

# OVERCOME THE MANUFACTURING LABOR CRISIS WITH KNOWLEDGE CAPITALIZATION IN CNC MACHINING

Your Guide to Tackling Talent Shortages and Closing the Skills Gap in Your Workforce

# ADVANCED MANUFACTURING IS GRAPPLING WITH TALENT CRUNCH

The manufacturing and CNC machining industries are facing a talent crisis characterized by a shortage of skilled workers. According to a recent Deloitte report, the talent deficit is projected to persist with an estimated 2.1 million unfilled manufacturing jobs in the United States alone by 2030<sup>[1][2]</sup>. The same report pointed out that the U.S. Bureau of Labor Statistics reported more than 500,000 open manufacturing positions at any time during the previous six months. Meanwhile, in Europe, Industry 4.0 is rapidly revolutionizing manufacturing, demanding workforces with advanced skill sets. The skills gap in manufacturing is a significant contributor to this workforce shortage.

Globally, this has already led to 10 million manufacturing jobs worldwide remaining unfilled, affecting the industry's ability to meet demand and grow efficiently<sup>[3]</sup>.

## THE SKILLS GAP MAY LEAVE AN ESTIMATED 2.4 MILLION POSITIONS UNFILLED BETWEEN 2018 AND 2028

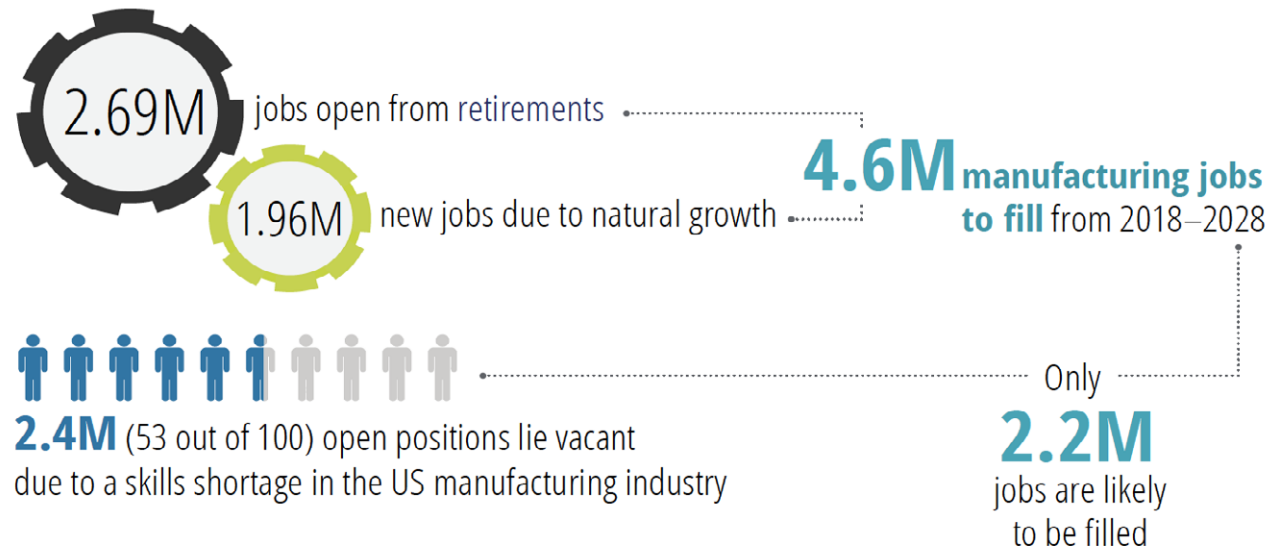


Image Courtesy Deloitte Consulting and the Manufacturing Institute

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SEVERAL FACTORS CONTRIBUTE TO THE LABOR FORCE SHORTAGE

SKILLED LABOR SHORTAGES IN THE NC AND CNC MACHINING SECTORS

How Machine Shops and the Industry Can Overcome This

How Knowledge Management Helps Solve Labor Problems

NC KNOWLEDGE MANAGER (NPX)



# SEVERAL FACTORS CONTRIBUTE TO THE LABOR FORCE SHORTAGE

Exponential industrial demand, rising geo-political tensions, post-COVID losses, and an education gap are some of the factors that contribute to the current and lasting labor force shortages.

## 1 High Industrial Demand

As of Sep 2023, there is a shortage of over 600,000 stable manufacturing jobs, reflecting increased industrial demand<sup>[4]</sup>.

## 2 Post-COVID Losses

About 1.4 million manufacturing jobs were lost during the COVID-19 pandemic, exacerbating the pre-existing labor crisis<sup>[5]</sup>.

## 3 Supply Chain Disruptions

Rising gas prices and increased costs of supplies contribute to the shortage, exacerbated by ongoing global conflicts affecting the supply chain<sup>[6]</sup>.

