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Proposal for automation and its digitization for the selected manufacturing company

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Keywords: automation, digitization, material flow.

Abstract: This article examines a selected manufacturing company, where an analysis of the current production layout was conducted. The primary objective of this study was to propose an automation solution to enhance the efficiency of the production process. The proposed automation system incorporates handling robots and roller conveyors to streamline material transportation from the warehouse to the production area. The implementation of this system aims to eliminate production downtime and ensure a continuous and efficient workflow. Article outlines the purpose of automation implementation, along with the necessary investment requirements. Additionally, the study provides a comprehensive evaluation of the proposed solution, highlighting both the advantages and potential challenges of automation.

1 Introduction

In today's manufacturing industry, there is a growing demand for increased efficiency, faster production processes, and the reduction of downtime. Automation and digitization have become key factors in ensuring competitiveness and optimizing workflow. This article presents a proposal for an automated system in a selected manufacturing company, focusing on improving material flow within the production process.

Currently, material is transported manually using workers and transport carts, which slows down production and leads to unnecessary delays. The proposed solution involves implementing conveyor belts and an automated control system at each workstation. Workers will be able to request specific semi-finished materials from the storage facility through a digital system. The warehouse will be organized into shelves based on different material types, such as bar stock, sheet metal, and other semi-finished products. A robotic system will process the request and transport the required materials using a roller conveyor to the designated production department, where workers will receive them.

The primary objective of this automation is to accelerate material flow and reduce inefficiencies in production. Initially, the company was unsure about the investment required for automation and was mainly interested in understanding how it would improve material flow. After evaluating the potential benefits, the company determined a feasible investment amount. This article focuses on the 3D visualization of material transport within the production process as part of the proposed automation strategy.

2 Analysis of the current state of the halls and machines

The current state of the production layout was initially illustrated using Microsoft Visio. This software is designed for creating various diagrams, including floor plans. In this software, it is possible to create flowcharts, organizational charts, building plans, floor plans, data flow diagrams, process flow diagrams, business process modeling, swimlane diagrams, 3D maps, and many others. Microsoft Visio can be used to create both simple and complex diagrams. It offers a wide range of built-in shapes, objects, and templates that we can work with. Within this program, we created a floor layout of the plant with machines and also provided precise dimensions [1].

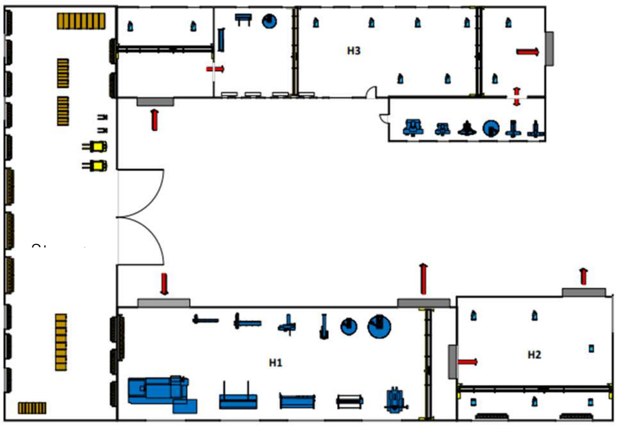

Figure 1 Hall layout

Using the Factory Design program, we created a 3D model of the enterprise where we will be implementing automation. The halls are represented with 3D models of machines. We illustrated the halls in this way to have a better visualization before implementing automation.

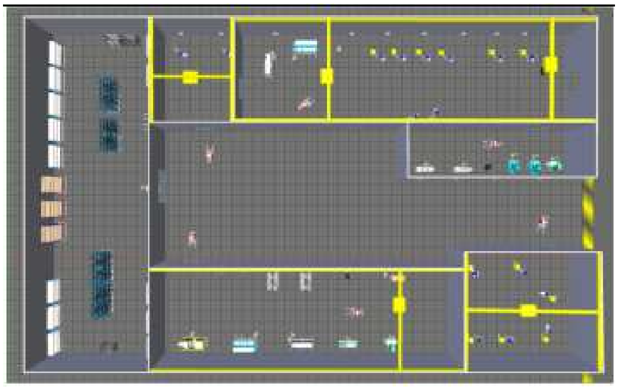

Figure 2 3D visual view from above of the current state

In the company where we have decided to implement production automation, there is a slow flow of production materials and semi-finished products into production. This causes downtime at the workplaces, and there is always a wait for the materials to arrive at the specific production department. Labor and various types of transport carts are required for the transportation of materials through production. In this enterprise, we have decided to automate production by introducing handling robots and roller conveyors that lead from the warehouse to both halls. The material from the warehouse will be placed on the conveyor by the robots and subsequently sent to the specific production department. The goal of this automation is to prevent downtime in production and ensure its smooth operation [2].

