REFERENCES

Alghamdi, H., & Bach, C. (2013). Quality As Competitive Advantage. *INTERNATIONAL JOURNAL OF MANAGEMENT & INFORMATION TECHNOLOGY*, *8*(1), 1265–1272. https://doi.org/10.24297/ijmit.v8i1.690

Antony, Jiju. (2016). *Lean Six Sigma for Small and Medium Sized Enterprises.* CRC Press.

Gaspersz, V. (2007). *Lean Six Sigma*. Gramedia Pustaka Utama.

Lopena, S., Bertumen, E., & Mondero, J. (2021). *Integrated Capacity Planning Tool Implementation in an OSAT Company using the Six Sigma DMAIC Framework.*

Mitra, A. (2016). *Fundamentals of Quality Control and Improvement FOURTH EDITION*. John Willey & Sons.

Nasution, S., & Sodikin, R. D. (2018). Perbaikan Kualitas Proses Produksi Karton Box Dengan Menggunakan Metode DMAIC Dan Fuzzy FMEA. *Jurnal Sistem Teknik Industri*, *20*(2), 36–46. https://doi.org/10.32734/jsti.v20i2.488

Ohno, T. (1988). *Toyota Production System: Beyond Large-Scale Production*. crc Press.

Pakdil, F. (2020). Six Sigma for Students: A Problem-Solving Methodology. In *Six Sigma for Students: A Problem-Solving Methodology*. Springer International Publishing. https://doi.org/10.1007/978-3-030-40709-4

Pande, P. S., Neuman, R. P., & Cavanagh, R. R. (2002). The Six Sigma Way. In *Das Summa Summarum des Management* (pp. 299–308). Wiesbaden: Gabler. https://doi.org/10.1007/978-3-8349-9320-5_24

Parast, M. M. (2011). The effect of Six Sigma projects on innovation and firm performance. *International Journal of Project Management*, *29*(1), 45–55. https://doi.org/10.1016/j.ijproman.2010.01.006

Setter, C. (2018). *SIX SIGMA: A COMPLETE STEP-BY-STEP GUIDE*.

Sulistiyowati, W., Adamy, M. R., & Jakaria, R. B. (2019). Product quality control based on lean manufacturing and root cause analysis methods. *Journal of Physics: Conference Series*, *1402*(2). Institute of Physics Publishing. https://doi.org/10.1088/1742-6596/1402/2/022038

Untoro, O. B., & Iftadi, I. (2020). Six Sigma as a Method for Controlling and Improving the Quality of Bed Series Products. *Jurnal Ilmiah Teknik Industri*, *19*(2), 131–141. https://doi.org/10.23917/jiti.v19i2.11623

APPENDIX

APPENDIX I – First interview transcript with printing supervisor

Writer (W)	:	Good afternoon sir, previously I have observed in the production area. For further explanation, I would like to interview you regarding the printing process if it's possible, can I?
Supervisor (S)	:	Good afternoon, yes, it's possible. What do you want to know?
W	:	First, from the defect percentage data I noticed the number of defects in the printing process was greater than defects in other process, it is true?
S	:	Yes, it is true. This printing process has a higher number of defects.
W	:	What is the tolerance percentage for defect products in the printing process?
S	:	The maximum tolerance for defect products for the entire process is 5%. There are no specific standards for each process.
W	:	From what I see, why is the printing process more supervised than other processes?
S	:	Because the printing process is one of the initial processes of making packaging. Printing results are one of the main goals of packaging, because they are a medium of information for consumers of these products. The company also prioritizes first process before move to the next process.
W	:	Next, can you explain the printing process in general?
S	:	Of course, the printing process is the process of transferring an image from an engraved cylinder to the film material that becomes the printing media.