## 4 Educational Gap

The education system is not adequately preparing individuals for manufacturing jobs, contributing to a substantial skills gap<sup>[7]</sup>.



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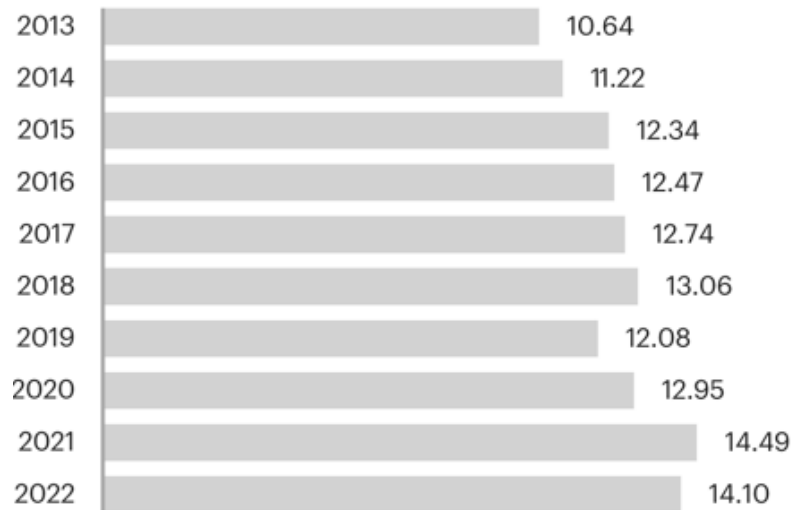
## Manufacturing Reshoring On the Rise

Kearney's most recent Annual Reshoring Index Report indicates the remarkable success of reshoring initiatives. Companies, previously adopting a cautious stance in establishing manufacturing operations, are now actively seeking facilities in Mexico and the United States. The report also highlighted that the process of reshoring is more challenging than anticipated, emphasizing the need for comprehensive preparation and strategic planning to navigate the complexities involved in this transformative process<sup>[3]</sup>.

### US GROSS DOMESTIC MANUFACTURING OUTPUT ROSE AT A FASTER PACE THAN THE US MANUFACTURING IMPORTS FROM 14 ASIAN LOW-COST COUNTRIES AND REGIONS, RESULTING IN A POSITIVE SCORE ON A RESHORING INDEX

#### US manufacturing import ratio (MIR)

MIR = total manufactured goods imported as % of domestic output



Sources: United States International Trade Commission, Bureau of Economic Analysis; Kearney analysis

#### Year-over-year change in the US MIR (Basis points, 2013–2022)

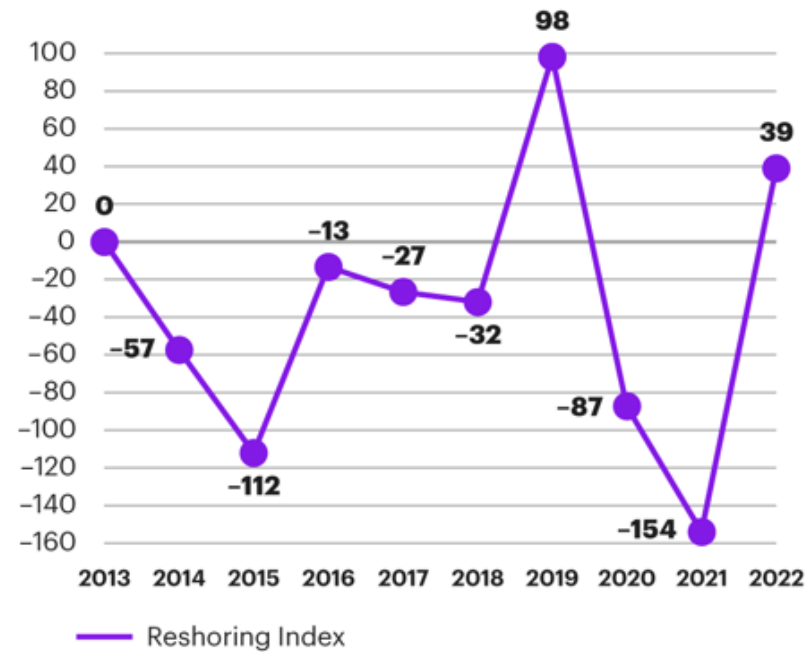


Figure 1: Image Courtesy [Kearney US Reshoring Index](#)

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## SKILLED LABOR SHORTAGES IN THE NC AND CNC MACHINING SECTORS

The CNC machining sector is particularly affected by the skills gap, with a shortage of manpower to fill various roles. This gap hinders the production of precision parts and components. Operating and programming CNC machines require skilled labor, and in certain regions, this expertise is in short supply. Over 92% of manufacturing decision-makers are actively hiring machine operators<sup>[9]</sup>.

