ZÁVĚREČNÁ ZPRÁVA

Z REALIZACE

KLÍČOVÉ AKTIVITY Č.03

Název Klíčové aktivity projektu:	Vliv a dopady strategií 4.0 (průmysl 4.0) na pracovní pozice v odvětvích
Bipartitní platforma:	Polygrafie

Obsah:

Zpracovatelé:
Zdeněk Sobota
Dr. Ing. Josef Opletal
Ing. Jaromír Aust
Antonín Pokorný

Přílohy zprávy:

Vstupní data + zahr.materiály

Evropská unie
Evropský sociální fond
Operační program Zaměstnanost

1) Stručný popis zaměření aktivity

Jedná se o aktivitu, která navazuje na realizaci a dosavadní dílčí výstupy projektu ze II. etapy projektu „Společným postupem sociálních partnerů k přípravě odvětví na změny důchodového systému“. Témata DIGITÁLNÍ PLATFORMY, AUTOMATIZACE, ROBOTIZACE, ERGONOMIE.

V rámci aktivity půjde také o ověření vlivu a dopadu automatizace, robotizace a digitálních platforem na setrvání zaměstnanců (i ve vyšším věku), získávání vstupních informací z praxe pro podporu, správné zacílení a postup řešení se zapojením cílových skupin pracovníků při využití již získaných znalostí z předchozího projektu.

Aktivita se snažila vypořádat se zásadním problémem polygrafického oboru, kdy „železo“, tedy stroje přetrvávají i několik generací a jejich životnost je nad odpisovou sazbou, zejména u rotačních tiskových strojů nebo archových ofsetových strojů.

Ovládací elektronika zkracuje svoji životnost přímo drasticky. Generační výměna pro elektronické ovládací prvky se zkrátila z dřívějších 30 let u elektrického analogového řízení na dnešních maximálně 10 let elektronického řízení v jedné kompatibilní generaci. Kompatibilita znamená, že je nutno inovovat řízení strojů ne proto, že nový systém řízení přinese další úspory nebo pokrok, ale protože se elementy původního systému již nevyrábějí, a i při relativně malé poruše je nutno vyměnit celý systém. Praktický dopad pro obsluhu spočívá v tom, že původní ovládání např. na bázi Window 98 se nahradí Window 10 a obsluha se musí tento nový systém naučit.

Ještě obtížnější je situace v digitálním tisku, kde jsou často jednotlivé generace digitálních strojů mezi sebou nekompatibilní a nelze dodržet ani výnos evropské unie, že na prodané zařízení je nutno po dobu 10 let zajišťovat veškerý spotřební materiál a náhradní díly. Tento problém se řeší nebo spíše obchází tím, že se tyto stroje neprodávají, ale dávají na leasing, kde se předpokládá výměna v kratší době než 10 let.

2) Materiály, zdroje

- Vstupní data
- Smart factory (něm.)
- Vliv covid na průmysl 4.0 (angl.)

3) Způsob zapojení a přínos cílové skupiny do řešení KA

Pracovní skupina byla sestavena tak, že měla přístup ke všem rozhodujícím výrobcům v polygrafickém průmyslu pro získání dat z praxe. Současně byly osloveni vybraní dodavatelé polygrafických zařízení, kteří byli ochotni předvést i zařízení, která nejsou ještě na trhu, experimentální zařízení, nebo zařízení, pro která se ještě nenašel kupující. Tím byl zajištěn objektivně nejvyšší možný stav techniky a dat pro mapování stavu. Vyhodnocení těchto exkurzí a testování umožnilo kvalifikovaný odhad vývoje ve všech polygrafických technikách na nejbližší období.

4) Vybraná témata pro tematická setkání dle závěrů vstupní analýzy

Organizační body k řešení

- obecná situace
- robotizace v polygrafii
- automatizace v polygrafii
- digitalizace v polygrafii

Obecná situace
V nejbližších pěti až deseti letech nás čekají revoluční změny v oblasti výroby, které se samozřejmě radikálně dotknou celé společnosti. Print je přitom jedním z odvětví, které tyto změny již prožívají, a tudíž je dobré být na očekávané změny dobře připraven.

Teze o čtvrté průmyslové revoluci, označované jako Industry 4.0, zazněla poprvé na konferenci při příležitosti velké průmyslové výstavy v Hannoveru v roce 2013. Podle této myšlenky vzniknou „chytré továrny“, které budou využívat kyberneticko-fyzikální systémy. Ty převezmou opakující se a jednoduché činnosti, které do té doby vykonávali lidé. V souvislosti s tím se očekávají změny pracovního trhu, jež mohou ohrozit zaměstnanost osob s nízkou kvalifikací. Měla by také vznikat nová pracovní místa, ta však budou vyžadovat vyšší kvalifikaci zaměstnanců.

Polygrafie několik let čekala na změny způsobené všudypřítomnou digitalizací a automatizací. Mnoho let jsme slýchali, jak digitální technologie odebere významný podíl analogové produkci. Máme za sebou fázi nadšení a očekávání, stejně jako fázi deziluzí a zklamání. Nyní je ale proces automatizace a digitalizace v plném proudu. Trh se změnil a digitální tiskové systémy patří dnes již k standardnímu vybavení tiskárny. Instalují se plně automatizované výrobní linky, které jsou dnes nejen po celém světě, ale i v České republice. Digitální transformace je patrná i v obalovém průmyslu, protože stále se měnící požadavky již nelze splňovat konvenčními výrobními technologiemi. Pro obalový průmysl, na rozdíl od polygrafie, inkoustová tiskárna sama o sobě nestačí, do plně automatické výrobní linky je zapotřebí integrovat různé periferní systémy.

Co je hlavní hybnou silou?
Trh stále více koketuje s masovou individualizací produkce. To, co v polygrafii známe jako technologie web-to-print, print-on-demand a celkovou digitalizaci výroby, můžeme pozorovat prakticky ve všech průmyslových odvětvích. Když si navíc představíme sjednocení protokolů a společné sdílení databází, získáme rámcový obraz toho, co nám čtvrtá průmyslová revoluce přináší.

Nová éra
Nová éra průmyslové výroby využívá schopnosti strojů vnímat, schopnosti autokonfigurace a autodiagnostiky spolu s počítačovým spojením strojů a dílů. Produkty i stroje jsou vybaveny čipy, pomocí nichž je možné kontrolovat a obsluhovat přes internet. Dále se budou ještě více využívat cloudová úložiště, 3D tisk, datová centra, automatické hlášení problémů či sklady, které samy informují o docházejících zásobách.

Print 4.0
Principy, jež charakterizují postupnou implementaci typických prvků nové éry průmyslové výroby, velmi důvěrně známe z aplikací, které již nějaký čas s důvěrou používáme. Digitální produkce kusových zakázek spolu s řešením Print & Cut, načítání dat o vloženém médiu do tiskárny a

automatické načtení profilů a podmínek tisku, automatická kompletace zakázek a tisk faktur podle dat z tiskáren v ekonomickém systému firmy jsou dnes již standardem. Vyšším stupněm je třeba automatizace workflow, kdy současně s příjmem zakázky systém generuje požadavek pro sklad na zvolené médium a inkousty spolu se zařazením do tiskové fronty příslušné tiskárny, rezervaci kapacit ve finshingu, balení a fakturace.

Hovoříme o velmi malých částech skládačky potřebné pro fungování inteligentního provozu. Vždyť nejedna tiskárna už dokáže avizovat potřebu objednání inkoustů a stačí jenom schválit, aby si jej od zvoleného dodavatele objednala sama, stejně jako tisková média. Automatickou linku schopnou načíst potřebná data distribuuje firma Zünd. Výrobu tapet s automatickým ořezem a kompletací zase najdeme u firmy Fotoba.

Kooperace firem HP a KBA přinesla na trh tiskárnu HP PageWide Web Press T1100S. Tato tiskárna určená pro obalový průmysl dokáže potisknout vlnitou lepenku v rolích širokých 2,8 metru. Tuto šířku dokáže rozdělit na několik „pruhů" a při produkci velkých zakázek současně tiskne malé série i kusové obaly. Jednotlivé zakázky se pak po výseku třídí pro následnou expedici.

Do tisku vstupuje umělá inteligence

Různé pracovní technologie již využívají umělou inteligenci pro usnadnění jednotlivých úkonů. V současné době došlo k objasnění některých základních schopností rozpoznávání hlasu pro inteligentní tiskárny a multifunkční zařízení, například u společností Xerox a HP. Dále lze očekávat další vylepšení, které bude do značné míry záviset na partnerstvích se společnostmi, jako jsou například Google a Amazon. U tradičních poskytovatelů tiskových služeb bude klíčové rozvíjet právě schopnosti v této oblasti v případě, že budou chtít udržet svoji roli jako dodavatele tiskových služeb.

Jsme součástí revolučních změn

Postup digitalizace je neúprosný a reagovat na ni musí všechny odvětví, i to tiskové. Tradiční firmy, které si chtějí svoji pozici udržet, musí přizpůsobovat své stroje i nabízené služby právě aktuálním požadavkům trhu. Ostatně díky digitalizaci a robotizaci se očekává zvýšení produktivity až o 30 %. Světové ekonomické fórum v této souvislosti avizovalo ohrožení několika milionů pracovních míst.

Stanovení dílčích závěrů k řešenému klíčovému tématu:

Veškerá šetření se prováděla ve třech oborech
-tiskař
-knihař
-grafik

Tiskař:
Robotizace na vykladači rotaček
Automatizace na archovém stroji
Digitální tisk a jeho hranice

Knihař:
Digitální ražba, výsek, rilování
Automatizace vazby V1 u stroje

Grafik:
Redakční systémy, grafické nástroje

5) Projednávaná témata při realizaci tematických okruhů

Možnosti digitalizace při dokončujícím zpracování.
Na praktických ukázkách byl znázorněn digitální výsek a perforace, digitální rilování prostřednictvím digitálně zhotovené rilovací formy. Jednalo se o prototypová zařízení, která ještě nebyla v té době instalována ani u nás ani v Evropě. Jedno obdobné zařízení bylo instalováno v tiskárně v Letňanech v Praze, experti měli možnost zařízení navštívit, ale tiskárna zkrachovala.

Pro oblast potisku jiných materiálů, než je papír a materiálů pro externí prezentaci byl popsán a předstsaven reliéfní tisk a byly uvedeny i kvantitativní údaje. V oblasti reliéfního tisku na netradiční materiály, jako je sklo, dřevotříska, plech, hobra, keramická dlaždička, umělohmotná deska nebo textil, nemá tato nová forma digitálního tiku srovnatelnou konkurenci.

V oblasti robotizace byl představen první robot za rotačkou, který je schopen odebírat a ukládat složky na paletu v plné rychlosti stroje 50.000 otáček/hodinu. V té době u všech kotoučových ofsetových strojů u nás probíhá stohování a ukládání na paletu ručně a tento výstup je často limitujícím faktorem pro výkon stroje. Při praktické rychlosti stroje spotřebuje 5 tun papíru za hodinu. Dosud odebíralo v třísměnném provozu 9 mužských pracovníků, takže požadovaný výkon na směnu na jednoho pracovníka při odebírání balíků je cca 14 tun a je za hranicemi lidských možností. Předvedený robot v praxi ukázal, že jeho naprogramování zvládne obsluha tiskového stroje a úspora manuálně zdatných pomocných dělníků je opravdu 9 za den.

Stěžejní téma v rámci tematických setkání byla také oblast tisku a dokončující výroby, protože se ukázalo, že v oblasti grafiky jsou nejmenší problémy jak s ohledem na technické zabezpečení výroby, tak možnosti dálkového přenosu a home-office.

Část tematických setkání byla věnována zvýšení univerzálnosti jednotlivých profesí, prostorové a investiční náročnosti moderní dokončující výroby, vývoji tištěných nákladů, zejména u periodik, a změnou struktury reklamních tiskovin.

Tematická setkání provázelo přežití karanténních opatřeních a technická řešení, která vznikla nově vzhledem ke Covidu. Mimo redukci kapacit nastala potřeba vzniku nové kategorie průmyslu 4.0 a to dálkové diagnostiky při poruše zařízení. Tím, že nebyl možný příjezd zahraničních montérů na opravy zařízení, vznikla potřeba dálkové diagnostiky jednotlivých zařízení. První takováto zařízení byla spuštěna např. u archových strojů a šicího bubnu.

6) Zhodnocení a výsledky diskusí, přijaté závěry

Od digitalizace a automatizace očekáváme vždy to samé – zvýšení produkce, minimalizaci chyb a snížení nákladů na výrobu. K tomu má v blízké době pomoci zavedení nových modelů do výroby, jako jsou digitální řízení produkce a kvality, prediktivní údržba, zapojení robotů do výrobních procesů. Na pozadí všech těchto modelů je potřeba přenášet ohromné množství dat. Jen tak lze digitální transformaci úspěšně provést.

Pro zvládnutí nároků, které jsou spojeny s novou technikou v oboru s označením průmysl 4.0, je nutné u všech tří profesí splnit následující předpoklady:

Počítačová gramotnost

Veškerá zařízení v oboru polygrafie, která si mohou dělat nárok na to, že jsou na současném stavu techniky, vyžadují uživatelské znalosti IT, které převyšují ovládání chytrého mobilu nebo psaní emailu. Stroje mají monitory pro geometrická zadání, chybová hlášení, dálkový přenos pro zpracování zakázek. Je nutno vymyslet systém trvalého vzdělávání IT v oboru.

Jazykové schopnosti

Při současné rychlosti vývoje polygrafického průmyslu je odborné vzdělávání v oboru a zavádění nové techniky závislé na zahraničních zdrojích. Polygrafie nemá odborný časopis, rozhodující veletrhy a kongresy se odehrávají v zahraničí a výuková literatura je často zaměřená příliš teoreticky a často je na stavu techniky před více než 10 lety. Díky covidu se začíná prosazovat dálkový přístup indikace chyb. Všechny tyto činnosti vyžadují znalosti němčiny nebo angličtiny na úrovni schopnosti telefonovat. Bez tohoto předpokladu nemůže existovat prvotřídní odborník.

Motivace

Rozhodujícím faktorem pro úspěch průmyslu 4.0. v polygrafii je motivace starších pracovníků až do důchodového věku. Tato motivace spočívá zejména ve snížení fyzicky namáhavé práce, zjednodušení obsluhy, odstranění rutinních a často se opakujících činností a automatickém hlídání podstatných výrobních postupů. Zvýšení produktivity musí být jen jako vedlejší efekt pokroku.

Stáže u výrobců

Pro zajištění nejvyššího možného stavu techniky je nutné o tomto vědět. Průmysl 4.0. není jen o nových strojích, ale i o tom, co nového stávající stroje umí. To se nedá předvést na veletrhu, ale musí se ukázat ve školicím středisku. Příkladem je systém „smart factory“, který je přílohou č. 1. Systém se dá vysvětlit jen na příkladech se strojem.

Školství

Pro zajištění současného světového stavu techniky je nutné přebudovat školský systém. Jednou za semestr by měli přednášet jednotlivé kapitoly odborníci z praxe. Systém skript a učebnic je překonaný, v zahraničí se používají „Učební sešity“, jejichž životnost je maximálně 3 roky a dělají se často digitálně.

Rekvalifikační programy

Státní podpora rekvalifikačních programů neřeší průmyslový pokrok, ale dává jen základy pro zařazení do pracovního procesu. Aby byli pracovníci schopni setrvat i při skokových změnách, spojených s průmyslem 4.0., v pracovním procesu až do důchodového věku, je nutné zajistit rekvalifikaci ve formě celoživotního vzdělávání přímo u zaměstnavatele.

Školení řidičů se považuje za samozřejmost, školení tiskařů, třeba jen pro jednoho zaměstnavatele neexistuje.

Personální rezervy

V polygrafii je v Německu a Rakousku běžné, že po odchodu do důchodu je bývalý zaměstnanec smluvně vázán na maximálně dvě směny týdně na případnou výpomoc. Tím šlo zajistit střídání posádek při covidu a důchodcovské posádky byly velmi brzy očkovány. Při rozumném přístupu si celá řada důchodců ráda přivydělá a „vypadne z domova“. Víme, o čem mluvíme. Větší tiskárny v zahraničí mají pracovníka v personálním oddělení, který se stará o učně, stážisty a důchodce.

7) Zhodnocení a výsledky ověřování v praxi

Hodnocení a výsledky z praxe je rozděleno podle hlavních oborů polygrafické činnosti

Tiskař

Robotizace na vykladači rotaček je největší úsporou nekvalifikovaných pracovních sil v polygrafickém průmyslu za poslední dekádu. Robot se zatím uplatnil na velkoformátových kotoučových heatsetových strojích. Vzhledem k tomu, že robot zatím „neumí“ jemné uchopení, není využitelný na novinových rotačkách, kde hrozí nebezpečí „obtažení“ tisku. V novinové výrobě je robot využitelný jen pro část produkce, a proto není dostatečná ekonomická návratnost.

Automatizace na archovém stroji dosáhla takového stupně, že při automatickém mytí stroje, výměny ofsetových desek a plánovitém řazení zakázek (část smart factory) je zkrácena změna zakázky z desítek minut na méně než 5 minut a snížení obsluhy z nejméně dvou osob na jednoho operátora – tiskaře.

U digitálního tisku nelze ani odhadnout jeho hranice. Nový je reliefní tisk a 3D tisk, kde se jeho možnost uplatnění teprve testuje, přinese rozšíření do dalších oborů, jako je zdravotnictví metalurgická výroba, obalová technika.

Se zlevňováním vlastních strojů a zejména tonerů se stane rentabilní výroba i vyšších nákladů.
Digitální tisk umožní personalizaci tiskové produkce.