W	:	What materials and equipment are needed during the printing process?
S	:	For this material there is plastic film in the form of rolls, ink, solvent, and cylinders. Meanwhile, for equipment, there is a doctor blade and rubber roll. But, for ink and solvent comes from supplier because the ink has its own formula.
W	:	Can you explain the types of defects that appear during defects in the printing process?
S	:	There are five types of defects usually appear in printing process. First, there are streak defects, namely scratch or straight lines in the printing results area. Secondly, there is color off, which is when the ink does not come out evenly or the color of ink is drop. The third is misprint, which is an uneven and shaded printout. The fourth is dragging where excess ink is on the printout. The last, non-standard color is a printout that is not within the color tolerance limit.
W	:	Is there detailed data that shows what the root causes of defects are every day if a defect occurs?
S	:	No, because if a defect occurs, corrective action is immediately taken without recording the root cause.
W	:	Is there a possibility that one root cause will cause a different type of defect?
S	:	Yes, because the defects come from the same problem.
W	:	Alright sir, I think that's enough for now. Thank you so much for your time.
S	:	You're welcome, if later you still have questions, you can come to me again and we'll discuss it.
W	:	Ok sir thank you.
S	:	No problem.

APPENDIX II – Second interview transcript with printing supervisor

Writer (W)	:	Good afternoon sir. Previously I asked you about general information of printing process. Now, I want to ask about analysis the root cause of defect in the printing process. Can I sir?
Supervisor (S)	:	Sure, what do you want to ask?
W	:	From what I saw during observations, the doctor blade does not have a history of usage data.
S	:	Yes, that's right, until now we are still checking visually without recording it.
W	:	Doesn't that affect the doctor blade surface quality control loss? What if it is necessary to create a monitoring form of doctor blade?
S	:	Maybe it could be used as an improvement and monitored first to see whether it has an effect or not. Why do you want to do that?
W	:	Because from what I see, the operator only chooses a doctor blade randomly from a storage box that still looks good. Meanwhile, the storage box itself contains a collection of used doctor blades
S	:	Ok, that's possible, maybe you can try to make what the form looks like then we'll discuss it.
W	:	Sure sir. Next question is for a dirty ink filter, what is the cause, sir?
S	:	The dirty filter is caused by ink that dries up and collects in the graymills filter, it takes longer to be sucked up by the pump and into the ink pan. When the cylinder rotates, dry ink is carried in the cylinder and gets stuck in the doctor blade.
W	:	What if install a filter bag in the dispenser before the ink enters the ink tank where the pump sucks up the ink?

S	:	It's possible, because the ink circulates, right? From the ink dispenser, to the ink tank and flowed by graymills, after that to the ink pan, then flowed back to the dispenser. The dirt in the ink pan can be filtered out. You can give us suggestions for the filter bag, we will discuss it later.
W	:	Can you explain about a thin cylinder?
S	:	Sure, thin cylinder when the surface of the cylinder is worn out. The wear is due to the long use of the cylinder, it has an uneven surface. Thin cylinders should be chrome-treated by the cylinder making department.
W	:	What is the meaning of dry ink covers cylinder sir?
S	:	Cylinder covered with dry ink is caused by the process of cleaning the cylinder is not clean. There is still ink left in the cylinder cell. When the cylinder is used, the ink does not appear on the surface of the film because it is blocked by the dry ink.
W	:	What should be done to remove dried ink sir?
S	:	The method must be scrubbed thoroughly with a cloth, solvent, brush, and powder.
W	:	Why is the ink viscosity high during the process?
S	:	Because ink viscosity can change. So, the solvent must continue to be given if the viscosity is high.
W	:	Is the solvent given manually by pouring it?
S	:	No, there is a hose that can flow solvent automatically.
W	:	Why are there still problems caused by high ink viscosity even though it is automatic to add solvent?
S	:	Because the viscosity reading sensor several times does not display the correct numbers. So, there is already a standard for operators to check viscosity manually using a zhan cup.
W	:	Isn't it the sensor that needs to be repaired?
S	:	The machine is serviced once a week. However, it does not rule out the possibility that the sensor suddenly becomes

		inappropriate. So, companies prefer to measure viscosity manually to avoid problems and there is a data check sheet that needs to be filled in.
W	:	Oh I see sir, I think it's enough for now sir. Thank you very much for your time sir.
S	:	You're welcome. No problem.