

Translation



The following Chinese industrial policy directive aims to speed up the process of getting manufacturing prototypes into commercial production. One of the goals of this directive is to establish five homegrown, world-class pilot testing platforms in China by 2025. It prioritizes the development of more precise metrology technology as a means to this end.

Title

Implementation Opinions on the Innovative Development of Pilot Testing in the Manufacturing Industry
制造业中试创新发展实施意见

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Source

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Implementation Opinions on the Innovative Development of Pilot Testing in the Manufacturing Industry

Pilot testing (“piloting”) is transitional testing for transforming new products in the trial production stage into production processes. It is a key link in the industrialization of scientific and technological (S&T) achievements, an integral part of the manufacturing innovation system, and an important support for modernized industrial systems. Since the 18th Party Congress [in 2012], manufacturing industry piloting has continued to advance, promoting technology iteration, process reform, and product innovation. However, problems such as a deficient piloting service system and weak independent controllability (自主可控能力) are increasingly conspicuous, and the piloting industry’s development has lagged behind in providing hardware, software, and services for the industrialization of S&T achievements, making it difficult to meet

the practical requirements of high-quality development. The following opinions are put forward in order to build a modernized piloting capability and support industrial S&T-based innovation and high-quality development.

I. Guiding Ideology

Taking Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era as the guide, we must fully implement the spirit of the 20th Party Congress, take the new stage of development (新发展阶段) as our basis, completely, accurately, and comprehensively implement the new concept of development (新发展理念), accelerate construction of the new pattern of development (新发展格局), conform to the fundamental principles of industrial development, take building an advanced piloting capability as the goal, adhere to being demand-oriented and scenario-led, improve the service platform system, develop the piloting industry in an innovative way, optimize the piloting development ecosystem, and promote the synchronized development of the piloting and innovation chain with production chains, thereby providing strong support for promoting the high-quality development of the manufacturing industry, accelerating the achievement of new-style industrialization (新型工业化), and constructing a modernized industrial system.

II. Basic Principles

Persist in innovative development. Using innovation drivers to lead piloting development, promote the continuous upgrading of the whole piloting chain, and achieve higher-end technology, more modernized capability, more refined management, and more efficient services, thereby supporting high-quality development and the industrialization of achievements.

Persist in systematic layout. Focusing on combining the big picture with the details (远近结合), differentiated implementation, and software-hardware synergies, build appropriate piloting capacity according to industrial categories, lay out piloting services according to industrial clusters, and promote the deep integration of pilot production line construction and production chains, so as to support the movement of industries towards the middle and the high end.

Persist in supply-demand coordination. Focusing on the actual situations of industries and the piloting requirements of enterprises, push piloting platforms to provide accurate and effective services. Focusing on pilot platform capacity demand, expand the supply of products such as precision measuring instruments, high-end testing equipment, and design simulation software.

Persist in high economic efficiency. Guide the intensive construction and

standardized management of piloting capacity, and moderately advance the layout of modernized piloting capacity. Scientifically allocate piloting resources, promote the networkization (网络化) of piloting services, and raise the efficiency of piloting certification, thereby achieving higher quality and enhanced efficiency.

Persist in safety and reliability. Adhering to equal emphasis on technology and management, have safety and assurance permeate throughout the piloting process, and strengthen risk identification, monitoring, and early warning, as well as emergency response and analysis and evaluation, so as to ensure that piloting development is safe, reliable, and independently controllable (自主可控).

III. Development Objectives

By 2025, China's manufacturing industry piloting development will have made positive progress, the piloting capacity of key production chains will be basically fully covered, and it will be significantly more digitalized, networkized, intelligentized (智能化), high-end, and green. The piloting service system will have been continuously improved, and more than five piloting platforms at the internationally advanced level will have been built. The development of the piloting ecosystem will be further optimized, a number of independently researched and developed piloting software and hardware products will have been put into operation, and the support and assurance role of piloting for the manufacturing industry will have been significantly strengthened.

By 2027, China's manufacturing industry piloting development will have achieved remarkable results, and the formation of advanced piloting capacity will have accelerated. The high-quality and efficient piloting service system will be further perfected, and the piloting development ecosystem will be more robust, thereby providing strong support for the high-quality development of industries.