Knihař

Ražba, výsek, a rilování jsou činnosti, které vyžadují klasickou cestou velmi vysoké náklady na výrobu příslušných forem a to s časovým předstihem, který se měří na dny.

Digitální ražba, výsek, rilování zkracují operace na minuty a hodí se zejména pro nižší náklady, kde by se klasická výroba s formami nikdy nezaplatila, a proto se nepoužívá. Zejména v obalové technice se jedná o postupy, které umožní nahrazení umělých hmot papírovými ekologicky nezávadnými obaly. Automatizace vazby šité drátem umožňuje zvýšení produktivity násobně a připojení na tiskový stroj, protože rychlost výroby časopisů, šitých drátem se blíží rychlosti tiskového stroje.

Grafik
Používané redakční systémy a grafické nástroje jsou na současném stavu techniky. I když lámací a redakční programy pro češtinu mají komplikovanější uspořádání, než programy např. pro angličtinu nebo němčinu, jsou i ortoprogramy, případně překladatelské programy na světové úrovni. Grafik je oblíbené povolání a uplatnění existuje i u příbuzných oborů, jako je web designer, správce e-shopu atd.

8) Přehled doporučení pro oblast klíčové aktivity KA03

Kontinuita
Nejdůležitějším doporučením je potřeba kontinuálního pokračování v této oblasti na úrovni sledování technologického rozvoje a přijímání vhodných opatření k aktuálnímu vývoji. Perioda technologické obnovy je v jednotlivých profesích různá. Nejkratší je u grafiků, kde odpovídá modernizaci základních počítačových platforem a rozvoji hardware – periodicitu odhadujeme na maximálně 4 roky. U digitálního tisku je perioda technologické obnovy maximálně 5 až 6 let. V ostatních oborech je delší, ale nikde nepřesahuje 10 let.

Adaptabilita ve vzdělávání – připravenost absolventů
Ani učňovské obory ani střední vzdělání neodpovídá ve většině oborů požadavkům doby. Uspokojivá je situace v oboru „grafik“. Nedostatečná úroveň je v oboru tiskař a dokončující výroba – vyučený tiskař si většinou nezkusil tisk na moderním kotoučovém nebo více barvovém archovém stroji, protože na školách nejsou tyto stroje vzhledem k jejich pořizovací hodnotě k dispozici a byla zrušena pravidelná praxe.

Jazyková znalost
S dostatečnou připraveností absolventů pro vstup na trh práce u polygrafických profesí souvisí také zvýšené požadavky na jazykové znalosti. Prakticky žádná z uvedených zařízení se nevyrábějí v tuzemsku a nejedná se velkosériovou výrobu. Návody k obsluze, podklady pro programování a seřizování jsou v cizím jazyce. Pokud má být zavádění moderní techniky úspěšné, musí být obsluha schopna komunikovat v cizím jazyce.

Proto bychom budeme jako zástupci sociálních partnerů odvětví polygrafie v dalším období směřovat své aktivity do těchto oblasti a usilovat o dosažení změny pro vybrané pozice polygrafické výroby u jejich počátku – tj. úprava požadavků na absolventy = rozšíření požadavků učebních oborů profese tiskař, dokončení výroby a grafik právě v koordinaci s neustálým technologickým vývojem včetně praxe.

Vstupní data pro KA 03

VLIV A DOPADY STRATEGIÍ 4.0 (PRŮMYSL 4.0) NA PRACOVNÍ POZICE V ODVĚTVÍCH

2.Dělení dat

Aby byla zajištěna návaznost na minulá šetření, je nutno se soustředit na tři hlavní povolání
2.1 grafik
2.2 tiskař
2.3 knihař.

Těmto povoláním odpovídají v polygrafii následující výrobní procesy:
2.1. - výroba zrcadla, stránek a zlom
-archová montáž
-výroba tiskové formy
2. 2. – v návaznosti na NSP lze tiskaře dělit na:
2.2.1. -tiskař na kotoučových strojích
2.2.2. -tiskař na archových strojích

a dle použité technologie:
2.2.1.1tiskař na coldsetových kotoučových strojích
2.2.1.2tiskař na heatsetových kotoučových strojích
2.2.1.3tiskař na hlubotiskových kotoučových strojích
2.2.1.4tiskař na flexotiskových kotoučových strojích
2.2.2.1. tiskař na archových velkoformátových ofsetových strojích
2.2.2.2tiskař na maloformátových archových ofsetových strojích
2.2.2.3tiskař na archových digitálních strojích

2.3. Obecné označení je dokončující výroba, která má tyto oblasti:
2.3.1. Výroba periodik lepených a šitých drátem
2.3.2. Výroba tuhých a měkkých vazeb
2.3.3. Výroba obalů
2.3.4. expedice za výrobními zařízeními

3. Stanovení priorit

Ve výše uvedeném přehledu dle bodu 2. je patrné, že rozsahem ani časovým prostorem nelze obsáhnout všechny oblasti.
Proto je nutno vybrat kritéria důležitosti, která jsou uvedena v návaznosti na zadání úlohy.
Pro tuto úlohu navrhujeme následující kritéria:
3. 1. snížení fyzické zátěže
3. 2. úspora pracovních sil
3. 3. automatizace výrobních procesů
3. 4. vyloučení procesů, které jsou již nyní digitalizovány
3. 5. zajištění principu významnosti a opakovatelnosti, vyloučení unikátních řešení
3. 6. stanovení pro vybrané operace nejlepší možný stav techniky
3. 7. efektivní výroba malých nákladů

Evropská unie
Evropský sociální fond
Operační program Zaměstnanost

3. 1. snížení fyzické zátěže

Při analýze byl vybrán extremní případ heatsetové rotačky o formátu 64 stran A4,výkonu 50000ot/h při tisku na 60g/m2 LWC papír, kde se na výstupu tvoří balíky, které je nutné položit na paletu. Stroj tedy potiskne na jednu otáčku32 listůA4 což odpovídá 2m2 o hmotnosti 120g. Při výkonu 50000 obratů je hodinový výstup 6000kg.
Zde se bude hledat robotizované řešení.

3. 2. úspora pracovních sil

Úspora pracovních sil je možná zejména v dokončující výrobě a volbou digitálního tisku s hlavním důrazem na:

-automatické nakládání u knihařských linek
- digitální tvorba ražby a výseku
-automatická výměna tiskových desek
-digitální obsluha klasického tiskového stroje z centrálního pultu
-využití digitálního tisku

3. 3. automatizace výrobních procesů

Automatizace výrobních procesů je často spojena s úsporou pracovních sil, proto platí bod 3. 2. a dále ještě:

-standardizace zlomu a zrcadla při tvorbě stran
-spojování linek do výrobních celků
-splitting
-vkládání

3. 4. vyloučení procesů, které jsou již nyní digitalizovány

I když se to zdá nelogické, jsou procesy v kapitole 2.1 na světové úrovni, trvale se vyvíjejí s každou novou verzí software a vyučují se na odborných školách, je vyloučení z analýz nutné, protože při dokončení studie nikdo neví, jaká varianta redakčních, přenosových a zlomových systémů bude existovat.

Tato oblast je na světové úrovni z těchto důvodů:

-ekologické důvody vedly ke zrušení filmů (problém Ag) a trimetalických desek, jsou výhradně systémy CTP
-digitální přenosy a komprimace dat umožňuje přenosy stran i pro nejvyšší tiskovou kvalitu
-investiční náročnost grafických systémů je zlomkem investic do tisku nebo automatizované dokončující výroby.

3. 5. zajištění principu významnosti a opakovatelnosti, vyloučení unikátních řešení

Při průběžném vyhodnocování jednotlivých operací digitalizace budou vyloučena všechna řešení, která nejsou obecně použitelná nebo jsou vzhledem k velikosti republiky ojedinělá a obtížně je lze zobecnit i když by našla uplatnění v jiných odvětvích

3. 6. Pro vybrané operace stanovení nejlepšího možného stavu techniky

Expertní tým je postaven tak, že pokrývá celou paletu výroby v polygrafii. V závěrečné zprávě bude kapitola o nejlepším možném stavu techniky pro jednotlivé vybrané operace

3. 7. efektivní výroba malých nákladů

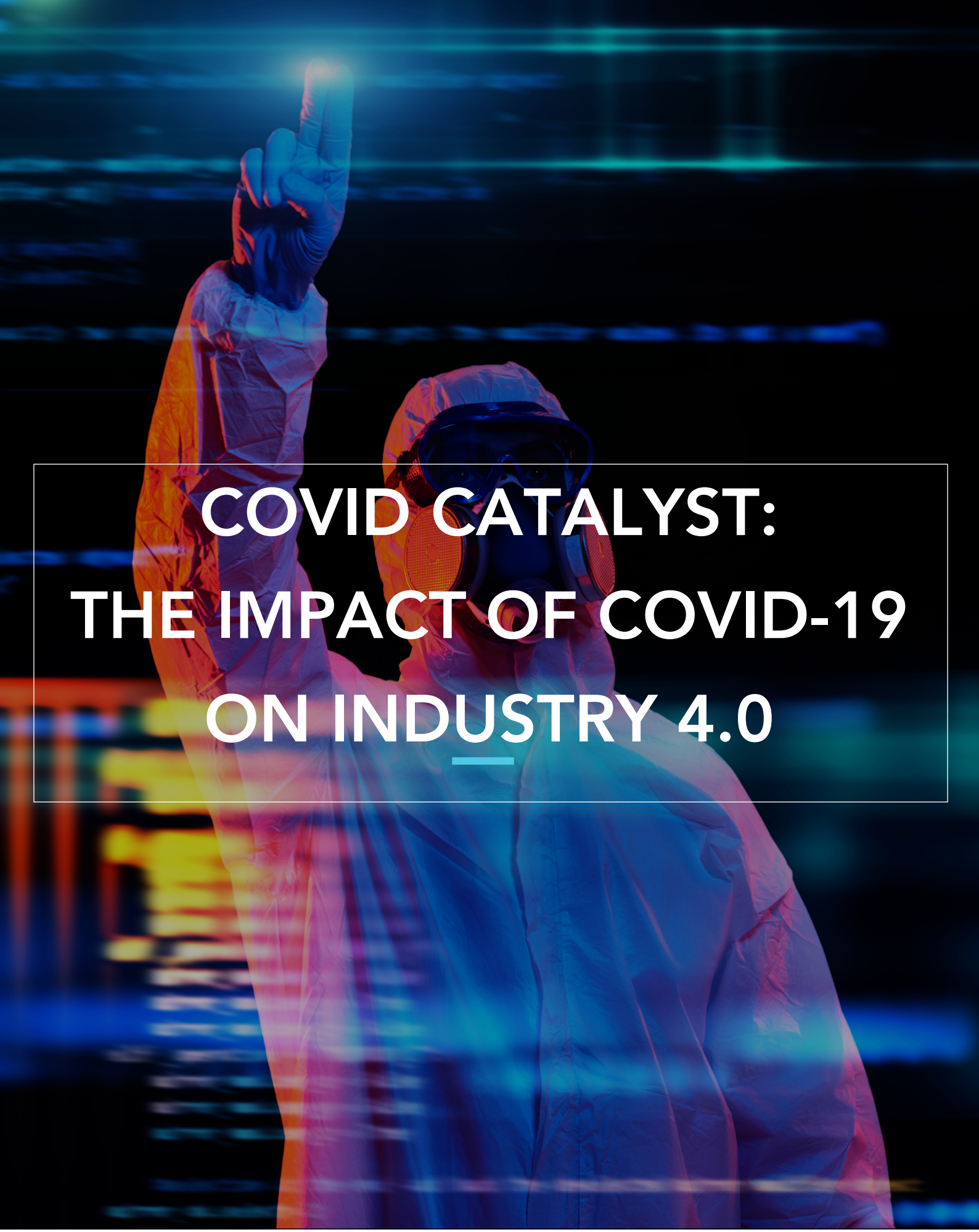
Budoucnost oboru je malonákladová výroba. Všichni o digitálním tisku mluví, někteří ho i mají, ale málokdo je dostatečně rentabilní. Důvodem je i nabídka digitálních strojů. Zákon EU praví, že 10 let po dodávce zařízení je výrobce povinen zajišťovat jak servis a náhradní díly, tak i spotřební materiál. To nyní skoro žádný výrobce není schopen u celé palety svých produktů splnit. Hlavním důvodem je technický rozvoj, zlevňování tonerů a málo robustní výroba stroje. Tento problém se obchází operativním leasingem, kdy se stroj za 5 let vymění. Tento postup je ale provozně drahý a pro průmyslové digitální stroje nevhodný.

4. Nová digitální řešení zlepšení pracovního prostředí

Ve vlastní polygrafické výrobě se podařilo odstranit všechny škodlivé látky v primární výrobě. Důležitou veličinou je ale pracovní pohoda. Trvalým problémem je hluk, kde existuje celá řada různých řešení. Novou kapitolou je regulace vlhkosti a teploty. Problém s oteplováním a nízkou vlhkostí se v polygrafických halách násobí. Klasické řešení klimatizací je provozně i investičně velmi náročné. Spotřeba energie klimatizace často dosahuje spotřeby výrobní technologie. V automobilovém průmyslu se začíná používat zvlhčování se současným ochlazováním odpařenou vodou s digitálním řízením, kde je úspora energie až 90%, je to např. zařízení rakouské firmy Merlin, které lze zabudovat i do starších objektů.

5. Závěr

Výše uvedená analýza mapuje obor, vytyčuje prioritní cíle a stanovuje i hranice činnosti. Vše bude předmětem další fáze řešení aktivity, tj. projednání s experty.



COVID CATALYST: THE IMPACT OF COVID-19 ON INDUSTRY 4.0

Special Briefing Report

McKayResearch

About the author

James McKay is an independent research consultant in the fields of technology and investment with expertise in the design and end-to-end implementation of custom research projects.

As principal and founder of McKayResearch, he has 12 years' experience providing strategic research services both to the world's leading market intelligence firms and a growing portfolio of private clients that include legal consultancies and investment firms. His research instruments and analyses have been widely published by a variety of technology and business publications, including the Financial Times.

On a personal level, James's experience in varied but interconnected sectors makes him at home with the inherent complexities and challenges of industry 4.0 adoption, and he is passionate about contributing to a deeper understanding of the ongoing digital transformation of industry.

Contact:
James McKay
Research Consultant
+44 (0)7854 214 830
james@mckayresearch.com

Executive Summary

The Fourth Industrial Revolution, or Industry 4.0, has been under way for the better part of a decade, with many manufacturers compelled to explore the disruptive potential of its constituent technologies across a range of sectors.

However, the ongoing COVID-19 pandemic raises several questions as to how this technological transformation will play out under its influence; will circumstances such as mass unemployment, global supply chain shifts, and repeated government lockdowns further accelerate its development? Or will the economic crisis take its toll on the industry, as it has many others?

In this report, we provide an overview of the impact of COVID-19 on the three core Industry 4.0 technologies of 3D printing, robotics, Industrial Internet of Things, and chart how the pandemic has impacted existing trends and developments for each.