Some of the needed knowledge and skills require specialized training and work experience, such as the ability to use CAD software (Computer-Aided Design), CAM software (Computer-Aided Manufacturing), and create machining programs, to name a few. Machining programming is another specialized skill in the value chain. The scarcity of qualified professionals has made it challenging for manufacturers to meet their production demands and adapt to new technologies<sup>[10]</sup>.

# How Machine Shops and the Industry Can Overcome This

Manufacturing businesses are continuing to explore solutions to this problem. Generally, these solutions fall into one of the following categories.

1

## Competitive Compensation

Offer competitive wages and benefits to attract skilled machinists. This can include increased rates and performance-based incentives<sup>[11]</sup>.

2

## Improved Work-Life Balance

Enhance the work environment by promoting work-life balance. Providing flexible schedules and reasonable workloads can make your company more attractive to potential employees<sup>[12]</sup>.

3

## Education Partnerships

Partner with educational institutions to create awareness of CNC machining careers. This can help bridge the skills gap by nurturing future talent<sup>[13]</sup>.

4

## Repairing Perception

Address misconceptions about manufacturing and CNC machining careers. Promote the industry's technological advancements and opportunities for career growth<sup>[14]</sup>.

5

## Diversity and Inclusions

Focus on diversity in your hiring practices. Broaden the talent pipeline by actively recruiting individuals from diverse backgrounds, genders, and age groups<sup>[15]</sup>.



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These long-term endeavors take time to produce tangible results. However, businesses often need immediate solutions to alleviate the bottleneck brought about by a talent drought. For example, if a veteran machining programmer retires without replacement talents to fully fill the skills gap, the business is suddenly facing potentially serious production issues.

# How Knowledge Management Helps Solve Labor Problems

What if veteran machining programmers could store their expert knowledge into standardized programs that can be accessed, replicated, or tweaked by the broader team? In the world of digital product design and programming, the ability to capture what experts know and use already and use it for your work can be a game changer. Being able to reuse information and make changes to multiple elements can dramatically boost productivity.



**Define Machining Operations**

**Increase Productivity for NC Programmers Through Automation**



**Create Personalized Activities**



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## Define Machining Operations

NC experts can define machining operations for specific features on a given part with all details, including tool paths, cutting tools, macros, and more, which can then be stored for reuse. Once saved as manufacturing cells on the platform, they can then be revised and lifecycle controlled based on any changes that may be required.

This capability is not restricted to standard CAD features. Users can define any machinable geometry on a given part and identify that feature as a template. For instance, power features coming from engineering can be templated for machining. This helps reduce programming time, increases the quality of the machined part, mitigates user errors, and shortens the time required to program a quality part.



## Increase Productivity for NC Programmers Through Automation

Once the NC experts have their know-how organized, they can share these setups through the platform for reuse by NC programmers. An NC expert knows what type of toolpath, parameters, cutting conditions, and macros are needed for specific feature materials or a given geometry to the machine (such as pocket or stiffener). Once these different pieces of knowledge are saved and shared through the platform (thanks to a new “Machining Cell Know-How”), NC programmers can capitalize on it by searching for the right knowledge, applying it to their current process, and computing it to complete the toolpath.

The end goal is that NC programmers will have a database of the company’s various best practices. This reduces potential errors for NC programmers and significantly improves their productivity.



## Create Personalized Activities

NC experts can customize all operation panels, being able to set the visibility, sensitivity, default parameter values, and strategy tab management like an administrator.

These customized operations are saved and shared through the platform in the Machining Cell to all NC programmers, granting direct access to the customized operations in their workbench like any default operation.