The purpose of implementing this automation was primarily to prevent production downtimes that occurred due to the slow flow of materials into production. Currently, materials are being moved at the workplace using manual labor and transport carts.

The automation of production will proceed in such a way that each workstation will have a control center where workers will enter requests into the warehouse for the semi-finished products needed at that specific production workstation. In the warehouse, shelves will be divided according to specific types of materials, for example, there will be a shelf for bar materials, a shelf for sheet materials, and various other semi-finished products. The robot will receive the information entered into the warehouse and will use a roller conveyor to send the specified materials and semi-finished products to the specific production department, where workers will collect them.

In this implementation of automation, our primary goal is to accelerate the material flow. At the beginning, the company was unsure of how much it wanted to invest in this automation; it primarily wanted to see how the material flow into production would be addressed and whether it would benefit their business. Subsequently, it indicated how much it was willing to invest in it. Therefore, in this work, we focused on the 3D visualization of the material transfer to production [3].

3 Proposed automation and digitization solution

To enhance efficiency and eliminate production downtime, the proposed automation and digitization solution focuses on optimizing material handling within the selected manufacturing company. The current manual transportation of materials using workers and transport carts slows down production and introduces inefficiencies. The new system aims to streamline this process by implementing handling robots, roller conveyors, and a digital request system that automates material flow from the warehouse to production stations [4].

Implementation of Handling Robots and Roller Conveyors

The proposed automation will introduce handling robots that will be responsible for picking and placing materials, reducing the need for manual labor in material transport. These robots will operate in the warehouse, retrieving materials from designated shelves and placing them onto roller conveyors, which will then deliver them to specific production workstations. This approach will ensure a continuous flow of materials and eliminate delays caused by manual handling [6].

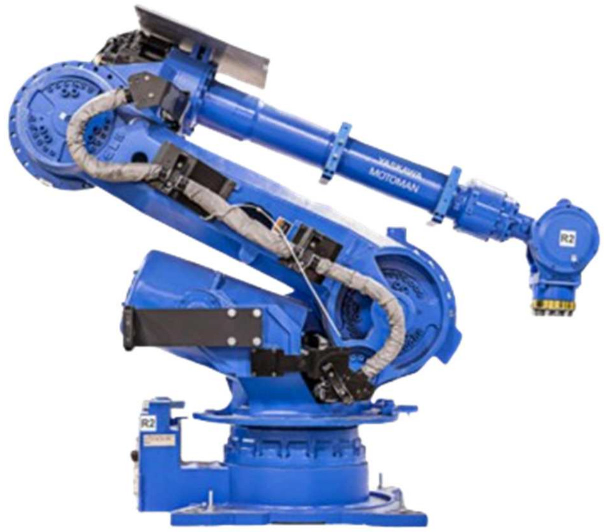

Figure 3 Proposed manipulation Robot Motoman ES165D-100 [5]

The picture above shows a 3D representation of a manipulative robot that can grab materials from the shelves and subsequently sends it via a roller conveyor to the designated production department [6].

Digital Request System for Material Handling

Each workstation will be equipped with a digital request system, allowing workers to input the type and quantity of materials needed. The request will be processed by the central control system, which will then instruct the warehouse robots to retrieve and transport the required materials. The warehouse will be structured with categorized storage racks, such as sections for bar stock, sheet metal, and other semi-finished products, enabling efficient material selection and retrieval [7].