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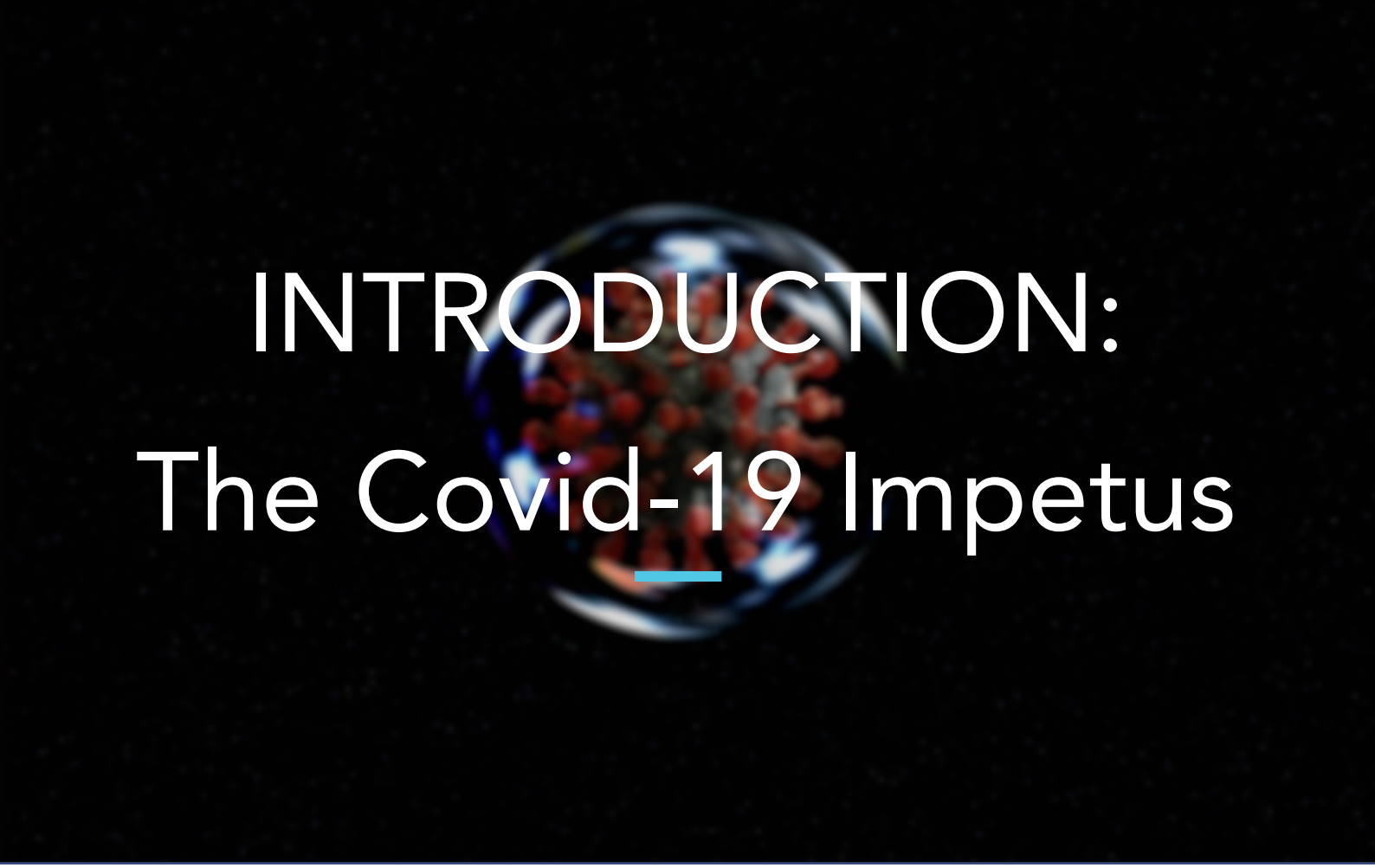


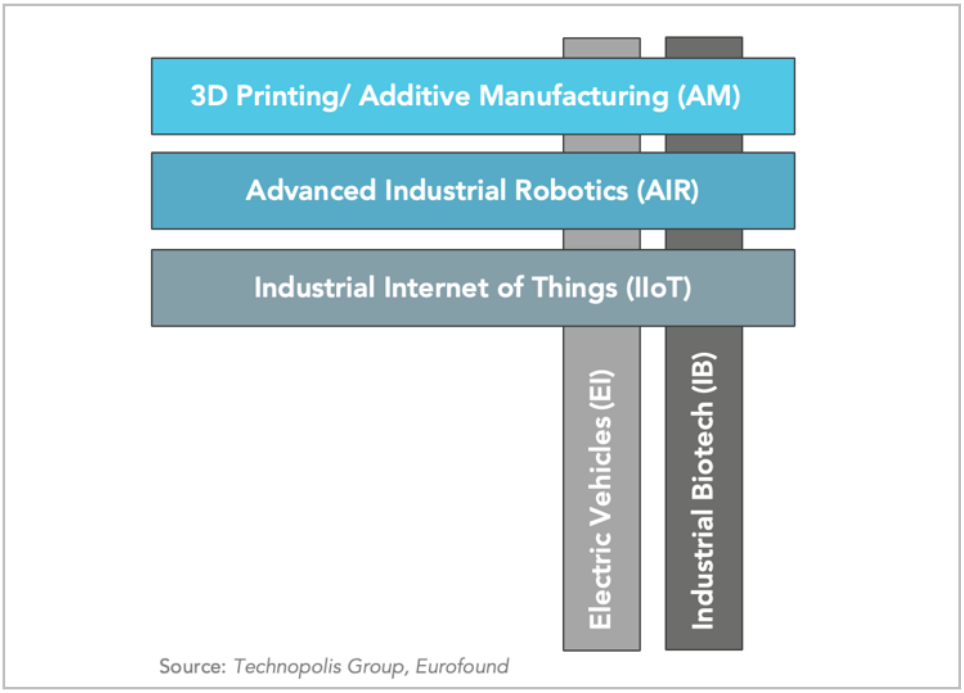
INTRODUCTION: The Covid-19 Impetus

Industry 4.0 refers to the automation of traditional manufacturing and industrial practices through the adoption of smart equipment. These technologies not only enable improvements in the efficiency, speed, and cost of manufacturing, but also make it possible to gather and analyse micro-level data across machinery, thereby allowing for improvements in production processes. Industry 4.0 is shifting the face of global economics by rebalancing human intervention in manufacturing, bringing about a paradigm shift in the nature of competitive advantage.

The outbreak of COVID-19 has brought with it a whole new set of challenges for companies and manufacturers. The pandemic has forced firms to think creatively to overcome the challenges of a limited workforce, global supply chain dependencies, as well as new health and safety restrictions that are being imposed by governments worldwide.

In this context, digital adoption has become more widespread than ever, providing an unparalleled opportunity for the broader adoption of Industry 4.0 technologies. 3D printing, robotics, and the Industrial Internet of Things (IIoT), lie at the heart of this drive towards automation and are both shaping and hastening the transition to the 'new normal'.

Figure 1: Five core Industry 4.0 technologies



Source: *Technopolis Group, Eurofound*

An acceleration towards digital transformation

Having already been expected to exceed $200 billion in the next five years, digital transformation facilitated by the suite of Industry 4.0 technologies had already gathered plenty of momentum prior to the COVID-19 outbreak. Now, under the present circumstances, it has become even more critical for business managers to develop rapid cost optimisation to the dynamic market conditions.

A survey of European business managers indicated that 70% expect the COVID-19 outbreak to further accelerate the pace of digital transformation, with wider acceptance of remote working, increased channels for remote communication, and improved technological infrastructure driving the change[i].

The increased impetus towards digital transformation will also come from external stakeholders, governments, and broader society.

Countries such as the US, China, and Singapore among others have already proposed tax breaks and grants for organisations that implement flexible working arrangements for their employees. Additionally, digital consumer demand is fast reaching its highest levels ever. For example, data from payment systems company, ACI Worldwide, points to a sharp 74% growth in average transaction volumes in online retail sales during March 2020, compared with the same period last year[ii].

Experts predict that this changing behaviour will outlast the current crisis, paving the way to a future in which digital channels are central to every upstream and downstream interaction, from suppliers to end consumers.

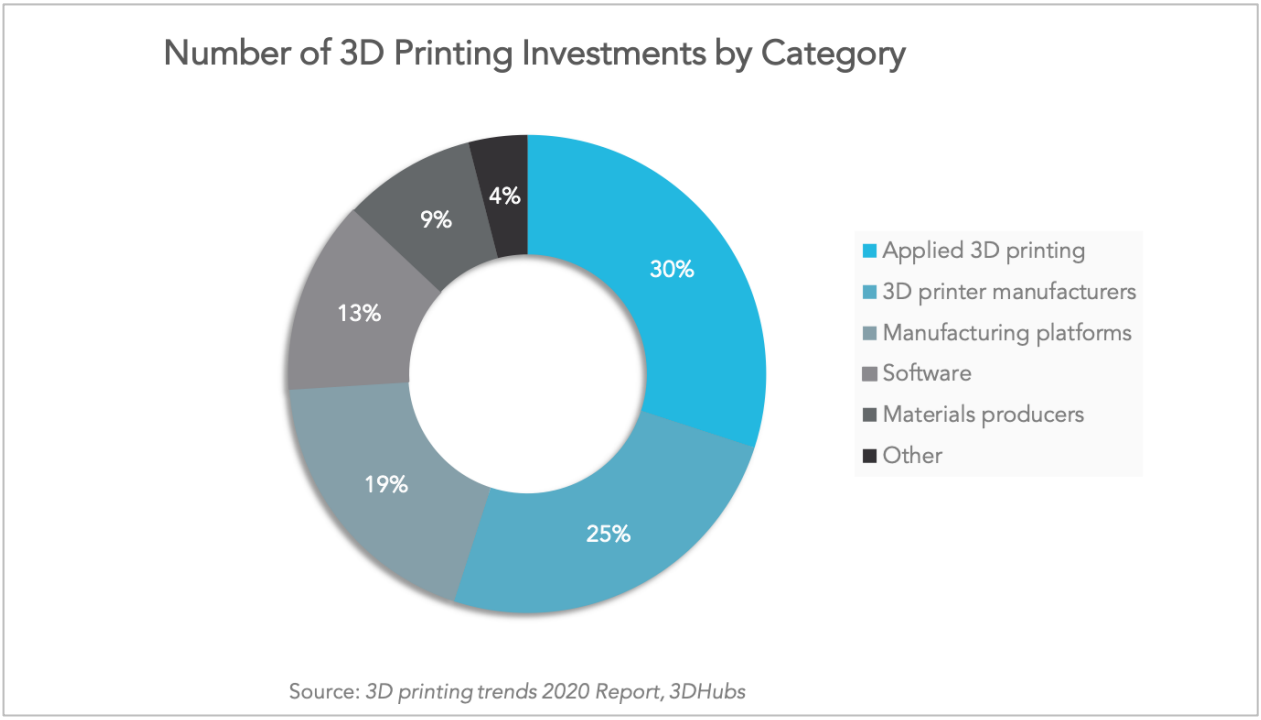
PART ONE: 3D Printing

3D Printing, also known as additive manufacturing (AM), offers a paradigm shift in manufacturing by increasing efficiency, decreasing waste, democratising design and production, and revolutionising industrial design through free complexity. Former CEO of 3D Systems, Avi Reichental, once told the Financial Times that 3D printing could potentially be "bigger than the internet."

The initial hype around 3D printing was centred on the belief that the technology would achieve mass penetration of the consumer market as desktop appliances for the home. This early universal optimism was a view shared and backed by many of the large market intelligence firms, resulting in a swell of media hype and unsustainably soaring stock valuations. However, this consumer-centric thesis of the technology's application was blindsided by R&D manufacturers ramping up R&D to unlock the technology's potential to cut costs and increase industry inefficiencies.

Even though consumer use has increased as 3D printers have become more widely available, it is the major businesses from a broad a range of sectors such as General Electric, Boeing, and Nike, which have become the dominant drivers of additive manufacturing. For example, of the $1.1 billion invested in 3D printing in 2019, 30% was dedicated to companies exploring the application of the technology industry.

Figure 2: Applied 3D printing leads investments by category



Source: *3D printing trends 2020 Report, 3DHubs*

The unique advantage of 3D printing technology

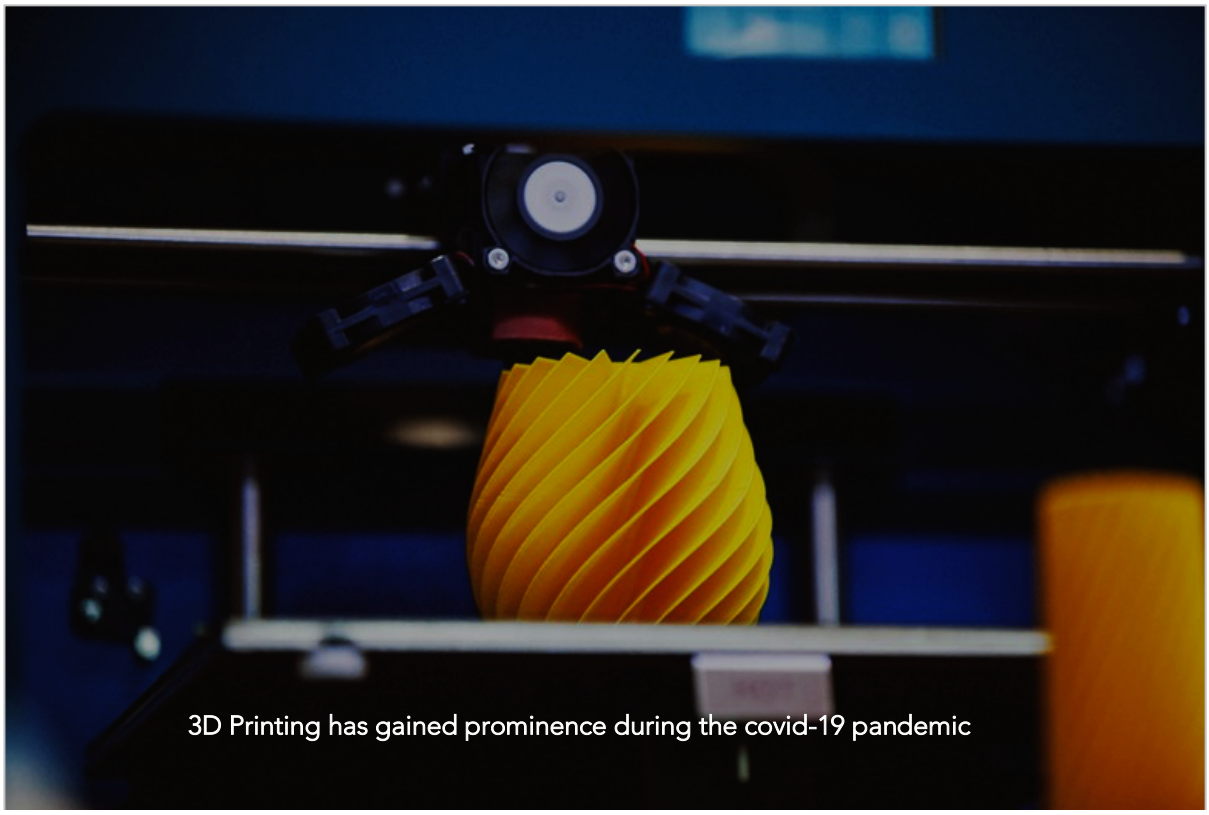
Its biggest advantage is that it overcomes the challenges associated with traditional manufacturing by offering a faster, more cost-efficient, and customisable alternative to production, while at the same time resolving several of the environmental sustainability and health and safety implications of the manufacturing process. As the 3D printing market matures and the technology becomes more affordable and widespread, the technology will allow for a far greater degree of personalisation and customisation of products, as well as allowing manufacturers to operate with fewer suppliers in the supply chain.

In the context of COVID-19, such advantages are invaluable, considering the limited capacity of a reduced workforce, and the global economic fallout as a result of global supply chain dependencies. The key drivers that will accelerate the adoption of 3D printing in a post-COVID world will be:

a) A shift towards decentralised manufacturing
b) The enablement of full-scale production via 3D printing
c) The increased need for sustainability

How COVID is accelerating the shift towards decentralised manufacturing

In response to COVID-19, a wide range of businesses have decided – or will soon decide – to transition to remote working, either temporarily or permanently. 3D printing will also become highly prized in this context due to the ability of makers to share their designs online, and for them to be reproduced worldwide. Advances in digital manufacturing have created a new ecosystem of partners, alliances, and networks consisting of OEMs, software development firms, and printing bureaux, allow for the remote design, production, and reproduction of any product anywhere in the world. This will enable a larger number of makers to partake in the 3D printing economy, democratising manufacturing to an unprecedented degree.



3D Printing has gained prominence during the covid-19 pandemic

At the same time, the pandemic has spotlighted firms' need to diversify their supply chains in order to remain operational, even under exceptionally challenging circumstances. Going forward, efficiency will be just one of the factors that determine key relationships in the supply chain, with risk mitigation becoming an increasingly strong consideration. A survey by the Institute for Supply Management[iii] reported that close to 75% of companies reported supply chain disruptions as a result of COVID-19, affecting both lead times and causing delays due to freight capacity shortages. Another report by Dun and Bradstreet[iv] identified some 51,000+ companies that had at least one key supplier in the Chinese provinces most heavily impacted by the outbreak of the virus. While trade intelligence can help businesses find alternative suppliers, the setup of such an

undertaking can take months, and in some cases even years to process. Here, 3D printing brings production closer to the end-user, eliminating both the dependency on supply chains and the downtime of finding suitable alternative suppliers. Furthermore, the shift away from conventional production and distribution models to more localised, demand-driven systems has the potential to reduce the imbalance between exporting and importing countries.

Full-scale production via 3D printing

The COVID-19 pandemic has underscored the degree to which additive manufacturing has moved beyond prototyping into first-run production, allowing large volume production in a relatively short period of time. As traditional supply chains in many jurisdictions struggled to maintain the supply of essential goods to combat the pandemic, 3D printing was shown to be an effective alternative, with additive manufacturers stepping in to produce everything from pharmaceuticals to personal protective equipment (PPE), and face masks.

For example, Avid, a specialist 3D printing product service provider recently acquired by Lubrizol, teamed up with other members of the additive manufacturing ecosystem to deliver essential protection equipment such as face shield frames and masks using HP's Multi Jet Fusion Technology (Figure 2). Technology multinational, Siemens, also tapped into its 3D printing capability, to reduce the impact of spreading the virus through 'contact prevention' door openers. The company teamed up with Russian Railways (RZD) to test door handles that can be opened with an elbow or lower arm rather than by hand, reducing the risk of spreading germs or a virus like COVID-19 (Figure 3).

Figure 3: 3D Printable Face Shield by Avid

Source: *avidpd.com*

Figure 4: 3D printed door handle for elbow/arm by Siemens

Source: *railjournal.com*

"Covid-19 has impacted our business in many ways. We have had projects slow down and new opportunities have been found. The key for our team at Avid was to "pivot". Avid has been fortunate to have a focus on engineering and 3D Printing and we have been designing and printing PPE since April."

