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Produktion2030
Call for proposals 6, spring 2017:2

Testing and Demonstration Projects for Increased Digitisation in Industrial Production

1 Summary

The Produktion2030 Strategic Innovation Programme is part of Vinnova's, the Swedish Energy Agency's and the Swedish Research Council Formas' joint efforts within strategic innovation areas. Strategic innovation programmes are to lay the foundation for international competitiveness and sustainable solutions to global societal challenges.

The vision for Produktion2030 is that Sweden will be a world leader in sustainable production by 2030. The programme began in 2013 and aims to create competitive production, jobs and growth in Sweden. Detailed information on Produktion2030 is available at www.produktion2030.se

This call will support a number of test and demonstration projects, with the main focus within one of the Produktion2030's six areas of strength:
i) Resource-efficient production, ii) Flexible production, iii) Virtual production, iv) Humans in the production system, v) Circular production systems and maintenance, and vi) Integrated product- and production development.

Project consortia are hereby invited to apply for grants to initiate and implement test and demonstration projects aimed at increasing digitalisation in industrial production.

Important Information Vinnova reserves the right to revise the description of the call for proposals at any time during the call's period and without specific notice. Changes will not occur during the last four weeks before the call's closing date.

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2 The Produktion2030 Strategic Innovation Programme

Sweden is an advanced manufacturing country and many Swedish companies have achieved a high level of IT maturity from an international perspective. As digitalisation increases, however, completely new opportunities emerge for radically changing manufacturing. Industrial robotic applications, additive manufacturing, mobile and digital operator tools and advanced process control systems are some examples of the technical level within Swedish manufacturing. Ongoing product, process and business development make many companies in Sweden competitive and world-leaders in their industries.

Produktion2030 is aimed at initiating a large number of different activities, everything from research, innovation, and demonstration projects and research and civil engineering programmes to increased mobility for individuals between industry and academia. The ability to collaborate and the strengthening of technical development in small- and medium-sized manufacturing companies are also priority areas for Produktion2030. For this reason, the dissemination of results to companies is important. Produktion2030 also includes efforts to increase international collaboration within production research and innovation.

2.1 Produktion2030's Areas of Strength

Production is a wide-ranging research and innovation field. It can include everything from design and material strategies to communication and IT tools, circular business systems and working situations. Produktion2030 is focused on six areas of strength with clear strategic importance for competitive production in Sweden. *The six areas of strength highlight important industrial challenges that require long-term solutions.*

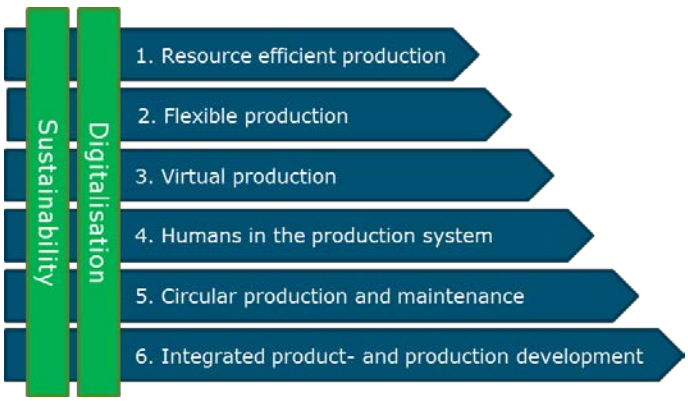

Image 1. Illustration of the areas of strength and overlapping themes in Produktion2030

A description of the programme's areas of strength and the challenges involved can be found in the research and innovation agenda ***Made in Sweden 2030***, which can be downloaded at www.produktion2030.se.
Within all six areas of strength, there are challenges and opportunities related to sustainable development and increased utilisation of the opportunities offered by digitalisation. This is why digitalisation and sustainability are both key themes throughout the programme.

3 Description of the Call for Proposals

3.1 The call's aim

The call aims to initiate and conduct test and demonstration projects in physical or digital production environments. Projects are to test and/or demonstrate effects of increased use of digitalisation in industrial production. Projects can include adapting of existing environments.

Test and demonstration projects are to be conducted within the framework of the call's schedule, a maximum of three years.