IV. Laying out Modernized Piloting Capacity

(i) Accelerate the full coverage of the piloting capacity system.

Scientifically plan advanced piloting capacity covering key industries, and form a perfected piloting technology system, an advanced piloting service network, and an effective supply of piloting software and hardware products. Build a number of major piloting projects with strong industry-driving power. Support the leading enterprises of production chains in doing unified planning of piloting, R&D, and production, so as to form a complete piloting capability for industries.

(ii) **Promote project-based building of piloting capacity.** Implement manufacturing industry piloting capacity enhancement projects and achieve

breakthroughs in stages in accordance with the idea of “planning one batch while constructing one batch, with another batch in reserve.” Guide enterprises in formulating piloting capacity enhancement plans, encourage process-type manufacturing enterprises to build piloting capacity for trial product production and mass production, and improve product quality and production efficiency. Encourage intermittent manufacturing (离散型制造) enterprises to build piloting capacity for new product development and continuous iteration, thereby improving product reliability and environmental adaptability.

(iii) Promote the digitalization of piloting. Strengthen the integrated application of new-generation information technology, carry out the digital transformation of test equipment and processes, optimize test methods and management modes, and extend digital technology solutions in test scenarios such as process and tooling testing, defect detection, and predictive maintenance. Encourage enterprises to mine the value of data, build digital twin systems, carry out virtual simulation experiments, and strengthen application at scale of model-based systems engineering, so as to shorten the R&D cycle, reduce testing costs, and achieve production without physical prototypes.

(iv) Promote the networkization of piloting. Develop networked collaborative piloting, deepen the application in piloting of technologies such as the industrial internet, Internet of Things, and 5G, promote the networkized connection and platform convergence of enterprise piloting resources, improve the interoperability of equipment and systems, and achieve the integration of production experiment management and control. Promote the cloud-based sharing of test data resources between enterprises and suppliers. Extend cloud-based piloting services to meet the requirements of making piloting more cloud-based.

(v) Promote the intelligentization of piloting. Promote the construction of intelligent pilot production lines, accelerate the intelligentized transformation of piloting, and comprehensively improve the intelligence level of test processes, management services, and safety and assurance. Promote the application of machine vision, machine learning, and artificial intelligence models in piloting, and optimize technological processes and boost testing efficiency through comprehensive perception, real-time analysis, scientific decision-making, and precise execution.

(vi) Promote the movement of piloting toward the high end. Continuously improve piloting technology and test quality to meet the piloting needs of constantly upgraded products. Accelerate the development of high-precision measuring instruments, high-end test equipment, and other products, and strengthen research on design simulation software to support high-level piloting. For test materials, high-end

products, and equipment with significant application prospects and high value-added, give priority to including them in the Application Guidance Catalogue of the First Batch of Materials and First (Set of) Equipment.

(vii) Promote the greening of piloting. Simultaneously advance piloting with the green, low-carbon, and safe development of industry, accelerate the green transformation of piloting, and extend new models that are intrinsically safe and reliable, and have low resource consumption and low environmental impact. Guide enterprises to build green and safe pilot production lines, promote software encapsulation (软件化封装) of green technologies, and carry out dynamic monitoring, precise control, and optimal management of the whole process of piloting resources, energy, and pollutants, thereby improving the comprehensive utilization efficiency of piloting resources.

V. Building a piloting service platform system

(viii) Encourage leading enterprises to build production chain piloting platforms. Support leading enterprises in providing application scenarios and test environments, building piloting platforms for independent (自主) products, driving product R&D, design, and validation tests, working with upstream and downstream enterprises in the production chain to formulate technical rules and standards for piloting, and striving to solve common piloting problems. Push state-owned enterprises to strengthen the promotion of independent innovation (自主创新)-based technologies and products in piloting, and take the lead in putting applications into use in key areas.

(ix) Build comprehensive piloting-oriented public service organizations. Lay out the construction of technologically leading, world-class, and comprehensive piloting-oriented public service organizations, so as to provide high-level piloting services that cut across industries and fields. Focusing on major national regional strategies such as Beijing-Tianjin-Hebei collaborative development, Guangdong-Hong Kong-Macao Greater Bay Area construction, Yangtze River Delta integrated development, etc., coordinate and guide well-positioned (优势) scientific research forces and the right conditions to build regional comprehensive piloting-oriented public service organizations. Build comprehensive piloting-oriented public service capabilities in industrial clusters and parks to support industrial development in an all-round way and meet the diverse requirements of enterprises.