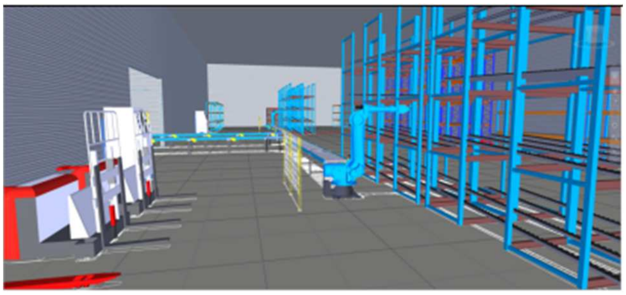

Figure 4 Warehouse robot retrieving required materials

Integration with the Existing Production System

To ensure seamless operation, the automation system will be integrated with the company's existing production management software. This integration will enable real-time tracking of material movement, inventory updates, and predictive restocking, ensuring that materials are always available when needed. The system will also generate analytical data to further optimize the production workflow over time [8].

Expected Outcomes

The implementation of automation and digitization in material handling is expected to bring several benefits, including [8]:

- faster material flow, reducing production delays
- minimized manual labor, allowing workers to focus on core production tasks
- reduced material handling errors, ensuring accuracy in production
- improved inventory management, preventing material shortages and overstocking
- enhanced production efficiency, leading to increased overall productivity

4 Investment and implementation strategy

In the company are two employees designated for loading, unloading, and transporting materials and semi-finished products. The average salary of these workers is 900 euros per month. The company employs two additional employees who assist in transportation and loading. The average salary of these employees is 700 euros per month. Approximately 400 euros are spent monthly on diesel for the transport vehicles.

If we were to implement automation in the company, where these four employees would no longer be necessary and no funds would be spent on transport carts, approximately 3,600 euros would be saved monthly. Annually, this amounts to 43,200 euros.

According to the company's internal analyses, estimated downtimes due to low material flow efficiency in production exceed 10% annually. This efficiency, in terms of employee time utilization, is primarily related to wages and personnel costs. The company's financial statement from 2019 indicates that personnel costs amounted to 189,572 euros. Considering the 10% time losses, this inefficiency costs the company 18,957 euros annually.

The absence of automation in the company results in estimated annual losses of 62,157 euros. The company clarified that roller conveyors could also be manufactured in-house, as they have previously engaged in the production of similar conveyors. This implies that the introduction of conveyors would be somewhat less expensive for the company.

Table 1 The cost of making 1-meter of conveyor

Production of a 1-meter conveyor	Cost
Material for 1-meter of conveyor	160€
Components	90€
Work	150€
Other costs (energy, overhead costs)	30€
Total	430€

The construction of 1 meter of a roller conveyor would cost €430. Since we need to produce 200 meters of conveyor, the total amount would be €86,000. To this amount, it is necessary to add the technology required for driving the conveyor, which would cost approximately €25,000. Therefore, if the conveyor were manufactured in the given company, its production would cost approximately €111,000.

As mentioned above, the Motoman ES165D-100 (*Figure 3*) is an advanced robot focused on machine operation and material handling with a payload of 100 kg and a reach of 3010 mm. The Motoman ES165D-100 is equipped with the DX100 controller. New industrial robotics with components range from 40,000 to 65,000 euros. After adding application-specific peripherals for production, the robotic system costs between 83,000 and 125,000 euros. The purchase of such a robot would cost up to 100,000 euros, including the relevant components. The company would be willing to invest 200,000 euros in automation. The implementation of automation would overall cost approximately 211,000 euros.

The implementation of this automation has more positive aspects than negative ones. The main intention was to accelerate the material flow, which has been achieved with the introduction of this automation, and the investments made by the company are more or less in line with the approximate costs required for this automation. Since the company would save 62,157 euros annually with the implementation of this automation, the amount of the implemented automation, which is approximately 211,000 euros, is acceptable for the company. Additionally, the payback period is very favorable for the company.

5 Conclusion

The primary objective of this study was to implement automation to enhance the efficiency of the production process, with a particular focus on optimizing material flow. The proposed automation strategy, outlined in the third section of this study, involved the optimization of intra-facility material transport through the implementation of roller conveyors, significantly improving inter-operational logistics and reducing production delays.

A detailed financial assessment was conducted to evaluate the economic feasibility of this automation initiative. The total investment required for the acquisition of inter-operational transport systems amounted to €211,000, while the projected annual cost savings resulting from automation were estimated at €62,157. Based on this analysis, the payback period for the investment is approximately three years and four months, which is considered highly favorable for the company.

Beyond financial savings, the introduction of automation also led to a reduction in labor requirements for material handling and eliminated production downtime caused by delays in the delivery of raw materials and semi-finished products. By streamlining material flow and ensuring direct delivery to designated workstations, the proposed solution enhances overall production efficiency and minimizes operational disruptions.