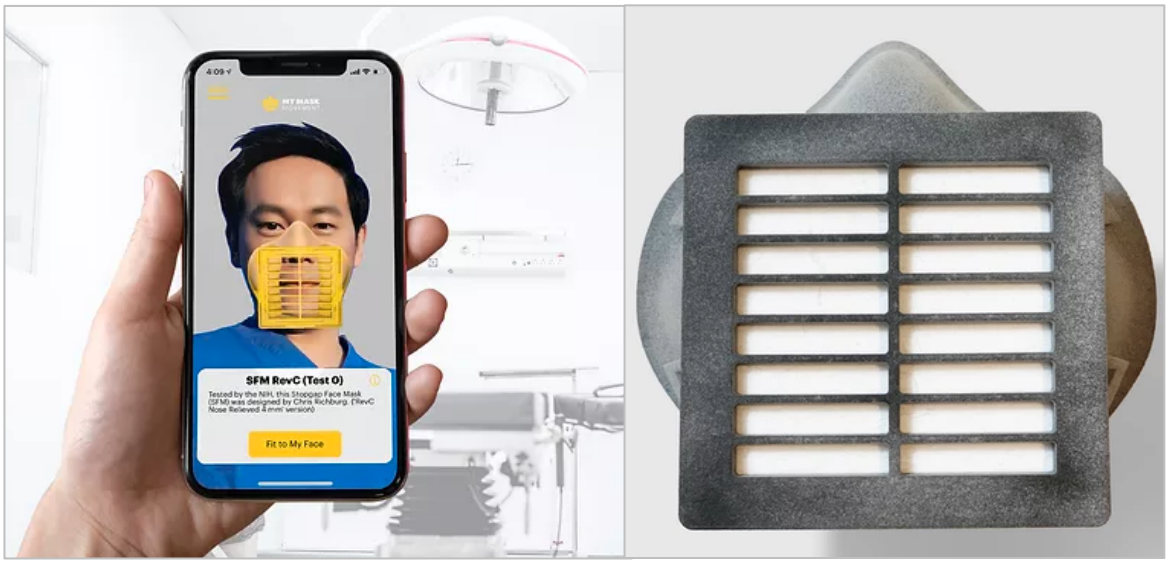
Doug Collins

Development Director at Avid Product Development

At the same, the speed of end-to-end concept to production and personalisation possible with additive manufacturing has seen a growing number of start-ups looking to plug the unmet equipment needs during the pandemic. For example, according to the Mayo Clinic, 40% of healthcare workers are unable to consistently find access to respirators that fit. Here, social enterprise, My Mask Movement, have created a digital supply chain to address the critical shortage of face masks and respirators, as well as the challenge of proper fit. Using light depth-sensing facial scanning technology through the My Mask app, individuals can obtain a custom-fitted mask through a simple process.

The speed with which 3D printing has been adopted to respond to COVID-19 underscores how rapidly the technology is maturing en route to mass production, and there is no shortage of examples of industrial use cases from outside the medical sphere. For example, aerospace giant Airbus is making extensive use of 3D-printed hydraulic flight components for the localised production of essential tooling equipment.

Figure 5: Light depth-sensing facial scanning technology with submillimetre precision to produce custom-fitted masks



Source: *mymaskmovement.org*

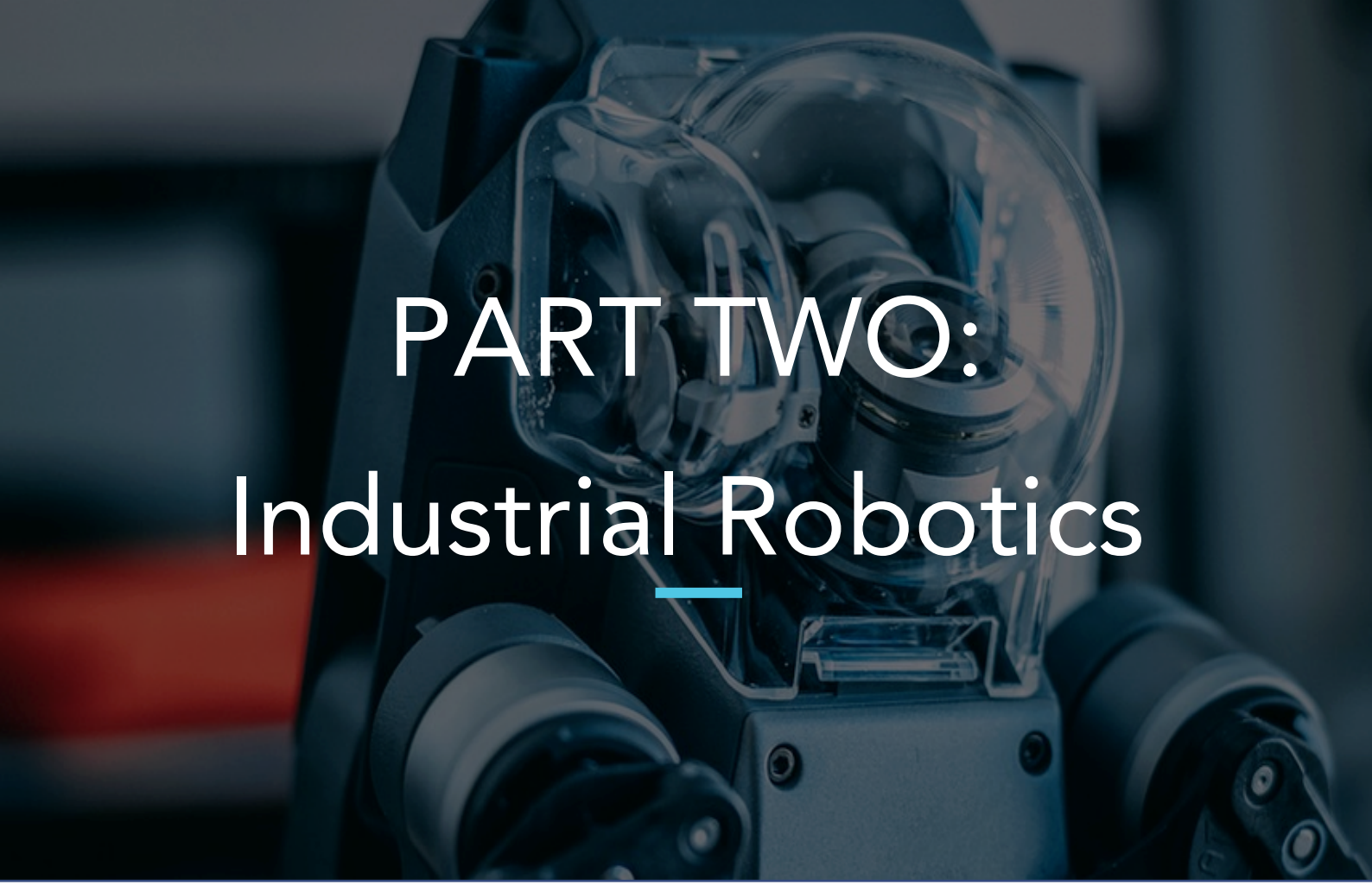
An increased need for sustainability

The COVID-19 pandemic has given the world a stark reminder of the need for sustainable practices in manufacturing. As firms begin the of process re-tooling for the new normal, sustainability will move up the agenda, both to capture reviving customer interest in sustainable products, and to ensure the health and safety of their workforce as well. For example, a survey by management consulting firm, Kearney, indicates that 55% of customers are more likely to purchase environmentally friendly products as a result of their experiences during the COVID-19 outbreak[v].

The business world is responding to the rising perception that 3D printing is seen as an inherently more sustainable approach to manufacturing due to the reduced material usage, lower carbon emissions through freight reduction, and the long-term benefits of lightweight design and eco-friendly materials development. Consequently, more manufacturers will highlight the adoption of elements of 3D printing into their overall production processes for a competitive advantage.

Key takeaways:

- Pandemic-fuelled global supply chain shocks have increased the need for decentralised manufacturing. 3D printing will enable this by bringing production closer to the end-user, and enabling faster reproducibility worldwide.
- 3D printing's effectiveness as a technique for mass production during the pandemic has proven that it is ready to move from a prototyping technology to a tool for full-scale production, with a focus on improving operational efficiency.
- The increased desire for sustainability after the pandemic will turn businesses on to 3D printing and other sustainable solutions to drive value for customers and employees in the long term.

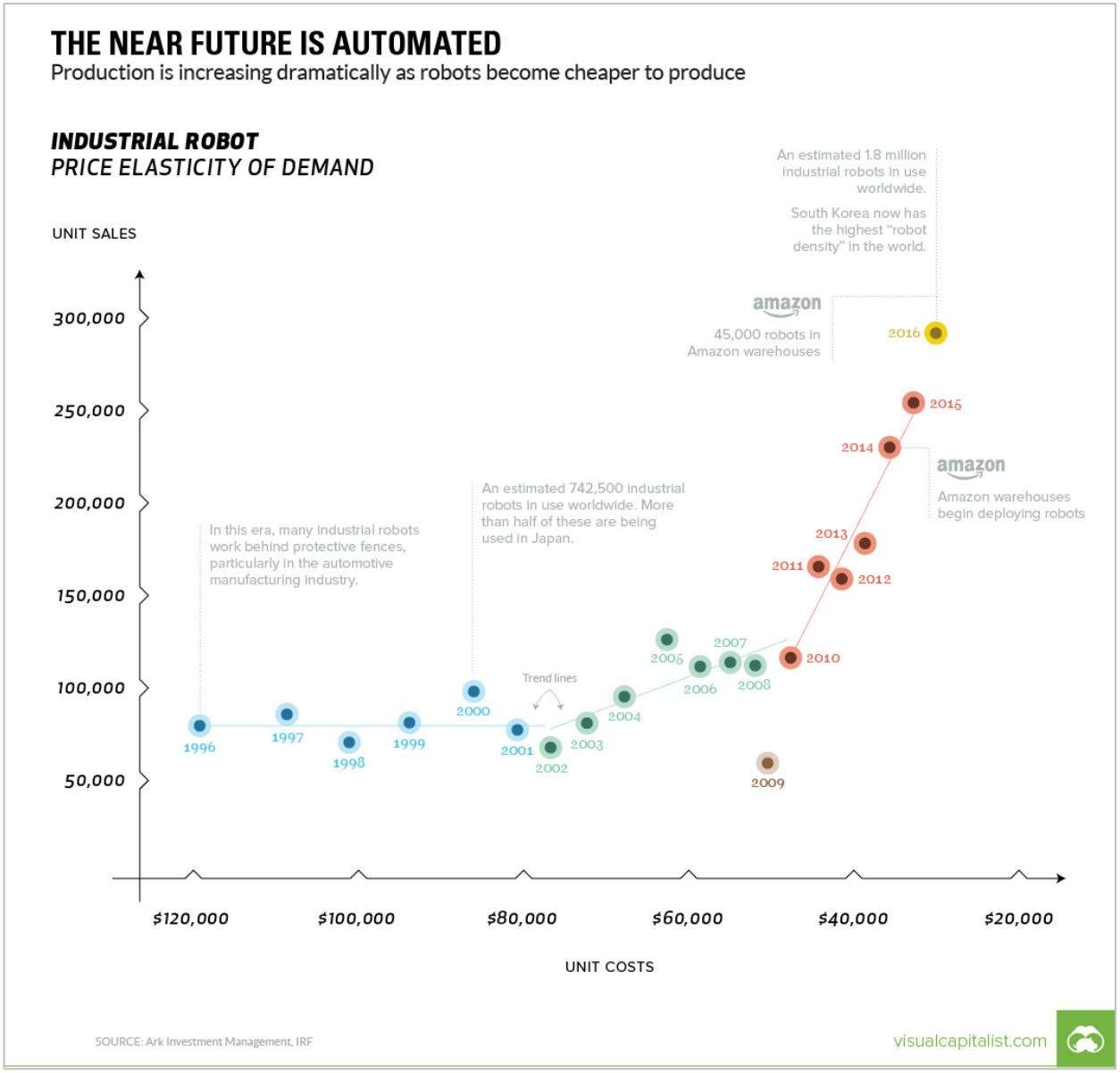


PART TWO: Industrial Robotics

Robotics is a vital part of the ongoing digital transformation of the economy. Since Industry 4.0 technology creates a digital data flow between smart devices, machines, software, and people, robots play a central role in harvesting and analysing this data in order to make the necessary improvements to manufacturing processes.

While robots were initially developed to assist humans with manual or repetitive tasks, the robots of today have a much higher degree of autonomy and sophistication. They are equipped to make valuable optimisations such as improving cycle times, increasing output rates, identifying maintenance issues, capacity planning, and much more.

Figure 6: Covid-19 will further accelerate the trend of rising robotic automation



Source: VisualCapitalist

Robots - allies in the manufacturing process

The single most important function of robotics is to reduce operational downtime, thereby preventing downstream manufacturing delays and enabling capacity optimisation. Unscheduled factory downtime is presently one of the biggest causes of delays in the manufacturing process. Robots enable collection and real-time data exchange, identify existing issues that could lead to potential bottlenecks, and perform preventive maintenance to mitigate excessive downtime. Although social distancing and increased sterilisation have emerged as primary tactics for combating the spread of COVID-19 in industrial settings, these measures can result in delays to production. Here, robots can assist manufacturers to fulfil order timelines while adhering to the new coronavirus health and safety regulations that will become

increasingly standardised in industrial and business settings.

In the context of a post-COVID world, the key drivers that are expected to define the future of robotics are:

a) An increased need for health and safety
b) The evolution of the human workforce
c) Enhancements in digital and technological capabilities

Increased need for health and safety

As observed in industries that continued to work through the worst of the outbreak, hand washing, social distancing, and protective equipment policies can only go so far to protect fully operational workforces. In healthcare, for example, robotics has already played a key role in the pandemic, assisting healthcare workers in routine tasks such as disinfecting, taking temperatures remotely, interacting with patients, and delivering meals.

Consequently, their role will be broadened to even more industries and applications as companies begin to consider which aspects of the manufacturing process are the most unsafe and inefficient. Here, the appeal of robots lies not just in the minimisation of human intervention that they enable, but in their ability to tap into vast data stores to identify patterns and highlight outliers. This means that they can be used to identify potential safety breaches, predict future problem areas and carry out contact tracing, as well as reduce the risk of human error in procedures that require safety. This could play a key role in enabling safer work environments in the future.

"Covid-19 has brought to light the opportunities for remote access technologies and capabilities, with robotics use cases for hazardous environments like nuclear decommissioning having received intense interest in recent years. The pandemic has set the ground for similar capabilities in numerous other settings – especially in healthcare – with remote swabbing, remote diagnosis and assessment, and even remote intervention being possibilities that may emerge."

Prof Danail Stoyanov
Professor of Robot Vision at University College London

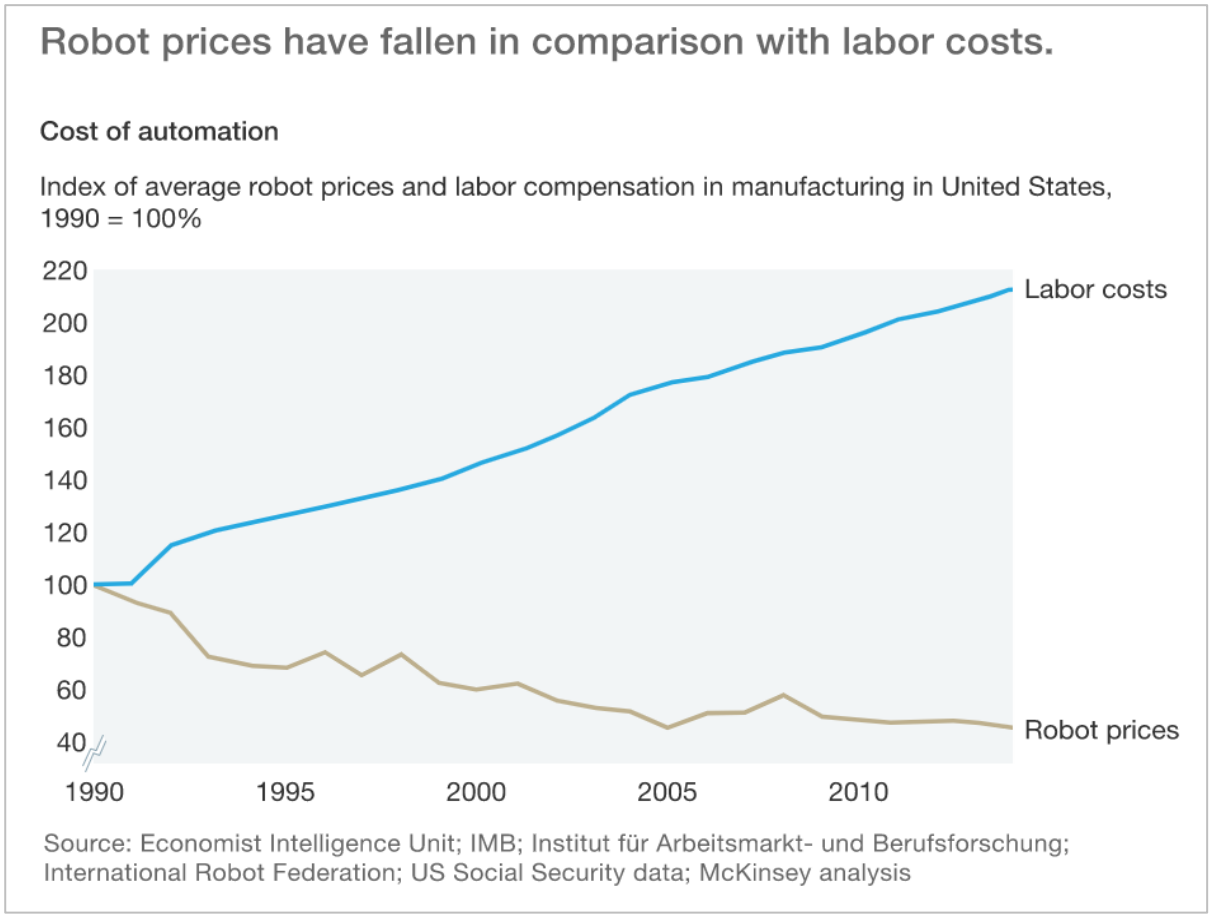
The evolution of the human workforce

A study by Technavio estimates that by 2020, the average labour cost savings achieved by replacing humans with robots will stand at around 22%[vi]. As cost-efficiency remains the dominant force behind the adoption of robotics, the financial fragility of businesses will catalyse robotics automation, as firms look to cut costs as well as de-risk and futureproof their operations.