The long-term impact of test and demonstration projects is to strengthen the competitiveness of participating actors.

The proposed test and demonstration project is to focus on one of the programme's six areas of strength (see Chapter 4).

The budget for this call is SEK 48 million, and the maximum grant to approved projects is SEK 8 million, with a maximum project time of three years. The Call's Impact Goals

3.2 The call's impact goals

This call is to contribute to the following impact goals:
Increased digitalisation of industrial production through testing and/or demonstration of digitalisation's possibilities.

The results from approved projects are to contribute to the programme's overall objects: sustainability and competitive production in Sweden.

3.3 Who is this call for proposals intended for?

The call is aimed at companies, universities, university colleges and research institutes active in Sweden. Applicants are to have the ability and interest in collaborating to contribute to the effects, visions and goals for Produktion2030.

Formal requirements for participants in project consortia are described in Chapter 7.

3.4 The call's project types

This call is limited to: **Test and demonstration projects.** These are to be conducted in realistic production environments, such as laboratory, experimental and company environments, and are therefore to have a high degree of technical maturity. The industrial co-funding will, therefore, be higher than traditional research and innovation projects. As such, **at least 60 per cent co-funding is required as part of the project.** Projects normally focus on application of previous project results in realistic environments (equivalent to TRL 6-7[1]).

Consortia for test and demonstration projects can apply for grants of at most SEK 8 million and a project time of a maximum of three years.

A complete description of formal requirements is found in Chapter 7.

Projects are to clearly focus on one of Produktion2030's areas of strength (see below). The call's theme is industrial digitalisation. As such, project proposals are to clearly describe how the project's digitalisation goals are expected to contribute to increased competitiveness in manufacturing companies.

Produktion2030 is funding test-projects in existing testbeds, laboratories or demonstration environments. Produktion2030 can fund minor upgrades of existing testbeds to enable a test-projects.
Observe: Produktion2030 will not fund investments in novel test-beds.

4 Content and Implementation

The call's theme is digitalisation in industrial production. Development and implementation of digitalisation technology for the production area characterise a large percentage of the projects conducted so far within Produktion2030.

Within production, digitalisation can involve describing products, equipment, infrastructure and people in digital form through modelling, simulations, scanning and so on. The digital form allows analysis and optimisation of, for example, productivity, quality or flexibility without needing to create physical products or production systems. Decisions are supported by analysis of large amounts of data, machine learning, cloud-based analysis services and specialised forms of artificial intelligence.

Digitalisation in industrial production also involves connecting all the parts of a production system via the internet. New communication technologies, like 5G, allow for significantly improved broadband, communication speeds, data security and data privacy. These possibilities should be utilised by the manufacturing industry and allow customers and suppliers to integrate in digital value chains.

[1] TRL: https://en.wikipedia.org/wiki/Technology_readiness_level

Applications for a test and demonstration project are to focus on one of Produktion2030's six areas of strength. The areas of strength are described below, together with their current challenges.

4.1 Area of Strength 1 – Resource-efficient Production

The area: Resource efficiency in production is a prerequisite for industrial success in a country with high salary levels and material costs. Resources like materials, people, energy, capital and time must be used efficiently for production to be competitive. Increased resource efficiency in production requires a comprehensive perspective and impacts all life-cycle phases for products and production systems, i.e. the design phase, installation/commissioning phase, operation phase and maintenance phase.

Specific challenges and expected impacts: How to utilise industrial digitalisation's impact on resource efficiency among all production resources and in all life-cycle phases? How can digitalisation be utilised for data collection, analysis, decisions and follow-up? How to achieve measurable impacts, such as decreased resource use, quicker decision-making processes and better process adaptation?

4.2 Area of Strength 2 – Flexible Production

The area: Flexibility in production is a prerequisite for one-off production and customised, individualised products. Flexible production allows for differences in production volumes, variations, materials and material combinations. Flexibility generated through new and innovative production methods requires new types of machines, better understanding of process engineering and effective planning methods. This requires, in turn, modern toolboxes that include a wide collection of manufacturing methods and automation solutions.