The findings of this study indicate that the proposed automation strategy offers substantial benefits to the company, both in terms of economic return and operational effectiveness.

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References

[1] BUDA, J., KOVAČ, M.: *Projektovanie a prevádzka robotizovaných systémov*, Bratislava, ALFA, 1990. (Original in Slovak)
[2] DEMEČ, P.: *Automatizácia výrobných strojov*, Košice, Elfa s.r.o., 2007. (Original in Slovak)
[3] VELIŠEK, K., KOŠTAL, P.: *Mechanizácia a automatizácia*, Bratislava, Slovenská technická univerzita v Bratislave, 2007. (Original in Slovak)
[4] POPPEOVA, V., ČUBOŇOVA, N., URIČEK, J., KUMIČAKOVA, D.: *Automatizácia strojárskej výroby*, Žilina, EDIS, 2002. (Original in Slovak)
[5] Robot.com, „Robot.com," Robot Worx, [Online], Available: https://www.robots.com/robots/es165d100 [08 Sep 2025], 2025.
[6] VALENCIK, Š., POLAK, S.: *Automatizácia výrobných procesov*, Košice Rektorát Vysokej školy technickej, 1989. (Original in Slovak)
[7] ELANGOVAN, U.: *Smart Automation to Smart Manufacturing: Industrial Internet of Things*, Momentum Press, 2019.
[8] BOCK, T.: *Robotic Industrialization: Automation and Robotic Technologies for Customized Component, Module, and Building Prefabrication*, Cambridge University Press, 2015.
[9] GOLIAŠOVA, O.: *Návrh automatizácie výroby vo vybranom výrobnom podniku*, Košice, 2021. (Original in Slovak)

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Estimation of cumulative distribution for noncentral distributions

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Keywords: noncentral, cumulative distribution function, hypothesis testing, Type II error, Power of t-test.

Abstract: Noncentral distributions are probability distributions that are used to model a random variable where a noncentrality parameter determines the location of this distribution. These distributions are used in statistics, especially in hypothesis testing to compute the power of a test. The manuscript aims to compute cumulative distribution for noncentral t distribution using built-in functions in Microsoft Excel. The results obtained were found to be comparable to reported values.

1 Introduction

The noncentral *t* distribution has two parameters, namely υ (degrees of freedom) and δ (noncentrality parameter), that exhibits a unimodal density. When the value of δ is zero, the distribution becomes Student's *t* distribution. Degrees of freedom is usually a positive integer, but when calculated using the Welch or Satterthwaite equation [1] it can be any positive value (1). If *X* and *Y* are independent random variables such that *X* is normally distributed N(δ,1) and *Y* follows χ^2 distribution with υ degrees of freedom, then the ratio follows a noncentral *t* distribution with δ as the noncentrality parameter having υ degrees of freedom.

$$\frac{X}{\sqrt{Y/\upsilon}} \tag{1}$$

The most important application of the noncentral *t* distribution is to compute of power of the *t* test [2]. Power of a *t*-test is probability that a *t*-test will correctly reject a false null hypothesis with mean of a normal population $N(\mu, \sigma^2)$. The test of the null hypothesis is H_0: $\mu \le \mu_0$ against the alternative H_A: $\mu > \mu_0$ based on a sample from this normal population, where the population mean μ is greater than μ_0 [3]. The noncentrality parameter is the normalized difference between μ_0 and μ [4] (2).

$$\delta = \frac{(\mu_0 - \mu)}{\left(\sigma/\sqrt{n}\right)} \tag{2}$$

The existing algorithms to compute the cumulative distribution function (cdf) involve different expansion and or recurrence [5]. The manuscript aims to use Microsoft Excel to compute cdf by using normal and chi-square distributions. This is achieved by generating random variates from the noncentral *t* distribution of specified δ and υ values as a ratio normal distribution of specified mean which, corresponds to υ and a standard deviation of 1 and a chi-square distribution with degrees of freedom corresponding to δ. Simulation using the data table function in Microsoft Excel was performed to obtain a more precise estimate of the cdf.