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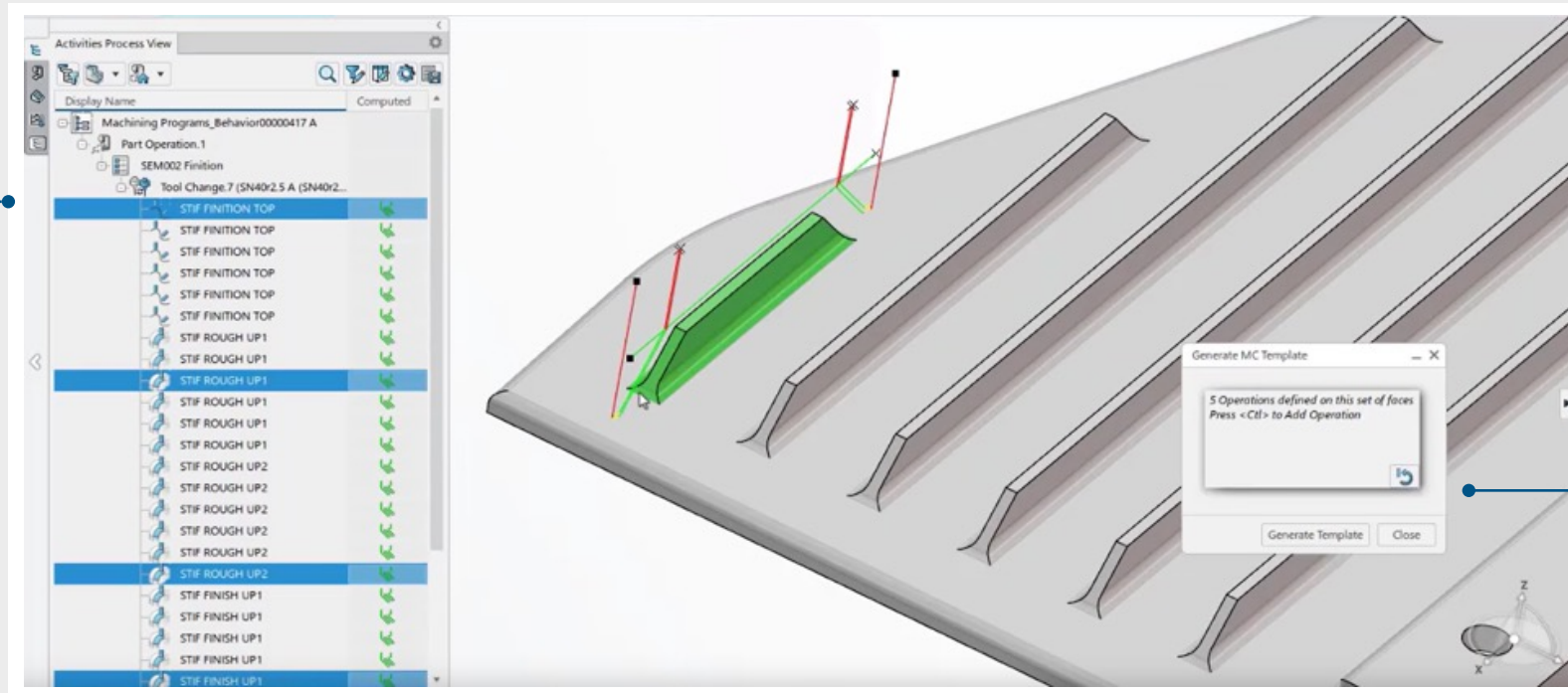


# NC KNOWLEDGE MANAGER (NPX)

Meet NC Knowledge Manager (NPX), a powerful role under Machining portfolio created by DELMIA, a Dassault Systèmes brand.

## Automatic Know-How Capitalization

NPX provides the ability to automatically generate Know-How of machining operations defined on features, saving them on the platform for reuse by other users.



## Standardization and Reusable Best Practices

NPX enables the standardization of machining operations. This reduces the time spent defining details on an operation, as well as maintaining the quality and repeatability of a toolpath's good and tested parameters.

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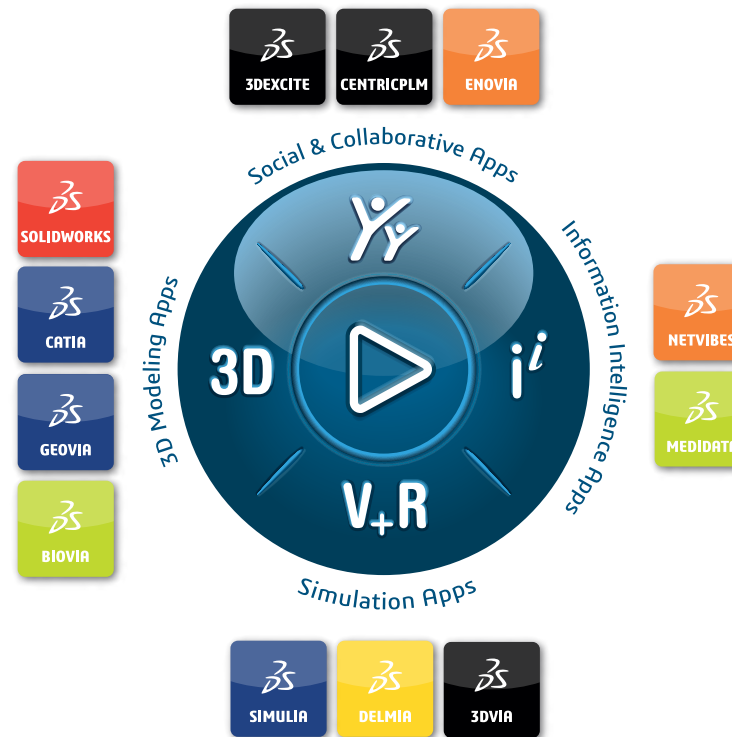
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