Specific challenges and expected impacts: How can significant increases in the use of digitalisation increase production flexibility and the opportunities for individualised products? How does digitalisation allow, for example, for specialised artificial intelligence, machine learning and smart utilisation of large amounts of data in the manufacturing industry? Which measurable effects are created, for example, in the form of increases in flexibility, quicker retooling times or increased customer order control?

4.3 Area of Strength 3 – Virtual Production Development

The area: Virtual tools and models allow the next generation of complex products and production systems. Through digital modelling, data collection and scanning of products and factories, it is possible to create digital twins of actual machines and people. Virtual environments result in better decisions through

optimisation of complex data and development of smart production strategies and the opportunity to predict and control the course of events in the short term.

Specific challenges and expected impacts: How to effectively collect, analyse and convert large amounts of data on products and production systems into virtual and digitalised data for decision making and control? How can visualisation and optimisation of value chains utilise and increase access to data from sensors and connected systems? How can automated data collection improve decision making? How to create measurable effects, such as shorter lead times, better version management and better precision in planning?

4.4 Area of Strength 4 – Human-centred Production System

The area: The complexity of production requires that skilled people cooperate with robots, automated production systems and manufacturing processes to solve problems and continually develop production. Humans manage and monitor global value chains and networks. New, smart analysis tools, sensors, fast connections, large amounts of data and access to virtual models create new opportunities for people.

Specific challenges and expected impacts: How can digitalisation ease and make work more efficient in the future? How to utilise virtualisation, unlimited communication, sensor information, smart decision-support and collaboration between robots and advanced? How to manage personal safety, cognitive load, communication, interface and the division of assignments between humans and technical systems? What measurable impacts can be created, such as in the form of learning time, reduced cognitive load, quicker responses and more attractive work places?

4.5 Area of Strength 5 – Circular Production Systems and Maintenance

The area: Circular economy allows for production systems that manage product life cycles in new ways. Products must be able to be refurbished and recycled for increasing numbers of life cycles, such as through innovative maintenance and smart combinations of materials and components. Production systems are to also be recyclable for long periods through smart maintenance and utilisation of large amounts of operation data. Virtual models and digital twins can be utilised as the basis for services related to recycled products and production systems.

Specific challenges and expected impacts: How can extensive digitalisation, such as virtualisation and online connections be utilised to allow circular economy in the form of circular product flows, refurbishing, smart recycling of materials and smart maintenance? How can IIoT (Industrial Internet of Things), 5G communication and digital twins allow new, product- and production-integrated

services? How does smart maintenance based on large amounts of data and cloud-based analysis services create competitive and measurable value?

4.6 Area of Strength 6 – Integrated Product and Production Development

The area: The development of products and production systems must occur in parallel, integrated and among multiple actors at the same time to create speed and flexibility toward the market. Integrated product and production development can improve competitiveness using large amounts of collected data, new material models and advanced product and process models. The amount of software in products is increasing and creating new customer value. Digital twins of products and production systems and cloud-based analysis services create new opportunities.

Specific challenges and expected impacts: How can digitalisation (according to the definition above) be utilised for continued parallel and integrated product development for complete product life cycles? How do online connection and digital value chains contribute to model-driven development and smart product development tools? How can increased digitalisation of integrated product and production development lead to measurable effects, such as increased individualisation of products and shorter lead times?

5 Prerequisites for Financing

5.1 Guidelines for the current call for proposals

- The total budget for this call is SEK 48 million. Applications for test and demonstration projects can be for at most SEK 8 million.
- Funding is awarded for three-year projects.
- Vinnova’s contribution can at most total: 40 per cent of eligible costs for test and demonstration projects.
- The project’s budget is to specify implementation costs of the tests and demonstrations and costs for adapting test and demonstration environments.
- With approved projects, grants to universities, university colleges or research institutes may be financed up to 100 per cent.
- The submitted project budget should only include costs eligible for support (see 5.3). Project costs not eligible for support should be specified in the project description since they may impact the assessment.

5.2 Rules for state support and costs eligible for support

Grants from Vinnova to companies and other organisations that conduct commercial activities are awarded in accordance with the Regulation on State Aid

for Research and Development and Innovation (SFS 2015:208) and the EU Commission's Ordinance no. 651/2014.

Parties conducting commercial operations can be awarded grants for research and development projects in accordance with Chapter I and III, article 25, in the EU Commission's Ordinance no. 651/2014 (see http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:32014R0651&from=EN).