2 Methodology

2.1 Visualize noncentral distribution

To visualize noncentral *t* distribution random variates from the noncentral *t* distribution as described [6], the random variates were generated using built-in function in Microsoft Excel. To generate a noncentral *t* distribution with 6 degrees of freedom and a noncentrality parameter of 4, 10000 normal random numbers of mean 4 and standard deviation 1 and chi-square random numbers with 6 degrees of freedom obtained using NORM.INV and CHISQ.INV functions respectively. Then the by using Equation 1, noncentral *t* distribution random variates were obtained. A plot of the histogram of these values as shown in Figure 1 represents the density estimate of a noncentral *t* distribution with 6 degrees of freedom and a noncentrality parameter value of 4.

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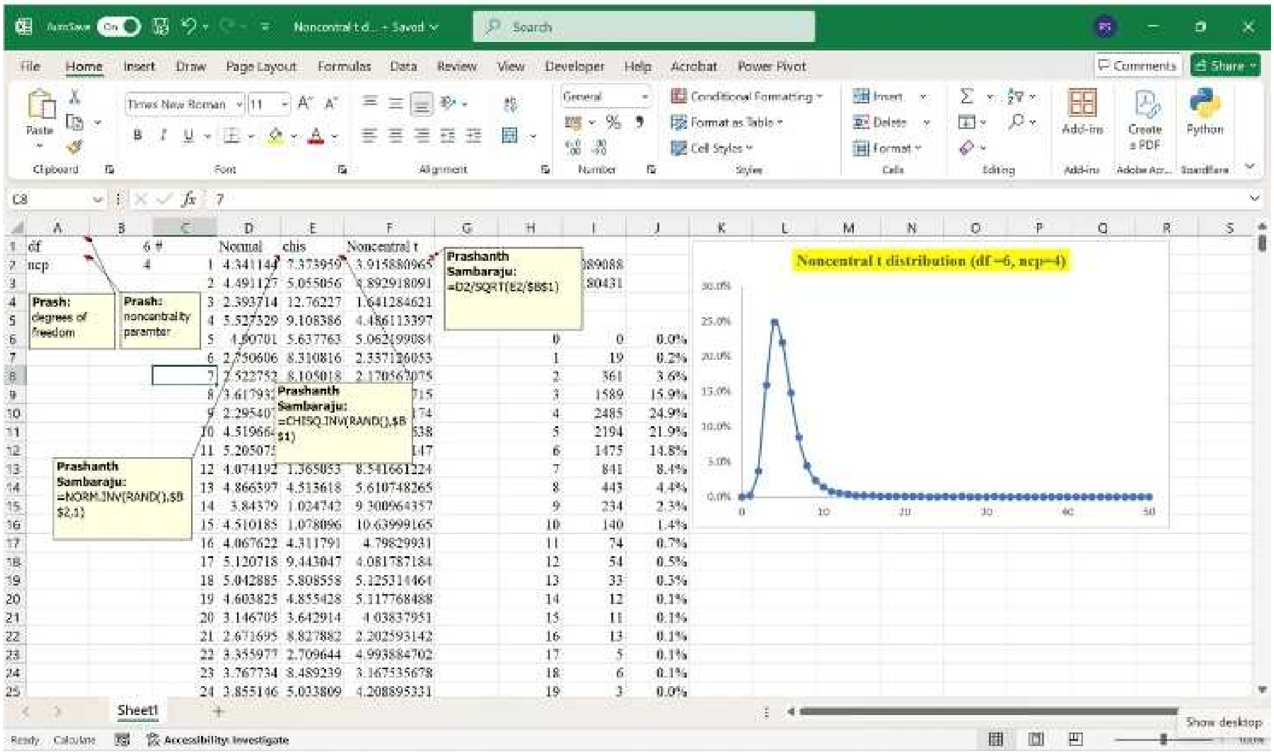

Figure 1 Computation of random variates of noncentral t distribution using Microsoft Excel. Histogram shown corresponds to noncentral t distribution density with 6 degrees of freedom and a noncentrality parameter value of 4

2.2 *Power of t test*

Power was determined for one sample *t* test using the data described here [7]. Simulation was performed using Table **1**. The Data Table can perform calculations at once without the need for any programming code. An introduction to the application of Data Table can be found here [9]. Power calculation for one sample *t* test using the Data Table function in Microsoft Excel [8]. The results are shown in

noncentral *t* distribution density plot is shown in Figure 2. Two sample t tests can be divided into two categories as shown in Figure 3.