Despite this, even the most advanced industrial robots of today still require a significant degree of human intervention, which makes predictions of a wholesale replacement of workforces premature. More likely is a reassessment of essential vs. non-essential roles, as well as an increase in demand for workers with expertise in robotics, to balance out the reduction in low-skilled or manual workers.

As Industry 4.0 continues to grow, collaborative robots, or 'co-bots', will play an increasingly important role in manufacturing. As they take a more central role in the workforce, they will bring about a greater degree of responsive collaboration with human counterparts.

Figure 7: Divergence of costs for labour vs. robots had remained steady pre-COVID-19 but may now accelerate



Source: *www.mckinsey.com*

Enhancement in digital and technological capabilities

COVID-19 has accelerated digital advancement to an unprecedented degree. Classrooms and offices, individuals, and entrepreneurs alike have all sought ways to continue to function despite the coronavirus pandemic. In this new environment, robots have had to become 'essential workers' across broad swathes of industry. Robotics firms have reported big gains in technical knowledge and technical gains as a result of this trial-by-fire deployment, a fact that will make future machines smarter and more capable

Figure 8: AIMBOT by UBTECH Robotics performs disinfection tasks at Shenzhen Third Hospital

Source: *UBTECH Robotics, spectrum.ieee.org*

Indeed, the coming 5G revolution coupled with the increase in IoT-enabled devices will accelerate the deployment of robotics, as faster data transfer rates and decreased latency make them capable of carrying out complex computations, yielding richer interactions with the world around them. Similar improvements in sensory systems, disk storage, wireless communication networks, data capabilities, and design tools will improve the performance of robots, making them cheaper and more reliable.

Key takeaways:

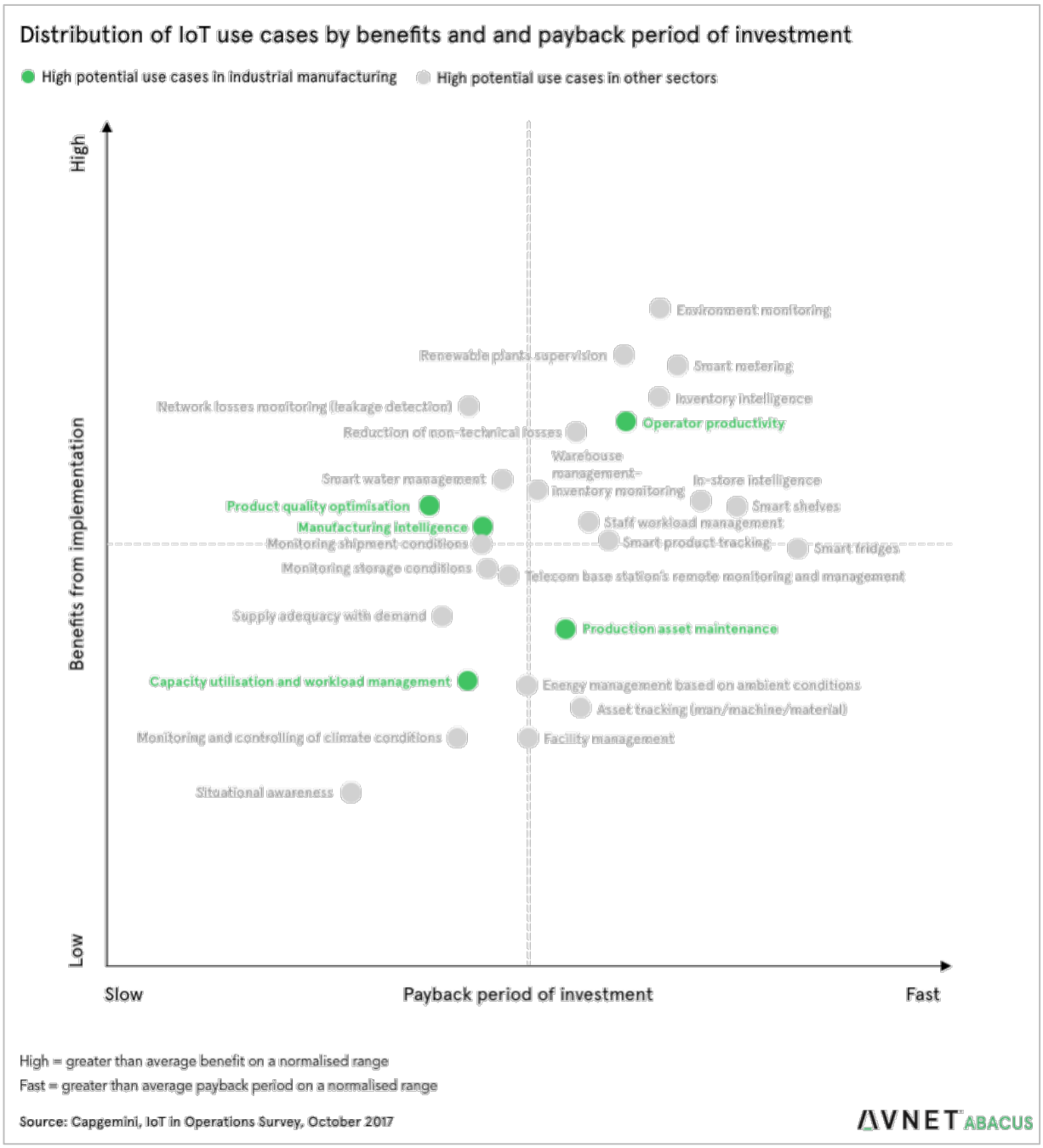
- Even with a limited workforce, robots will help manufacturers increase operational efficiency, reduce factory downtime, and allow proactive identification of manufacturing bottlenecks.
- As health and safety become more important, the role of robots in the workforce will expand and diversify, leading to a shift in organisational structure and in-demand skill sets.
- Though businesses in financial distress may need to consider the economic benefits of automated workplace solutions, co-bots and hybrid automations will still be prevalent in the immediate future.
- Enhancement in digital and technological capabilities as a result of the COVID-19 pandemic will likely spur further innovation and adoption in robotics.

PART THREE: Industrial IoT

The Industrial Internet of Things (IIoT) refers to a subsegment of the Internet of Things (IoT) that deals specifically with industrial applications such as manufacturing or agriculture. It focuses on the broader network of industrial devices connected by communication technologies, which enable the collection, exchange, and analysis of data that can be used by manufacturers to optimise processes and improve decision making.

As a more mature market relative to other Industry 4.0 technologies, many of its core applications (e.g. product quality optimisation, operational productivity, and manufacturing intelligence etc.) have proven ROI. For other emergent technologies such as blockchain, by contrast, very little data exists on business outcome specifics which presents challenges to gauge ROI and raises the level of perceived investment risk. Several prominent companies like Siemens, ThyssenKrupp, Caterpillar, and AGCO have already deployed IIoT applications for everything from equipment monitoring, to automated production, to predictive maintenance, and more.

Figure 9: Asset maintenance, capacity utilisation, and manufacturing intelligence among the highest potential use cases for IoT in industrial manufacturing



Source: *avnet.com*

New challenges for industrial manufacturing

COVID-19 pandemic has served to highlight several of the glaring issues with manufacturing in its current state. Supply chain shocks have led to challenges in procurement, fluctuations in pricing, and limited fulfilment by suppliers, which has translated into a loss of operational efficiency. Additionally, staffing shortages have also restricted manufacturers' ability to preserve business continuity, which has slowed downstream production and resulted in revenue shortfalls.

Manufacturers need to look beyond measures that will simply allow them to navigate through the immediate crisis, but embark on a comprehensive competitive analysis to ensure

every aspect of the business is optimised for efficiency over the long-term. The IIoT can play a pivotal role in helping businesses navigate the unique economic and logistical challenges posed by COVID-19, and key factors that will drive IIoT adoption over the coming years are:

(a) The need for operational flexibility
(b) Leveraging big data capture value in altered circumstances
(c) Accelerating the exploration of connected tools

A need for operational flexibility

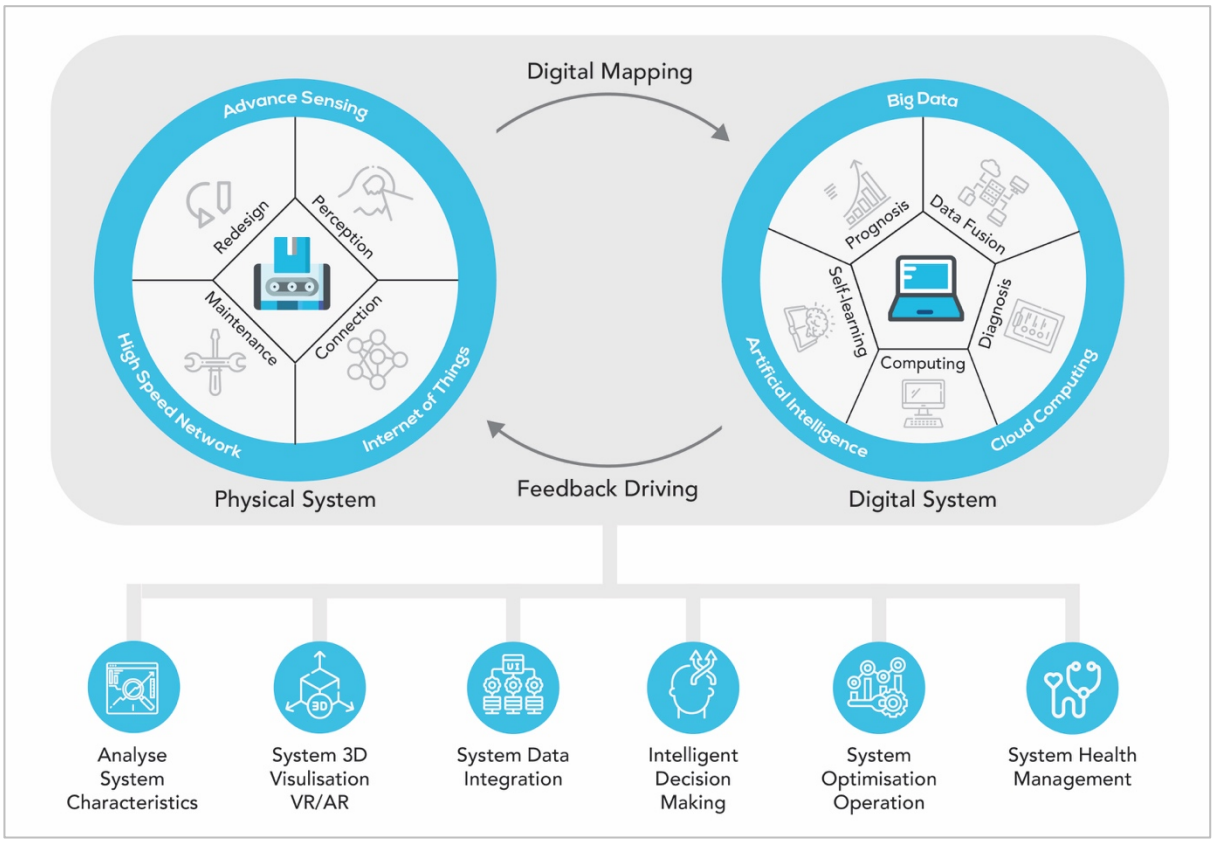
A key aspect of businesses' post-pandemic strategy to recover losses in productivity will be to increase their operational agility. Here, the IIoT, enhanced by machine learning and AI, is already being leveraged to analyse historical data patterns, make data-driven decisions about the future, and find market opportunities in the data, to identify where processes must be retooled, in order to take advantage of them. The unique economic challenges and market unpredictability caused by the COVID-19 pandemic have made the deployment of such technologies increasingly part of a goal-oriented, risk-mitigating strategy to hedge against future similar scenarios. Several businesses have already shown the potential of using IIoT for end-to-end supply chain synchronisation in improving operational KPIs, including productivity, agility, and customisation

A whitepaper by the World Economic Forum[vii] in collaboration with McKinsey showed that some of these manufacturers managed to increase output by up to 200%, while reducing production costs by up to 40%, and decreasing time to market by up to 90%. With so many businesses having been caught off-guard by COVID-19 and its effects, maximising agility and flexibility going forward will be essential in streamlining workflows and resolving issues around surplus goods, inventory management, and manual supply-chain analysis, while keeping operating costs low.

Leveraging big data value capture in altered circumstances

The COVID-19 pandemic has shed light on the value of big data in achieving deep granularity in the tracking of every operational metric. This need to unlock more business insights from ever-larger quantities of data has seen a rising interest in modelling to generate replicas that track every facet of manufacturing. Known as 'digital twins', these simulations are a digital representation of processes, people, places, systems, and devices, and require integrating systems and data across entire ecosystems. Though the digital representation provides both the elements and the dynamics of how an IoT device operates and lives throughout its life cycle, the four-dimensionality of a digital twin model necessitates the entire range of Industry 4.0 technologies, including artificial intelligence (AI), cloud computing, and augmented reality (AR) (Figure 10).

Figure 10: The architecture of Digital Twin for digital manufacturing

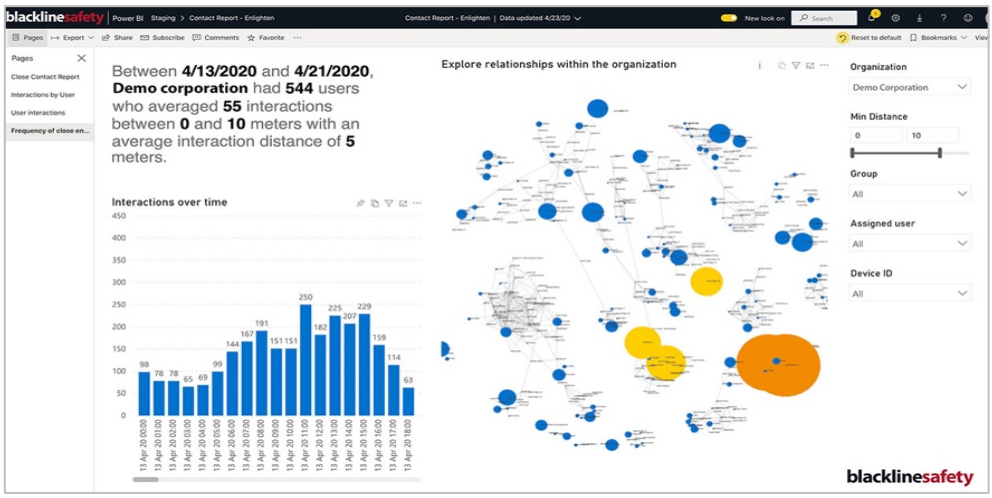


Source: *International Journal of Production Research*

The real-time harvesting of every component throughout the supply chain allows companies to approach strategic planning more holistically. For example, they can carry out predictive analyses that identify issues even before they occur, and tweak production schedules to account for fluctuations in demand or any unexpected disruptions to the supply chain, should they occur in the future.

This enhanced connectivity is particularly well suited to other Industry 4.0 technologies that themselves engender complex ecosystem processes with data-heavy workloads, such as 3D printing. In the context of the modern additive manufacturing facility, each 3D printer forms part of a network capable of self-learning, predictive maintenance, and responding to every facet of a digital factory environment. Digital twins can be used to simulate the manufacturing process and identify distortions so that they can be corrected/optimised on the 3D model. This allows for a self-correcting model designed to auto-calibrate to produce the best printing results, as well as allowing for the storage of 3D printable files of replacement parts that may be necessary for the future or during critical circumstances.

Figure 11: Close contact reports generated by location tracking systems by BlacklineSafety



Source: *Blacklinesafety.com, spectrum.ieee.org*

Accelerating the exploration of connected tools

Business leaders are also interested in how connected devices could facilitate contact tracing, by identifying those exposed to an infected person in the workplace and beyond. Some wearable options emit sounds if people stand too close to each other, and also allow for managers to review location history records to better understand which colleagues have come into contact with individuals who have tested positive for COVID-19.

A good example of businesses adapting existing products to Covid-19 comes from Blackline Safety, a manufacturer of connected safety monitoring devices. The Canadian company has equipped their wearable walkie-talkie IoT devices with location-tracing systems that automatically send data to indoor beacons, placed around a workplace and uploaded to the cloud, to generate close contact reports[viii].

Other gadgets can provide auto-alerts to remind people to wash their hands when entering or leaving a workspace or other key areas, such as the cafeteria or restroom. Such products permit dependence on accurate data when performing contact tracing, rather than asking people to rely solely on memory. Enterprises could also get data breakdowns that offer warnings of potential increases in symptomatic workforce members.

Key takeaways:

- An increasing pace of digital transformation and the development of widespread technological infrastructure as a result of the pandemic will further accelerate the adoption of IIoT enabled technologies.
- Technologies that enable greater agility and improve output will be key to recovering productivity losses in a post-pandemic world.
- Firms will look to connected technologies for the purpose of introducing track and trace systems in the workplace, both to ensure all business operations are carried out within the guidelines, and to facilitate adherence to the guidelines for staff.

Conclusion

The COVID-19 pandemic has exposed widespread gaps in the global supply chain and has left the unprepared scrambling to catch up. Though each of the three technologies discussed have multiple utility functions across a broad range of applications, any connected facility or machine must be integrated to benefit an overall system, preferably at the smallest possible cost.

Before any digital use-case can be deployed, Managers must identify the parts of their business that are most vulnerable to future similar shocks and prepare themselves by adopting a systematic approach of assessing ease of access to a given technology, as well as its effectiveness. Here, mindset is a critical ingredient in order to achieve a culture of cooperation and coordination across an entire operation, irrespective of location.