This call assumes project activities fall under one of the support criteria industrial research, experimental development and — for pilot studies — feasibility studies. For definitions, see Chapter I, article 2, items 85, 86 and 87 (page 25) in the above noted EU Ordinance.

Each project partner is responsible for ensuring that the received funding does not exceed the support level allowed according to the rules for state aid.

For ***the project as a whole,*** the specific details of the call for proposal (see Chapter 5.1) determine what percentage of the total eligible costs Vinnova's contribution can cover.

Individual project partners' eligible costs (the costs each project partner incurs for implementing the project) can be partly or fully covered by grants from Vinnova. What expenses are eligible depends on the nature of the project and its content and are specified in Vinnova's terms and in Chapter III, Article 25 of EU Commission Ordinance No. 651/2014.

The document **Guide till Vinnovas villkor om stödberättigande kostnader** (in Swedish only) (http://www.vinnova.se/sv/Ansoka-och-rapportera/Regler-och-villkor/) specifies which costs are viewed as eligible.

6 Timetable

The following dates apply for this call for proposals: Please note that the schedule may change. For the latest information, please visit the call for proposal's website.

Opening date:	9 December 2016
Application deadline:	31 March 2017, 2 PM
Date of decision:	10 May 2017
Date for project start:	15 May–15 June 2017
Deadline for project conclusion:	14 June 2020

7 Formal Requirements

Eligibility for assessment by Vinnova in accordance with the criteria stipulated in 8.2 depends on applications meeting the following requirements:

- The project may not have commenced prior to the application's submission.
- The project consortium is to consist of *at least three companies, at least one party from academia and at least one party from an institute.*

- The project partners must be legal entities.
- The coordinator for the project can be a company, university or research institute.
- The project must be able to start no later than 15 June 2017.
- Applications are to be complete, as described in Chapter 9.2. Deviating applications will not be considered.
- Project summary (see Chapter 9.2) is to be e-mailed to Produktion2030's programme management at: info@produktion2030.se

8 Assessment

8.1 Assessment Process

Applications will be assessed in competition with other submitted applications. Assessments will be based on the electronic applications submitted to Vinnova's eServices Portal (see Chapter 9). Applications are evaluated by a panel of independent Swedish and international experts.

The application and decision-making processes are as follows:

1. Application submitted via the eServices Portal.
2. The project summary is to be e-mailed to Produktion2030's programme management at: info@produktion2030.se
3. Applications that meet the formal requirements will be assessed by external, independent experts based on the following specific assessment criteria. This results in a ranking of the applications and a recommendation on funding.
4. The steering committee for Produktion2030 will have the opportunity to comment on the reviewers' recommendation.
5. Vinnova decides which projects will receive funding based on the funded projects' own contributions to the balance in the strategic innovation programme's project portfolio.
6. Decisions will be sent to applicants and the strategic innovation programme's management will be informed of the results.

The application is to **clearly meet** the criteria in the following chapter.

8.2 Assessment Criteria

A test and demonstration project is to have a clear focus on one of the six areas of strength, which is to be specified in the project application. The project is to also have a clear aim to increase utilisation of digitalisation in the manufacturing industry.

Applications for research and development projects are assessed based on three main criteria: 1) Potential, 2) Constellation of Actors and 3) Feasibility.

See the detailed description of the criteria below. The criteria have equal weight in the assessment.

		Criteria	Description
1. Potential	1.1	Industrial State-of-the-Art	To what degree does the project exceed current knowledge and technical levels? Does industrial application apply both nationally and internationally?
	1.2	The Call's Objectives	To what extent does the project contribute to the call's objectives and impact goals?
	1.3	Relevance for the Challenges within the Programme's Areas of Strength	To what extent will the project solve/address the call's identified challenges within the programme's areas of strength?
2. Actors	2.1	The Project Consortium's Composition and Expertise	To what extent do the project's collective competence and the identified project management match the established objectives for the project?
	2.2	Clear Resource Commitment and Role Assignments	To what extent do the project participants' defined commitments meet the project plan's resource needs? How well have the project participants' roles been described?
	2.3	Diversity	To what extent does the project consider the need for diversity in terms of gender and equality?
3. Feasibility	3.1	Collaboration	How well is the collaboration between the project parties described?
	3.2	Risk Analysis	How well are identified risks (from the risk analysis) considered?
	3.3	Realistic Plans and Choice of Methods	How realistic are the project's timetables and activity plans and how well are the project's measurable objectives described. How well is the choice of methods in the project justified?
	3.4	Plan for Utilisation and Dissemination of the Results	How well does the project application describe a plan for the application of the project's results, future commercialisation and the dissemination of results and their accessibility?