Table 1 One sample t test power calculation

μ_0	850
μ	810
σ	50
N	19
δ	= (850-810)/(50/√19) = 3.487119
α	5%
degrees of freedom	= 19 – 1 = 18
critical *t* (Formula in Microsoft Excel)	= T.INV(1-5%/2,18) = 2.100922
Power [7]	0.909207
Power obtained from this method	0.909226 (after 2000 simulations)

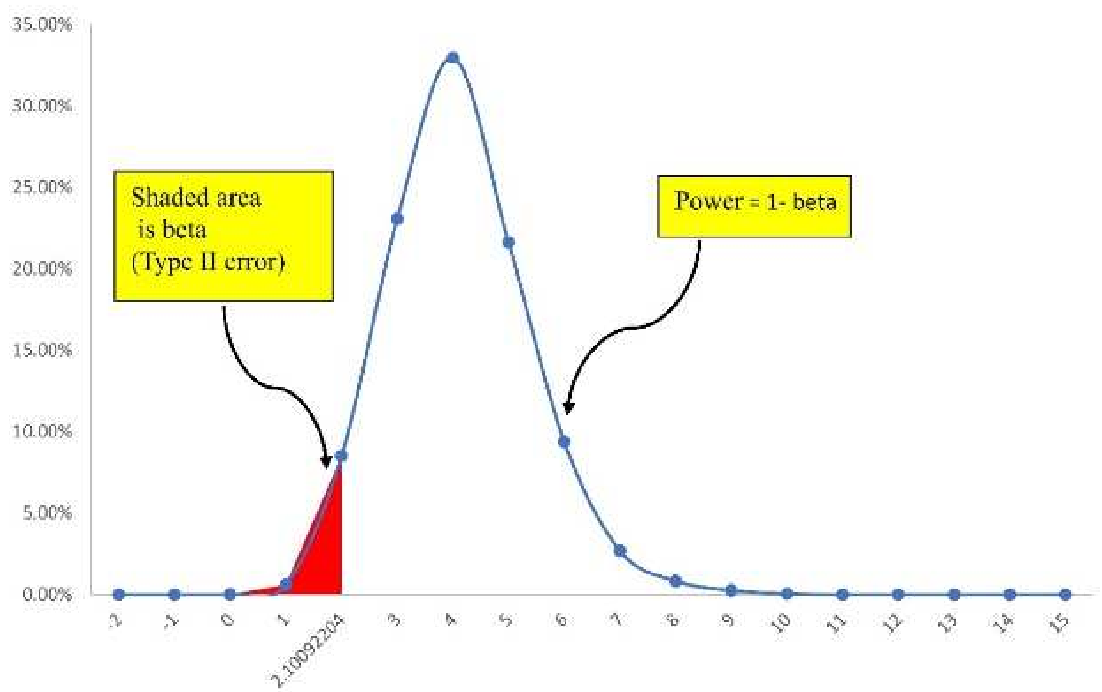

Figure 2 Power calculation using Microsoft Excel for example described [7]

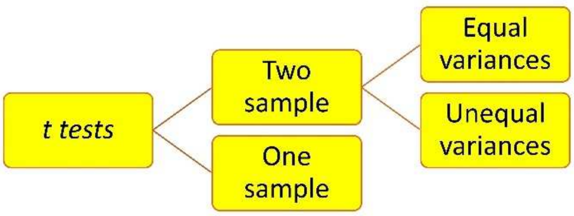

Figure 3 Different types of t tests

In case of one sample *t* tests and two sample *t* tests with equal variances, the degrees of freedom is always a positive integer. The noncentrality parameter for two sample *t* test with equal variances in given by (3)

$$\delta = \frac{(\mu_1 - \mu_2)}{\left(\sigma * \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}\right)} \quad (3)$$

where (4)

$$\sigma = \sqrt{\frac{(n_1 - 1) * s_1^2 + (n_2 - 1) * s_2^2}{(n_1 + n_2 - 2)}} \quad (4)$$

σ is the pooled standard deviation
s_1 is the standard deviation for the first sample
s_2 is the standard deviation for the second sample
n_1 and n_2 are the sample size for first and second sample respectively.
and the degrees of freedom is given by [10] (5)

$$degress\ of\ freedom = n_1 + n_2 - 2 \quad (5)$$

For two sample *t* tests with unequal variances, the degrees of freedom can be approximated by Satterthwaite formula [1], which might result in fractional degrees of freedom (6).

$$v = \frac{\left(\frac{S_1{}^2}{N_1} + \frac{S_2{}^2}{N_2}\right)^2}{\frac{\left(\frac{S_1{}^2}{N_1}\right)^2}{N_1 - 1} + \frac{\left(\frac{S_2{}^2}{N_2}\right)^2}{N_2 - 1}} \quad (6)$$

where,
S_1 is the standard deviation for the first sample
S_2 is the standard deviation for the second sample
N_1 and N_2 are the sample size for first and second samples respectively.