At the same time, businesses will need to increase their overall supply chain visibility and consider alternative future approaches to production. This could mean anything from shifting the centre of manufacturing to reducing the complexity of the finished product, or altogether changing the value proposition or business model – all options that managers should consider as a part of their long-term vision that digital solutions could help to achieve.

About McKayResearch

McKayResearch is an independent market intelligence consultancy specialising in trend analysis and custom research solutions. Informed by our multi-sector expertise spanning consumer, technology, and investment, our mission is to deliver broader data, deeper perspectives, and richer insights on which to base decision-making.

McKayResearch combines the agility and personal attention of a consultancy, with the reach and breadth of a larger market intelligence firm. When working with us, expert guidance will never be more than a call or email away, and you will benefit from a personalised service throughout the project journey.

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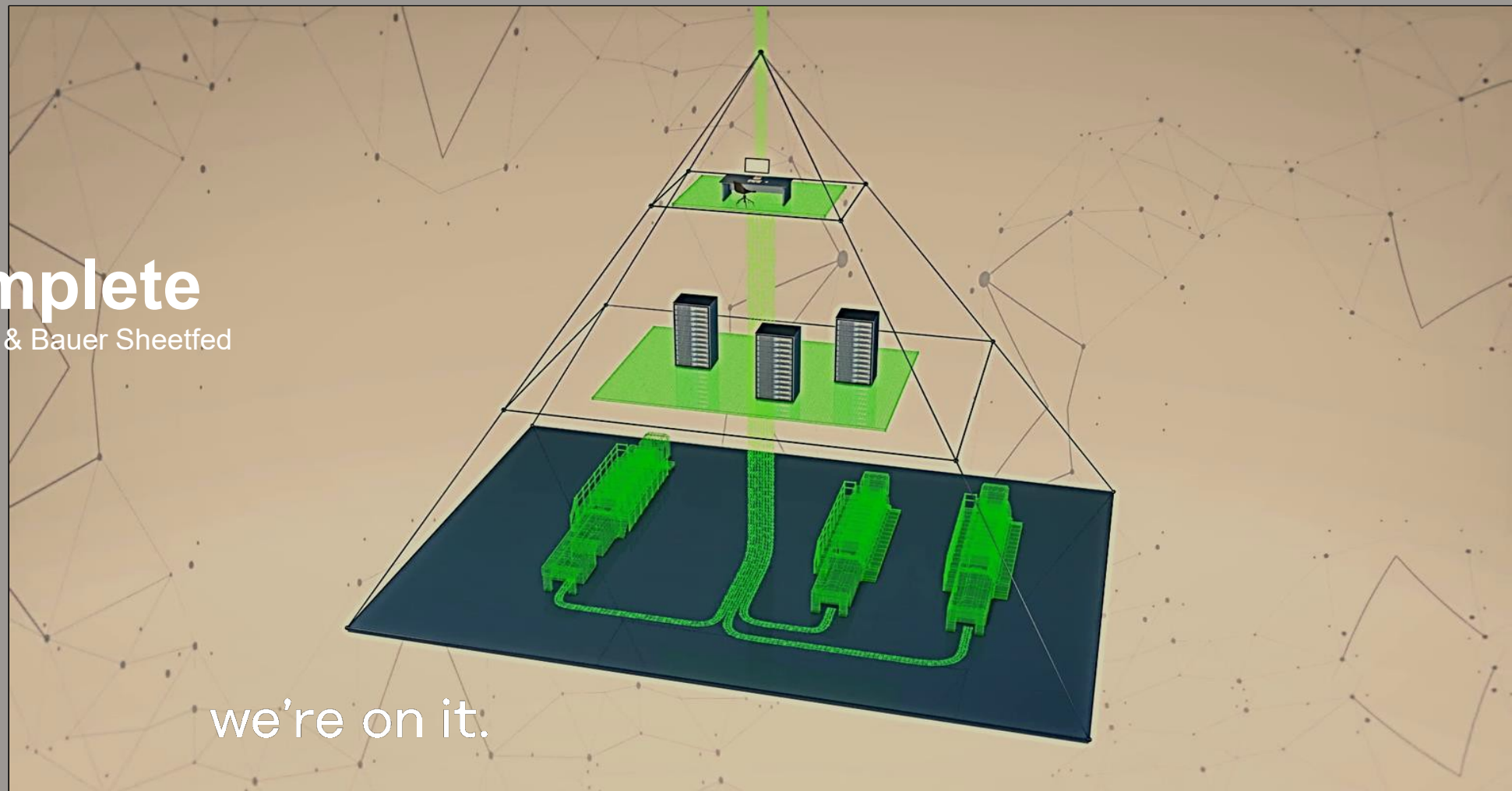
www.mckayresearch.com

Service Complete

Workflow Solutions by Koenig & Bauer Sheetfed



Koenig & Bauer Sheetfed – Service Complete

We make your business more profitable

Service Complete – Analysis

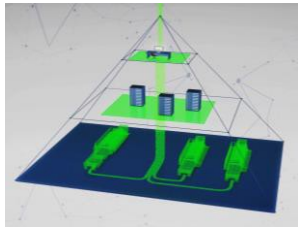
- Process Optimization
- Performance Report

Service Complete – Project Management

- Project planning
- Delivery
- Assembly
- Instruction
- Machine take over

Service Complete – Workflow

- More efficient processes
- Comprehensive project support with expertise
- Cost transparency and clearly measurable ROI



- Workflow Consulting
- Workflow Software
- Workflow After-Sales

Service Complete – Training

- on-site-training
- Training Centre Radebeul

Service Complete – Environmental efficiency

- Energy-saving drying technologies
- Intelligent energy management
- Climate Neutral Production

Service Complete – Workflow Solutions

We make your business more profitable

- The „game-changer“
- Workflow Partnership
- Complete Workflow
- „Top Floor“ – MIS/ERP
- „Shop Floor“ – MES/PPC
- Connectivity / Interfaces
- Case studies / Best Practice

KOENIG & BAUER

The „game-changer“

Koenig & Bauer 4.0

Internet of Things | Unlimited Possibilities

- **Industry 4.0**
- **Cloud Computing**
- **Fog Computing (decentralized Cloudlets)**
- **M2M Communication**
- **Augmented Reality**
- **Big Data Analysis**
- **Smart Robots/Home**

Networked world of things | Everything becomes smart.

Welcome to smart factory

- The idea is a **smart** networked printing **factory**, permanently exchange information in the products, machines and tools built on RFID chips and sensors
- Machines can configure switch automatically between different tasks and assist the operator in their work themselves
- According to the study, about 50 billion networked devices are on the road in the **IoT** (Internet of Things) by 2020

Die Auflösung der Automatisierungspyramide

Mit der Smart Factory entstehen cloudbasierte Plattform Lösungen!

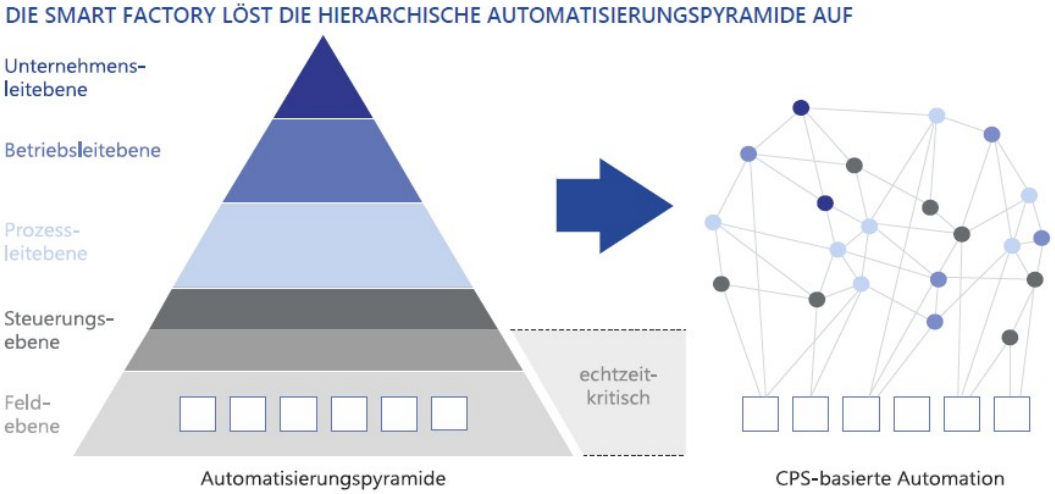


Abbildung 15: Auflösung der hierarchischen Automatisierungspyramide

Quelle: DGQ – Deutsche Gesellschaft für Qualität, Industrie 4.0 – Die vierte industrielle Revolution

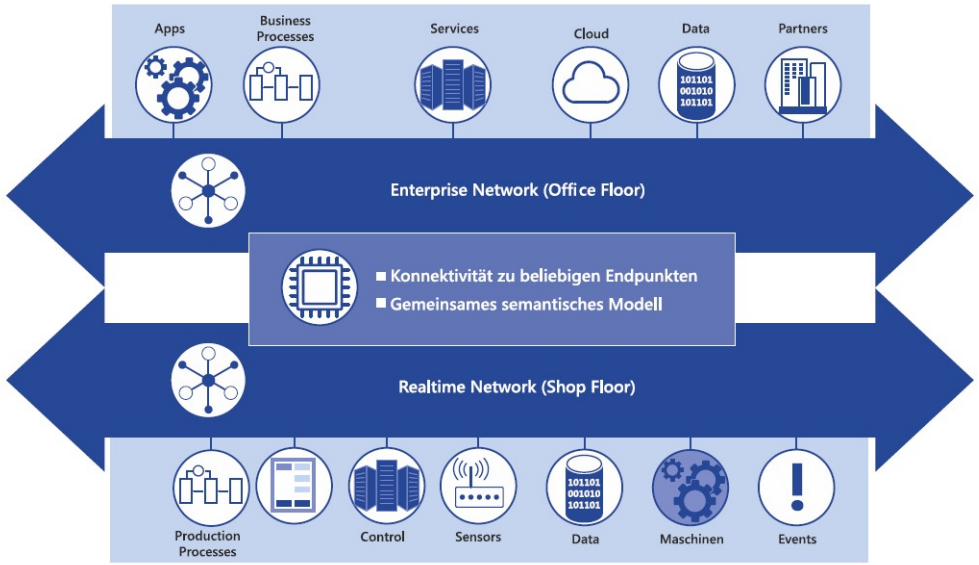
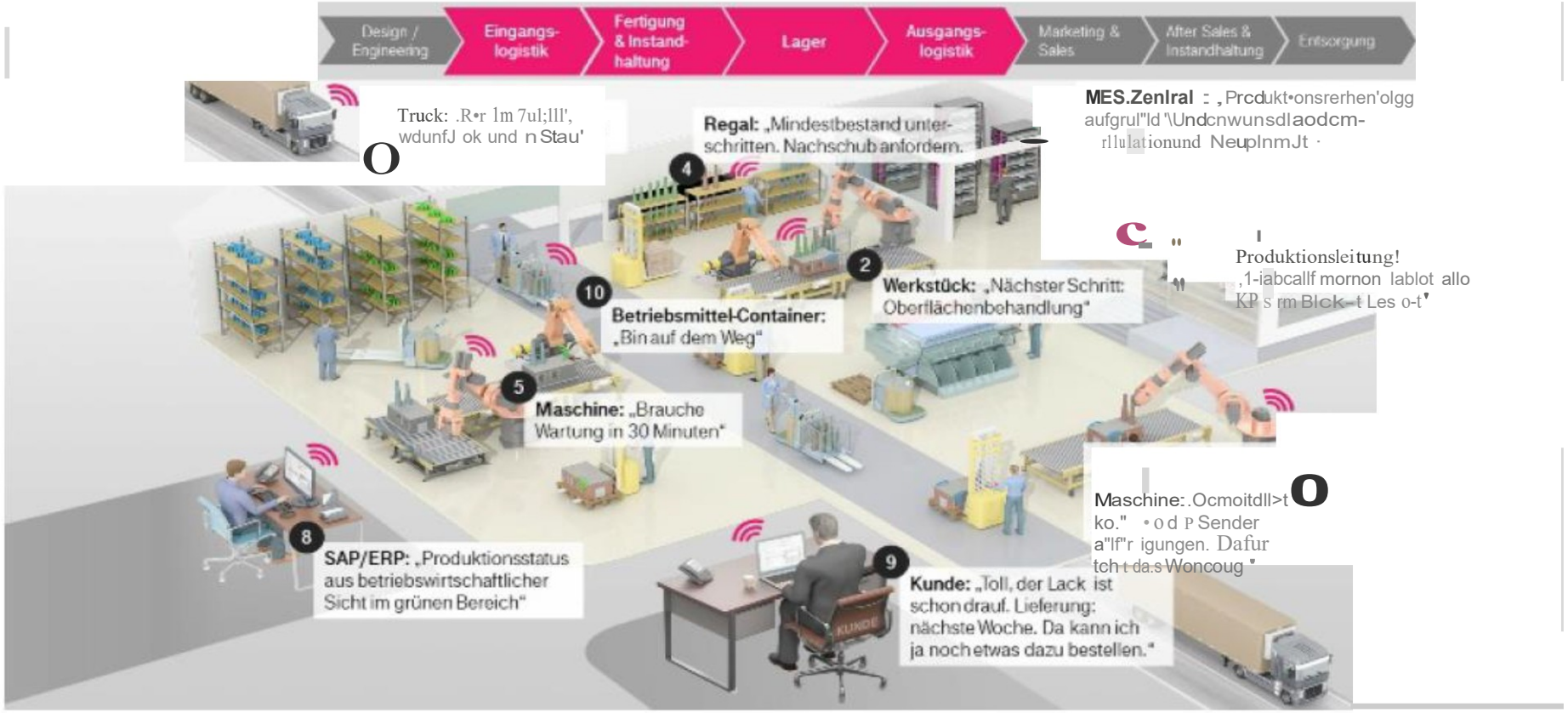


Abbildung 18: Gesamtbild Smart Factory: „Officefloor" und „Shopfloor"

Quelle: Plattform Industrie 4.0 (2013-2015), ein Projekt der Verbände BITKOM e. V., VDMA e. V. und ZVEI e.V, Umsetzungsstrategie Industrie 4.0. Ergebnisbericht der Plattform Industrie 4.0, 2015

Smart Factory mit Koenig & Bauer Sheetfed

DIE SMART FACTORY



Daten als Produktionsfaktor

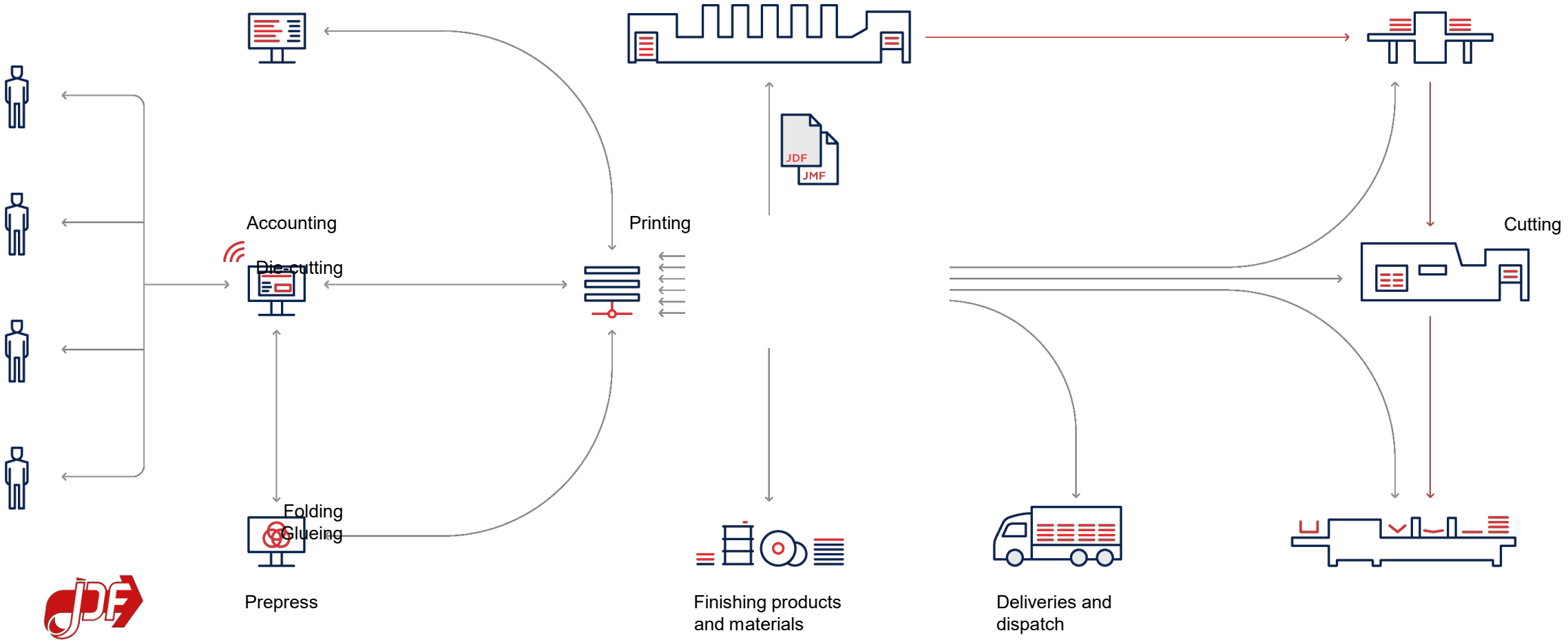
Benefit für uns und unsere Kunden

Quelle: L Ü N E N D O N K® - W H I T E P A P E R „ S M A R T F A C T O R Y “

- **Daten** der neue Rohstoff und damit als neuer Produktionsfaktor **zentraler Bestandteil von Digitalisierungsstrategien**

- **neue Herausforderungen hinsichtlich Speicherung und Strukturierung** dieser großen Datenmengen.
- **viele Unternehmen haben** noch **große Probleme**, **wichtige Kundeninformationen und Materialstammdaten für unterschiedliche Unternehmensanwendungen wie ERP oder CRM Systeme** zentral zu pflegen und anderen Systemen **bereitzustellen**
- In vielen Unternehmen gibt es folglich den einzigen Single Point of Truth (SPoT) noch nicht
- An dieser Stelle setzt **Stammdatenmanagement** an, welches einen kritischen Erfolgsfaktor bei der erfolgreichen Realisation von Digitalisierungsprojekten darstellt
- **Unternehmen, die in der Lage sind,** diese anfallenden **Datenmengen sinnvoll zu strukturieren, zu pflegen und zu interpretieren**, **werden** gegenüber der Konkurrenz Wettbewerbsvorteile erzielen können und somit **erfolgreicher am Markt agieren**

Über unsere Plattform - in Verbindung mit der Customer Community - wird eine WIN-WIN Situation entstehen!