9 Applications

9.1 How to Apply

Applications are to be submitted electronically via the application service in Vinnova's eServices Portal. The application consists of a form and a number of annexes and can be accessed at www.vinnova.se. To be able to apply, you must create a Vinnova user account.

Existing Vinnova accounts may be used. Applicants must be authorised to apply on behalf of the applying organisation.

Note that applications must be submitted no later that 2 PM on the last day of the application period. After this time, the application submission system closes and it is no longer possible to submit applications to Vinnova. No supplements to the application may then be submitted unless Vinnova requests such. Remember that it can take time to fill in, upload and submit an application, particularly if many applications are being submitted. For this reason, make sure to begin filling in your application well ahead of the deadline. Note that it is possible to save changes and additions up until the time the application is sent.

9.2 Application Details

The application service consists of a number of electronic forms filled out by the applicant in the Vinnova eServices Portal portal.vinnova.se. The following three required documents must be attached to the application. Templates for these are available on Vinnova's website for this call for proposals www.Vinnova.se/produktion2030:

- Project Description
- Project Summary
- CV annex.

Annexes should be submitted as PDF files.

The project description is to be no longer than ten A4 pages (in portrait orientation), single column, 12-point font and black text. References to information on websites or similar sources will not be evaluated in determining whether to fund the project.

The project summary (at most one page) should be in such a form as to be able to be shared and published freely and, thus, may not contain any confidential or in other way sensitive information. When submitting the application to Vinnova, the annex Project Summary is to also be sent by e-mail to the Produktion2030 programme office at: info@produktion2030.se. Note that this step is also required for the application to be considered for assessment.

The CV annex should contain relevant CVs for the project manager and all key members of the project team. Each CV is to be no longer than one A4 page, written in 12-point font.

NB! The application and annexes must be written in English.

All of the above annexes are required and are to use templates provided in the call for proposals. Deviating applications will not be considered.

10 Terms and Conditions

Vinnova's general terms and conditions for grants, as applicable on the date of decision, apply to this call for proposals. The terms and conditions contain rules for reporting, project agreements, follow-up, auditing, conditions for payment and more. They can be found under the heading 'Terms and conditions' on the left-hand side of the call for proposal's web page.

Because this call for proposals is issued within the framework of the Produktion2030 strategic innovation programme, special terms, conditions and instructions governing reporting, follow-up, communication and so on in relation to the Produktion2030 strategic innovation programme also apply. Additional special terms and conditions may be added for specific projects.

Each project must include a consortium agreement signed by all parties that regulates intellectual property matters. This agreement should be finalised no more than two months after the project begins. Approved projects should be able to be shown to or presented to industry and research actors outside the project. Members of the project consortium are to participate in relevant conferences and information meetings (1-2/year) within Produktion2030. Approved projects should be able to be used in undergraduate education, continued education and graduate level education.

11 Confidentiality

Applications for this call for proposals are public information. As a rule, in accordance with the principle of public access to official records, the public has the right to access these documents. This also applies to applications that are rejected or withdrawn. Vinnova's decisions and the reasons for its decisions are also public information.

Received applications may be shared and transferred between Vinnova, the Swedish Energy Agency and Formas. However, these authorities are required to keep confidential all information about an individual's business and operating circumstances, inventions and research results if it can be assumed that the individual will suffer financial loss if the information is made public.

More detailed information about what confidentiality rules apply to applications can be found on the 'Sekretess vid ansökningar' page (in Swedish) (http://www.Vinnova.se/sv/Ansoka-och-rapportera/Hur-man-ansoker/Sekretess-vid-ansokningar).

12 Contact Persons

For questions about the content and focus of this call for proposal:

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