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The noncentrality parameter is given by (7)

$$\delta = \frac{(\mu_1 - \mu_2)}{\left(\sqrt{\frac{S_1}{N_1} + \frac{S_2}{N_2}}\right)} \qquad (6)$$

where,
μ_1 *and* μ_2 are the means for first and second sample respectively [11]. The main limitation of using Microsoft Excel for power estimation for two sample *t* tests with unequal variances using the method described here is that there is no built-in function which can calculate *t*-value with fractional degrees of freedom.

3 Results and discussion

The accuracy method described here was determined by comparing it with the cdf for reported values [12], and the results are shown in Table 2. Figure 4 shows the combination plot of cdf and the noncentral *t* distribution.

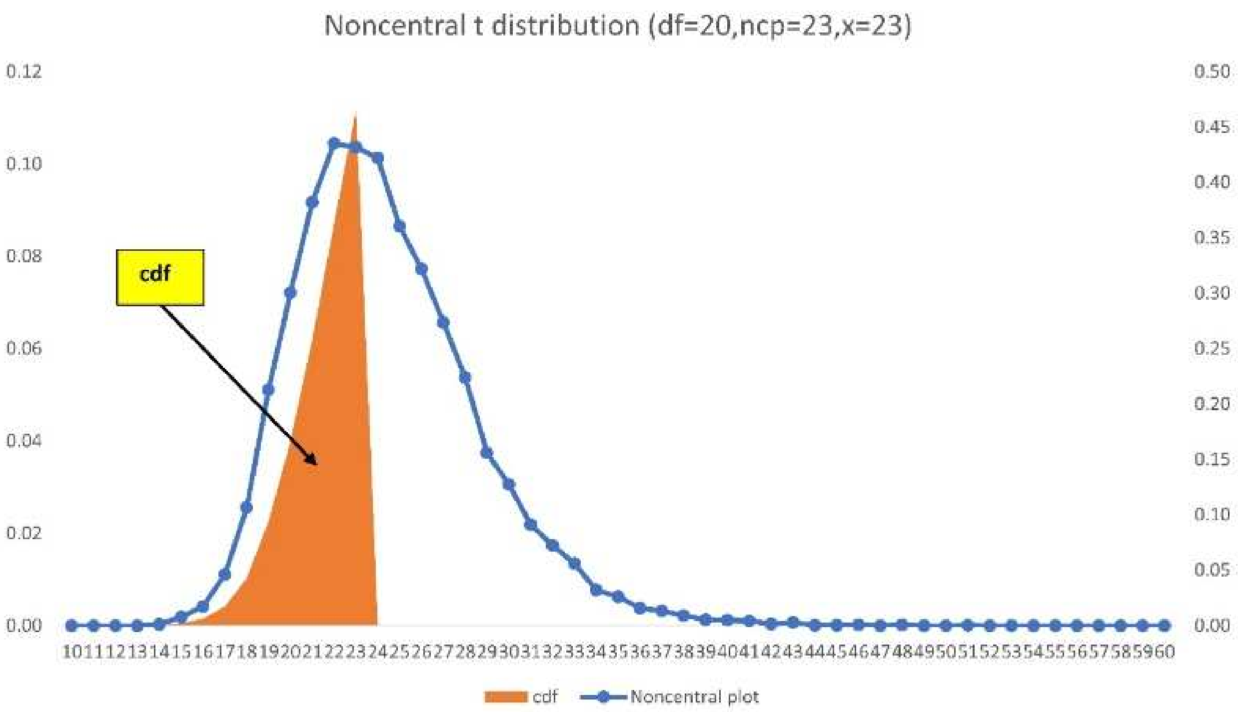

Figure 4 Plot showing cdf computed at 23 for a noncentral t distribution with 20 degrees of freedom, and a noncentrality parameter value of 23