JDF
JMF
Accounting
Die-cutting
Printing
Cutting
Folding
Gluieng
Prepress
Finishing products
and materials
Deliveries and
dispatch

Opportunities and challenges

- **More than 50% of German SMEs** are already engaged in **digital transformation**
- Already **today, almost half of industrial enterprises (46%) use industry 4.0 applications** to optimize existing processes
- Companies need to explore these possibilities now, if they want to succeed in the digital economy
- Investments in the optimization of production chains and delivery routes have to be made, otherwise you run the risk of no longer being competitive
- Common and mature standards are the basis for secure solutions
- **Intelligent security systems** for businesses to ensure a minimum of security and to prevent cybercrime

The digital chain under control | From the beginning.

IoT-Applications

- **Not limited to production**, but in industrial processes, production, logistics and downstream services
- Networking solutions as a **continuous digital chain** from inquiry to post-calculation

Trends

- **Smart logistics** (for example via AGV's as in the Schur logistics)
- **Internet-based services and technologies** for classical products (e.g., worldwide access to product data) or cloud services (e.g., as tracking tools for material or vehicles)
- Integration of the **Smart Factory** into cross-sectoral value-added networks creates the **possibility to produce individualized products** to conditions of extremely flexible high volume production

New working world

- New flexible working models through digital change
- **Digital transformation** requires extensive knowledge of technological developments
- Changes create completely **new business models**
- Common **communication networks** between man and machine
- From highest importance in the future is the ability to think far away off from an usual scheme and to have good ideas as well
- **Creative abilities, in particular, limit us humans to machines** that will carry out routine work in the future

Complete | Workflow Partnership

Koenig & Bauer and Optimus | 5 Years of success

8,000

Optimus single user world-wide

400

Running MIS systems world-wide

30

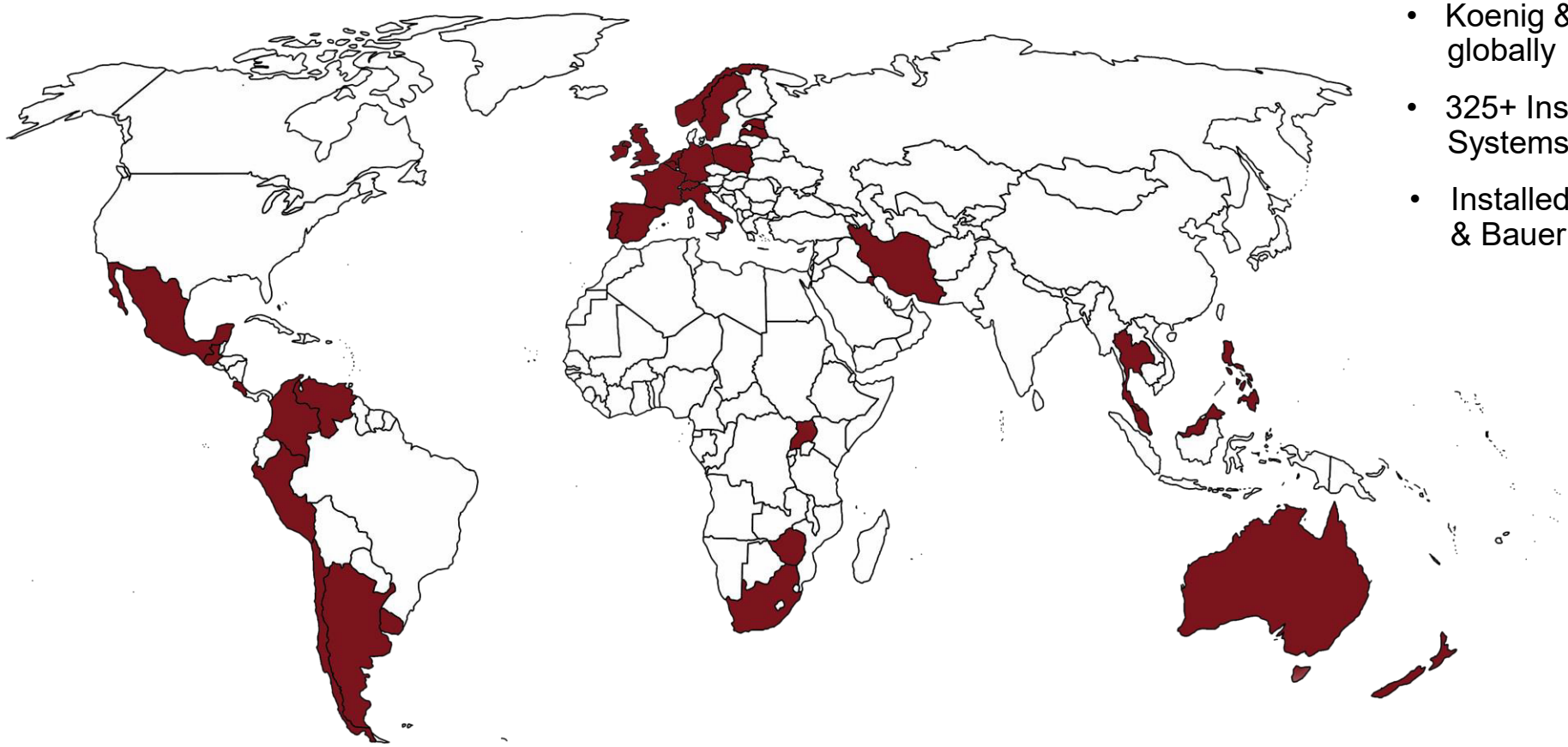
MIS systems sold together with Koenig & Bauer

10,000

Jobs created world-wide per diem via Optimus

Complete | Workflow Partnership

MIS systems as a part of Koenig & Bauer's wider value added proposition to market



- Koenig & Bauer and Optimus trade globally
- 325+ Installations of Optimus MIS Systems around the globe
- Installed in 35 countries with 25 Koenig & Bauer installations

Complete | Workflow Partnership

Optimus is supplying MIS to the Print & Graphic Arts for 34 years

1982

First Optimus MIS system developed by **Optichrome** printers

1990

Remote data collection released

2001

Optimus goes **Windows based** Launching V16

2002

Estimating pro+ was launched

2004

Version 18 of Optimus 2020 launched

2007

MBO of Optimus

2010

Launch of new process led dash engine

2011

Optimus dash wins **EDP Award**

2014

K&B **Partnership** announced

2015

Xerox Partnership announced

2017

Launch of UNI Code version

2019

K&B **Cooperation Contract** signed


Frank Nowak,
VP Service, Koenig & Bauer Sheetfed AG & Co. KG
Koenig & Bauer Sheetfed

Workflow | What CEO‘s need to know about Automation!

It isn’t sexy, nor is it easy, but it’s very profitable…

- 60% Printers who have prioritized investing in Workflow Automation
- 277% Average ROI for JDF-enabled automation
- 480% Average ROI for fully automated, end-to-end automation
- 6979 Average labor hours saved/year by printers who implement JDF

Sources: InfoTrends’ Production Software Investment Outlook and CIP4 CIPPI Case Studies

Complete | Differentiation through Integration

- Every printhouse is different
- The decisive for new investments today is therefore the **ability to integrate** ...
- Innovative process optimization in this context means the **JDF networking** of machines and systems from different manufacturers
- Koenig & Bauer partners Optimus, Kodak and Esko, as well as solutions from other manufacturers, can be optimally integrated into the **Complete Production Workflow**
- Communication gaps in the workflow are closed
- The result is an **end-to-end JDF-based overall process** with a constant exchange of information in **real time.**

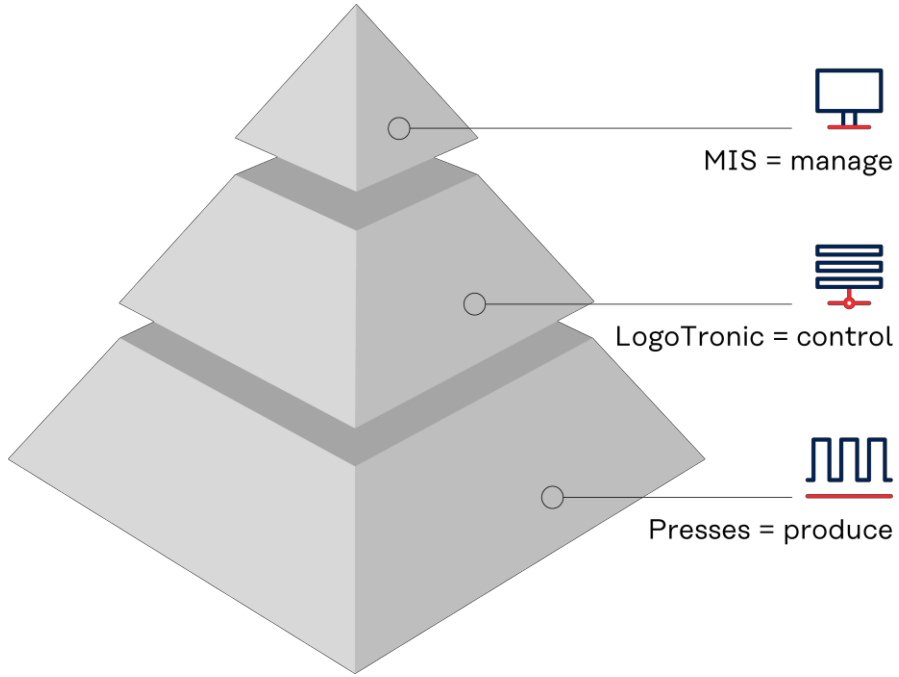
Complete | Analyze with expertise

- Koenig & Bauer is a competent partner for process optimisation
- **Analysis** of the systems and processes to be networked **as the basis** for an innovative solution
- With proven expertise we release potentials
- common definition of measurable objectives with our customers
- Development of a **tailor-made** integrated networking **solution** on a **project basis**

Complete | Koenig & Bauer 4.0

Real-time communication revolutionizes industrial production

- The transformation into a **Smart Printing Factory** requires close integration of all processes
- The most important pillar for this is the connection of production – the **shop floor** - to the business systems of the **top floor**
- Standardized data exchange formats, e.g. **PDF, PPF, JDF** or **xJDF** serve this
- All process steps along the value chain are structured, analyzed and made available throughout the company
- Status- and operational data are available from the shop floor in **real-time** in the **MIS/ERP system**, the top floor
- So arises the necessary transparency for **planning and control** across divisions
- **Faster** and more flexible **response to customer requirements** are possible



Complete | Intelligent Networking with Workflow Software

Management Executive System-Software (MES/PPC)

- Production Controller and Gateway toward MIS, Prepress-, Press- and Postpress technique
- **KBA LogoTronic Professional** delivers machine presetting data and sends back operational and resource data in real-time to the MIS

Management Information System-Software (MIS/ERP)

- Control center in the networked printing plant
- **Complete Optimus Dash** is an award-winning global MIS solution for modern packaging, commercial, web- and digital printers.
- **Complete Optimus Start** is an ideal MIS entry-level solution.
  It convinces through low investment costs and easy implementation

Complete | Workflow Software – Suite

	Entry Level	Pro Level	W2P	Special Solutions
MIS Software	Complete Optimus START	Complete Optimus DASH	Complete Optimus Cloud W2P Complete Optimus Cloud Mobile	Complete Optimus CRM Complete Optimus Packaging Modul 1) Complete Optimus Scheduler
MES Software	None	Complete LogoTronic Professional		Complete DataMatrix Select
Prepress-Interface	Complete LogoTronic CIPLinkX			Complete VisuTable Complete Cockpit
MIS/MES Connectivity	Complete Optimus RDC Complete Optimus Connect	Complete Optimus JDF Control		
MIS/MES Interfaces		JDF-MIS Interface XML-MIS Interface ODBC-MIS Interface		

1) for Commercial- and Label Printers as Sheet Optimizer available

Complete | Optimizing workflows in after-sales service

Successful Realignment with a 360-degree view at the company

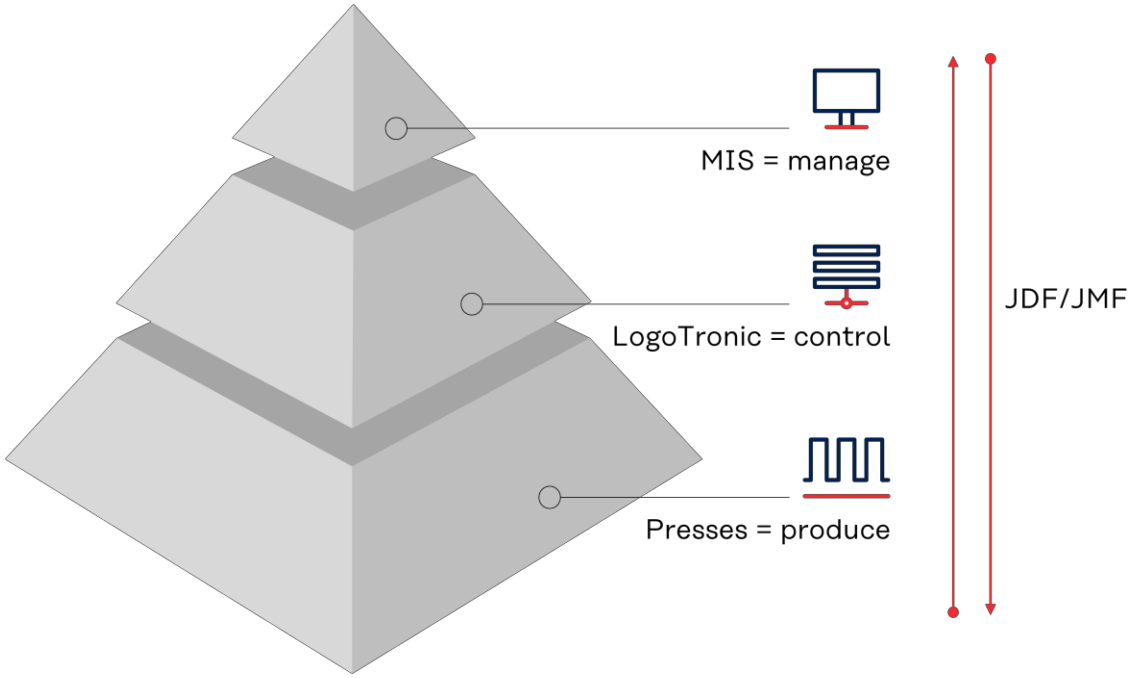
- The development of a **Smart Printing Factory** is a far-reaching process of change.
- With our knowledge of **benchmarks** and **technological expertise**, we support our customers in the **digital transformation** process
- **Optimized workflows** are created by linking all data from inquiry to post-calculation
- Seamless data flow with **standardized data exchange formats**
- Staff training, remote maintenance, regular updates and software upgrades round off our service

Smart Printing Factory becomes reality - Koenig & Bauer accompanies you!

Complete | Take Benefit and increase rentability

- Increased **efficiency** and **effectiveness** through Service Complete
- **Full control** over all sales activities, business processes and costs
- Takeover of all process-relevant data from the MIS to the machine control consoles
- **Shorter make-ready** times through supply of machine presetting and repro data
- **Real-time** collection of performance data as the basis for successful lean management
- **Automatic feedback** of operational- and resource data **into the post calculation**
- Exact post calculation and **clearly measurable return on investment (ROI)**
- Reducing faults through **standardization** of work processes
- Optimized material management by accurate consumption recording

Complete | MIS Systems for fast and flexible workflows



Complete MIS Solutions:

- The Heart of the company for full control of all business processes and cost
- Eliminating non-value added processes through optimized customer and order management
- Modular and customizable for standardized workflows in a "closed loop“
- Save time, increase sales and profit through streamlined processes (lean management)
- And provide above all - management information!