(x) Build specialized piloting-oriented public service organizations. Lay out and construct specialized piloting-oriented public service organizations with distinctive features and outstanding advantages, so as to provide specialized services that have

industry-specific characteristics and meet the needs of special scenarios. Taking resource endowments into account, gather professional forces to participate in construction, improve testing capacity for special application scenarios and extreme environments, and effectively meet the requirements of industry development and special application scenarios.

(xi) Construct high-level and multi-level piloting vehicles. Support localities with the right conditions, based on industrial foundation and comparative advantages, in creating piloting centers with a large scope for radiation, strong conversion ability, and good development mechanisms. Strengthen the piloting functions of existing innovation and service platforms, enhance the conversion of technology R&D, and open up testing capabilities, testing sites, and research achievements. Guide [piloting] vehicles of all kinds to emphasize intellectual property management and establish and improve intellectual property protection systems.

VI. Innovatively Developing the Piloting Industry

(xii) Strengthen policy coordination. Refine the piloting policy system, promote the organic combination of piloting with policies on high-tech zones, industrial parks, new-style industrialization demonstration bases, safety and emergency industry demonstration bases, advanced manufacturing clusters, clusters of small and medium-sized enterprises in characteristic industries (特色产业), etc., and strengthen the exchange of piloting information, piloting resource sharing, and piloting-production chain linkage and synergy, so as to optimize the allocation of factors of production (要素) and resources.

(xiii) Accelerate the tackling of key technological problems. With industrialization as the goal, distill the common needs of piloting, promote construction of the piloting scientific research platform system, focus on making breakthroughs in extremely complex environmental testing, reliability simulation and analysis, digital twins, and other key piloting technologies, as well as basic general purpose technologies such as metrology, standards, testing and inspection, and analysis and evaluation. Support enterprises in increasing R&D investment, and encourage user work units to jointly address piloting bottlenecks.

(xiv) Make breakthroughs in hardware and software products. Push to make up deficiencies and hone advantages in piloting software and hardware, taking the removal of impediments, constraints, and breakpoint problems as the orientation, and promote the standardized, serialized, modularized, and complete-set development of hardware and software products. Organize the implementation of a number of hardware and software product demonstration projects that meet the requirements of

application scenarios. For piloting hardware and software products, promote greater variety, improved quality, and brand creation, so as to increase the supply of high-quality products and services.

(xv) Create independent pilot production lines. Increase pilot production line system integration ability, promote prioritization of high-quality independent products in the process of building pilot production lines, and increase the independent controllability of pilot production lines. Promote the integrated application of software and hardware products from pilot production lines together with the industrial internet and digital infrastructure. Create industry pilot production line demonstration models, select a number of pilot demonstration lines, and organize their extension.

(xvi) Incubate high-quality enterprises. Benchmarking with the international advanced level, incubate a number of leading enterprises with ecosystem dominance capability in the fields of instrumentation, metrology standard devices, testing and inspection equipment, design simulation software, etc. Support small and medium-sized enterprises in focusing on their main business and fine-tuning their operations, continuously enhance pilot software and hardware product innovation ability and core competitiveness, promote the collaborative innovation of small, medium-sized, and large enterprises, and incubate more professional, meticulous, specialized, and innovative (专精特新) small and medium-sized enterprises.

(xvii) Expand full-chain services. Encourage various platforms to form full-chain service capabilities covering engineering development, technology maturation, process innovation, sample trial production, testing and inspection, etc., and increase support for professional, meticulous, specialized, and innovative small and medium-sized enterprises. Encourage the development of equipment leasing, remote operations and maintenance, shared experiments, and other new service industry formats. Issue a catalog of piloting service resources, select piloting service solutions and typical cases, and form advanced experiences that can be copied and widely adopted.