*Table 2 Comparison of reported cdf values vs obtained from the method described in the manuscript. x corresponds to the value at which cdf is computed (*1000 simulations)*

X	ν	δ	Reported [12]	Obtained*
2.34	3	1	0.801888999613917	0.8020529
-4.33	126	-2	1.252846196792878d-2	0.0125672
23	20	23	0.460134400391924	0.4601409
34	20	33	0.532008386378725	0.5319548
39	12	38	0.495868184917805	0.4958221
39	12	39	0.446304024668836	0.4462393
39	200	38	0.666194209961795	0.6664283
40	200	42	0.179292265426085	0.1793178

4 Conclusions

The existing algorithms used to compute cdf are complicated and most users use black box approach to compute cdf using statistical software. The method described in manuscript provides a way of computing cdf which is conceptually easy to understand and can be readily implemented using and any spreadsheet program like Microsoft Excel without the need for any complicated code. This method can also be extended to compute cdf of noncentral χ^2 distribution and noncentral *F* distribution.

References

[1] HARRISON, D.A., BRADY, A.R.: Sample Size and Power Calculations using the Noncentral t-distribution, *The Stata Journal*, Vol. 4, No. 2, pp. 142-153, 2004. https://doi.org/10.1177/1536867x0400400205

[2] RUST, P.F.: *Noncentral t Distribution*, *Encyclopedia of Biostatistics*, Wiley, 2005. https://doi.org/10.1002/0470011815.b2a15097

[3] WITKOVSKY, V.: A Note on Computing Extreme Tail Probabilities of the Noncentral T Distribution with Large Noncentrality Parameter, *Acta Univ. Palacki. Olomuc., Fac. rer. nat., Mathematica*, Vol. 52, No. 2, pp. 131-143, 2013.

[4] Matlab Help Center Noncentral t distribution, [Online], Available: https://www.mathworks.com/help/stats/noncentral-t-distribution.html [03 Sep 2025], 2025.

[5] LIU, X.S.: A Unified Way to Represent and Compute the Cumulative Distribution Function for Noncentral t , F , and χ^2, *Communications in Statistics - Simulation and Computation*, Vol. 42, No. 6, pp. 1433-1436, 2013. https://doi.org/10.1080/03610918.2012.664230

[6] The noncentral t distribution in SAS, [Online], Available: https://blogs.sas.com/content/iml/2022/09/21/noncentral-t.html#:~:text=When%20%CE%B4%20%3E%200%2C%20the%20noncentral,%2C%20CDF%2C%20and%20QUANTILE%20functions [03 Sep 2025], 2022.

[7] UCLA Advanced Research Computing Power analysis for one-sample t-test, [Online], Available: https://stats.oarc.ucla.edu/other/gpower/power-analysis-for-one-sample-t-test/ [03 Sep 2025], 2024.

[8] Calculate multiple results by using a data table, [Online], Available: https://support.microsoft.com/en-us/office/calculate-multiple-results-by-using-a-data-table-e95e2487-6ca6-4413-ad12-77542a5ea50b [03 Sep 2025], 2025.

[9] Introduction to Excel2007 Data Tables and Data Table Exercises, [Online], Available: https://people.wou.edu/~taylors/g302/Excel_2007_Data_Table_Notes.pdf [03 Sep 2025], 2009.

[10] NCSS Chapter 422 Two-Sample T-Tests Assuming Equal Variance, [Online], Available: https://www.ncss.com/wp-content/themes/ncss/pdf/Procedures/PASS/Two-Sample_T-Tests_Assuming_Equal_Variance.pdf [03 Sep 2025], 2025.

[11] NCSS Chapter 424 Two-Sample T-Tests Allowing Unequal Variance, [Online], Available: https://www.ncss.com/wp-content/themes/ncss/pdf/Procedures/PASS/Two-Sample_T-Tests_Allowing_Unequal_Variance.pdf [03 Sep 2025], 2025.

[12] BENTON, D., KRISHNAMOORTHY, K.: Computing discrete mixtures of continuous distributions: noncentral chisquare, noncentral t and the distribution of the square of the sample multiple correlation coefficient, *Computational Statistics & Data Analysis*, Vol. 43, No. 2, pp. 249-267, 2003. https://doi.org/10.1016/S0167-9473(02)00283-9

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