of funding this proposal will be a fully featured Product Feature Guide (PFG) that includes storyboards for tool functionality and a detailed project schedule developed in strict accordance with the Phase Review Process of the project Management. The results if properly funded in a Phase II award will lead to the truly commercial realization of Rapid Manufacturing. Digital Reality will also work to integrate the technology into the program with its suppliers and continue to develop the software seeking further refinements, improvements and feature enhancements. Finally, leading academic and industry advisors have agreed that our concepts are unique and have agreed to assist Digital Reality, lending credibility to the ideas contained herein.

Digital Reality also believes that Rapid Manufacturing has to begin somewhere other than from a proprietary application running at one manufacturing facility, producing limited quantities of similar parts. The MTO-RME "factory-in-a-box" concept, a tool designed from the ground up to be used by anyone for the purpose of Rapid Manufacturing is in many respects the first application conceived this way. The software is designed to run on servers and be used in massively simultaneous use models, unlike traditional CAD/CAM/CAE software. If funded, Digital Reality will be the first to market with an entirely new and novel tool for Rapid Manufacturing. In the 2004 Wholer's report, Terry Wholer stated that; "Perhaps the most significant barrier to realizing new applications and powerful benefits is our reluctance to change. Established process and procedures are difficult to displace. When forward thinking individuals apply Rapid Prototyping in new and exciting ways however, it is possible to achieve astonishing results."

On May 9th, 2003, Undersecretary of Commerce for International Trade Grant D. Aldonas stated, in a prepared testimony before the House Committee on Small Business that: "what is undeniable and what brings us together today is the fact that American manufacturing is facing one of the most significant competitive challenges it has faced. It is the Hope of Digital Reality that enabling Rapid Manufacturing through the MTO-RME "Digital Factory" software will provide US manufacturers with powerful tools to negate low-labor cost offshore manufacturing and help American manufacturers gain a competitive advantage by eliminating the cost advantage of low cost manufacturing with no-cost virtual manufacturing.

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