VII. Optimizing the Piloting Development Ecosystem

(xviii) Strengthen standards support and leadership. Implement piloting development standards improvement plans, establish a sound piloting standards system, and issue a number of key standards, including: simulation and emulation, processes and tooling, inspection and testing, and other key technology standards; instrumentation, pilot production line, and other test equipment standards; and standards for terminology and definitions, talent training, service organizations, and other support infrastructure. Promote the establishment of piloting industry technology

standardization organizations, and support specialized agencies (专业机构), industry associations, etc., in using various approaches to formulate and disseminate standards.

(xix) Create a professional talent cadre. Adhere to the simultaneous promotion of recruitment and training, deepen industry-education integration (产教融合), support industry-academia-research institute (产学研) cooperation, cultivate a cadre of interdisciplinary talents who understand products, manufacturing, testing, equipment, and safety, as well as outstanding engineers who are good at solving complex engineering problems, thereby improving the professional talent system for piloting. Support universities with the right conditions in setting up piloting-related curricula and majors, and in building training bases, expert work bases, and other platforms for piloting. Improve the evaluation, assurance, and incentive mechanisms for piloting talents.

(xx) Strengthen metrology service assurance. Strengthen the measurement traceability of piloting instruments and equipment, establish libraries of high-accuracy and high-stability metrology standard devices and metrology standard materials urgently needed for piloting development, and develop special metrology testing methods, standards, and specifications. Make full use of the technical support and assurance roles of metrology, strengthen construction of the national industrial metrology & testing centers and metrology instrument-type evaluation laboratories, and provide whole-life-cycle measurement and testing services for piloting development, so as to ensure that the values measured in piloting are accurate and tests are valid.

VIII. Assurance Measures

(xxi) Strengthen organization and coordination. Give full play to the role of the Office of the State Leading Group for Building China Into a Manufacturing Powerhouse¹ (国家制造强国建设领导小组办公室) in strengthening the overall coordination of piloting development. Strengthen linkages between central and local governments, guide localities to make the most of their characteristics and advantages, formulate effective implementation initiatives, and increase incentives and support for regions with significant achievements. Give full play to the role of specialized agencies and industry associations in strengthening information dissemination, supply-demand linking (供需对接), and technical services.

¹ Translator's note: This translation renders the Chinese word 强国 qiángguó—which literally means "strong nation"—in English as "powerhouse," as in the phrase "manufacturing powerhouse" (科技强国). For a more thorough discussion in English of the Chinese word qiángguó, see: <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/lexicon-wanluo-qiangguo/>.

(xxii) Strengthen resource assurance. Fully utilize existing financing, funds, and other policy channels to drive social capital² and support the innovation-based development of piloting. Implement policies such as additional deductions for R&D expenses and value-added tax (VAT) rebates. Make good use of the “first (set of), and first batch” insurance compensation policy. Give full play to the role of the National Industry-Finance Cooperation Platform (国家产融合作平台), and support financial institutions in actively providing financial services on the premise of legal and regulatory compliance and risk control. Include piloting in the “Science and Technology Industry Financial Integration” special project, and guide financial capital and social capital to increase their support. Encourage local governments to provide assurance for piloting with respect to funding, land, talent, finance, and other aspects.

(xxiii) Refine management mechanisms. Local governments should strengthen overall coordination, enhance the coordination of industrial, emergency response, and environmental policies, standardize the pilot project implementation process, optimize the procedures with respect to access conditions, land use planning, environmental protection and safety, construction and operation, etc., and strengthen guidance and services. Encourage the use of centralized processing, joint audits (联席审核), parallel approval (并联审批), and other methods, and explore the implementation of filing system for commitment to partially completed matters (部分事项承诺备案制) and other new management mechanisms to enhance the efficiency of project approval and improve the level of management standardization.

(xxiv) Launch effectiveness evaluation. Establish a scientific evaluation index system and carry out monitoring, analysis, and evaluation of piloting capacity, service level, standardized management, and comprehensive benefits, so as to dynamically reflect the overall trends. Strengthen the evaluation of pilot service platform effectiveness to ensure standardized operations, safety and reliability, and scientific development. Strengthen the application of evaluation results, and have evaluation results serve as an important basis for policy support and resource allocation.

² Translator's note: The Chinese term 社会资本, translated literally as "social capital," refers to any source of funding outside of government budget outlays. This term encompasses investment by private individuals and private institutions. However, investment from state-funded entities such as state-owned enterprises (SOEs), including state-run banks, also falls under the umbrella of "social capital."