Complete | MIS Software – Overview

The smart and powerful drive of your printhouse

Complete MIS Software

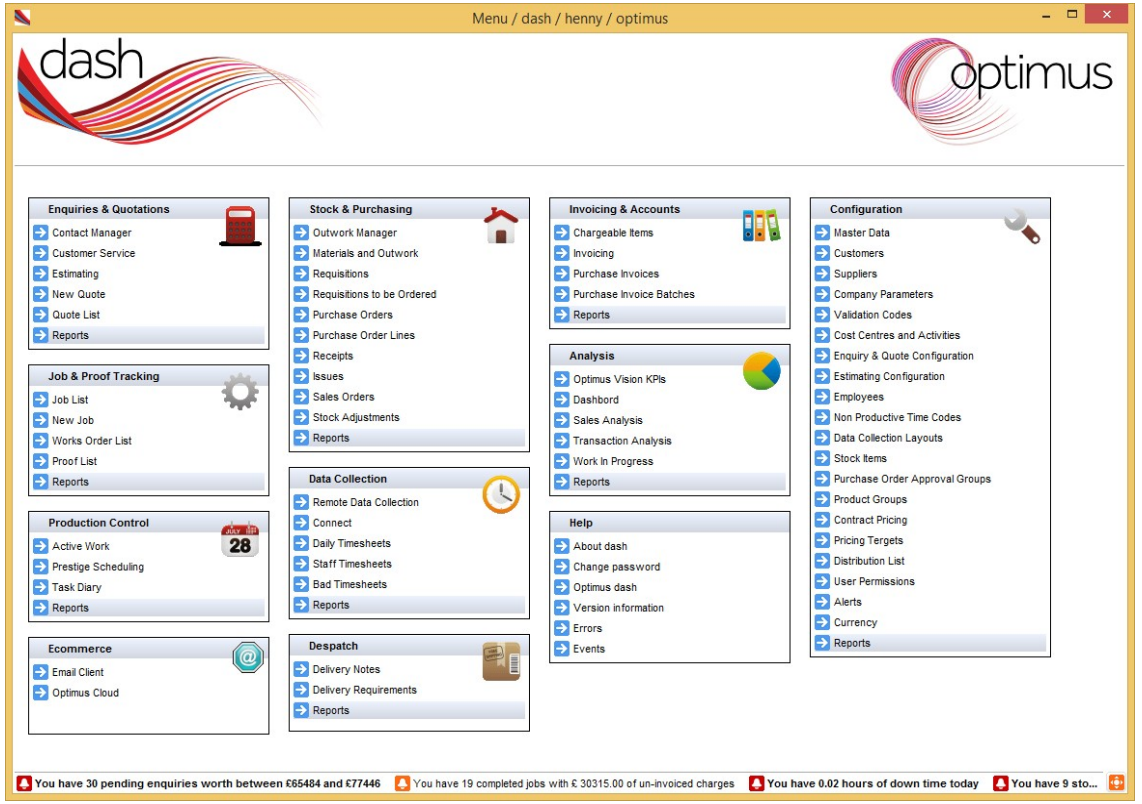
Optimus MIS – Software Solutions
Revolutionary **Dash MIS** with unique functionality, no matter which process or substrate
Optimus Start as a scalable MIS solution that can growth with your business
Optimus Cloud W2P – Web to Print solution for print providers and their customers (B2B)
Optimus Cloud Mobile – Empowering your sales team

Optimus MIS – Special Solutions
Optimus Packaging module, incl. Optimus Impose - additional module, designed for folding carton producers
Sheet Optimizer, incl. Optimus Impose – additional module, especially for the sheet optimization of commercial prints
Optimus CRM – Web-based module to empower the sales team
Optimus Xerox Freeflow Link - a full end-to-end integrated workflow for digital production. **Optimus XMPie Web 2 Print Integration** - A two way integration with the XMPie Web to Print

Complete | MIS Software – Optimus

The Unique Approach!

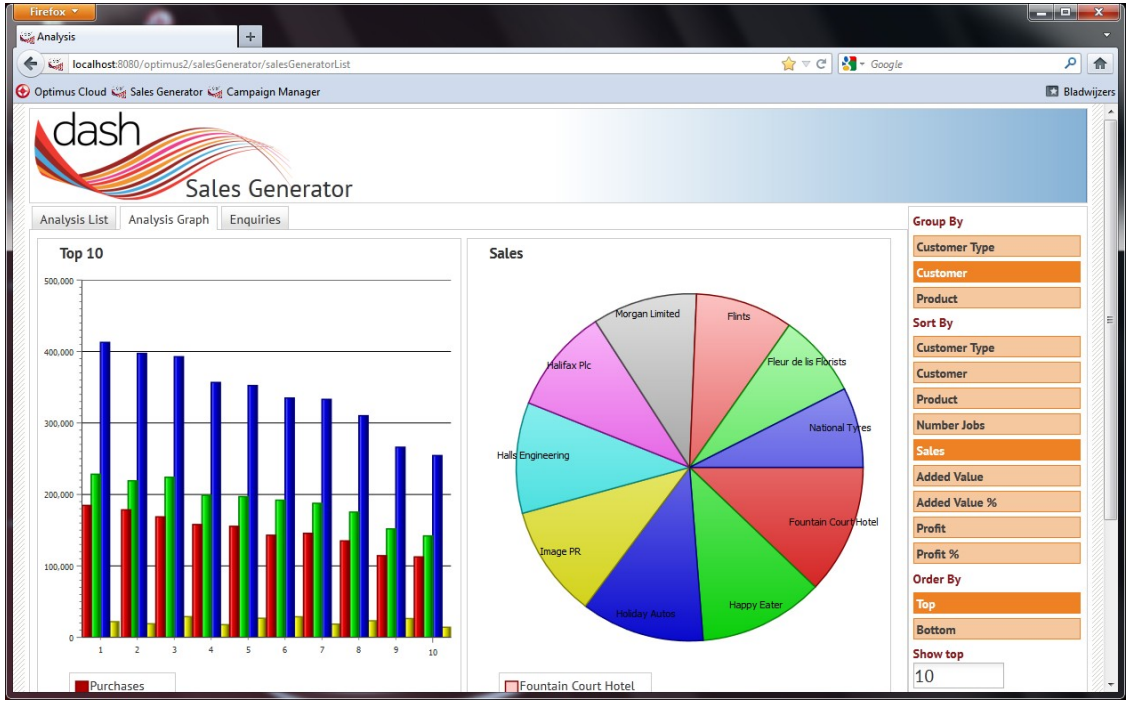
- **Global MIS Solution** for Packaging-, Commercial-, Label-, Flexo-, Metal-, Webfed- or/and Digital Printers, „step by step“ expandable
- **Optimus Dash** handles all the processes that an modern **MIS** must be able to deal with
- System offers common sense automation and functionality using revolutionary new powerful and **flexible templates**
- Intuitive user interfaces for less learning effort
- **Any substrate, any process** – once produced, **Dash** manages It!
- The generating and sending of invoices and having powerful, easily accessible reporting are also important ‘givens’



Complete | MIS Software – Optimus Dash

Basic functions

- **Main Module (mandatory), includes: 5 concurrent user licenses** providing manual Estimating, Job System, Proof Tracking, Job Ticket, Job Files, Stock System, Shipping, Invoicing, Active Work Screen, Sales & Transaction Analysis, WIP Summary & Multi Currency
- **Sales Enquiry & calculation engine;** easily create rapid and precise quotations and the automatic generation of a complete production order
- **Desktop alerts;** it ‘alerts’ the user to current key activities at a glance that may need immediate action
- **Task diary** provides instant views of individual tasks and associated data to facilitate production planning
- **Purchase order processing** for purchasing of paper, materials and outwork
- Dash **JDF Main Module**

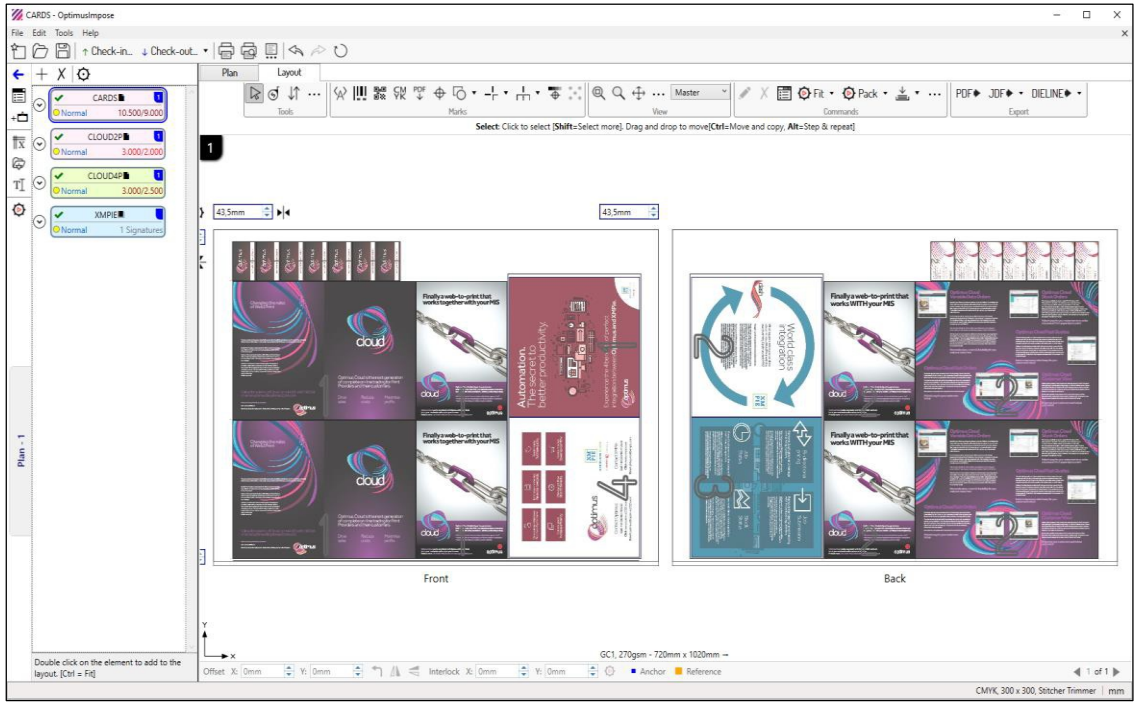


Complete | MIS Software – Optimus Dash

Options 1: Dash Packaging Module, incl. Optimus Impose

Packaging Modul – Maximum flexibility for packaging printers

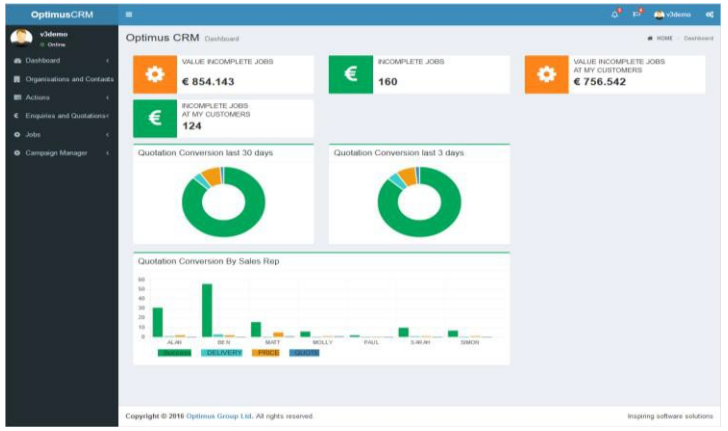
- **Optimus Dash** has been extended by a number of additional modules, **especially for folding carton producers**
- **Enhanced features** in estimating, sales order handling, stock control
- **Option to fully automatically create production jobs** based on a database of information about shapes, cutting knifes and end products
- To create **packing impositions (complete with inter-locking)** based on existing or newly to be created die knifes
- result is a **complete imposed PDF** being automatically created for the database information

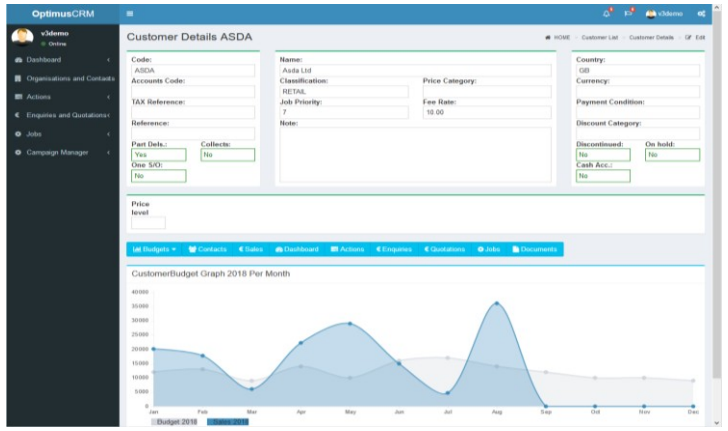


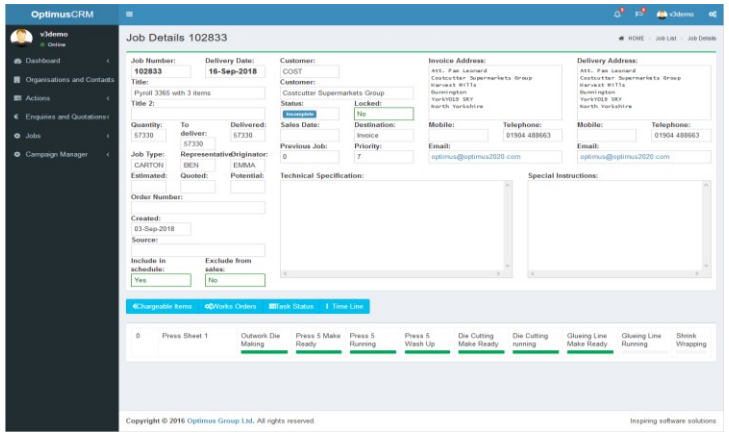
Complete | MIS Software – Optimus Dash

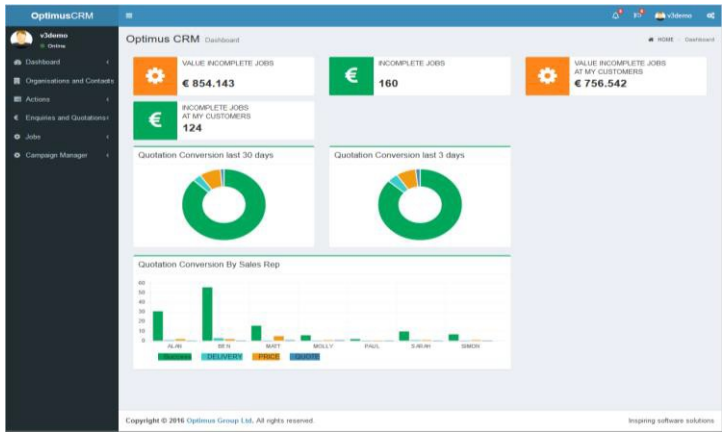
Options 2: Dash CRM Module (New)

- A Dashboard with widgets to show **high level commercial information,** e.g. Sales per period, Top 10 customers etc.
- Display and editing of customers contact data and characteristics of a contact
- Display and edit of customer sales budgets
- Planning and/or recording of Actions to plan, Recording of visit reports with description and follow on actions
- Display and search and tracking of outstanding quotations
- Display, search and tracking of production jobs
- Campaign Manager for sales campaigns





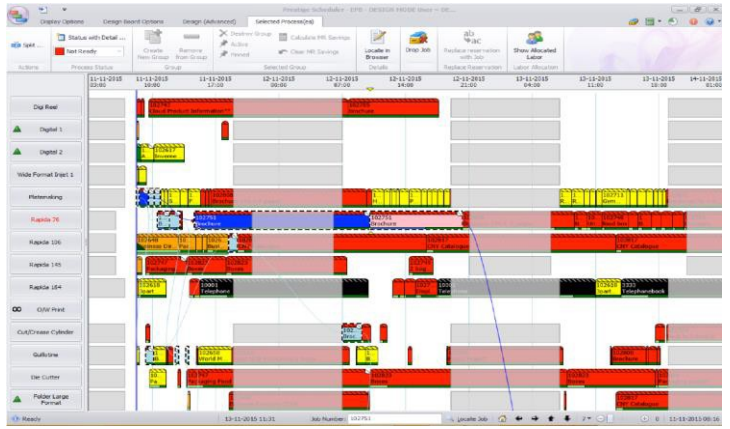


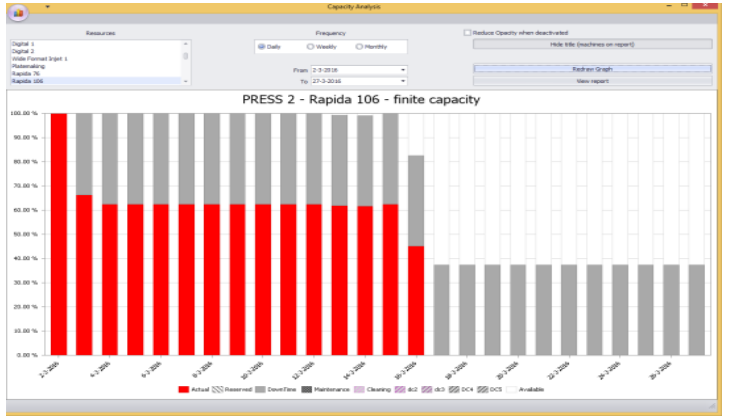


Complete | MIS Software – Optimus Dash

Options 3: Optimus Scheduler (digital planning board)

- **Optimus Scheduler** providing real-time dynamic scheduling and capacity planning functionality that can be used as stand-alone or integrated with Optimus
- Forward, backward and Mid-point scheduling
- Producing of Work-To Lists
- Direct updated from LogoTronic, Optimus Connect, Optimus Remote Data Collection and Optimus JDF Main module
- Direct updates back into the Optimus Job Management System
- The ability to generate a ‘What if’ scenario
- Group processes or job parts that must stay together
- Jobs can also be re-scheduled onto an alternative, available resource with required times being automatically recalculated for the new resource
- Optimus Scheduler has an additional visual feature ‘connecting curves’ which allows the user to see the connections of the job parts scheduled on different resources.
- Optimus Scheduler provides the Production Planner with complete job details



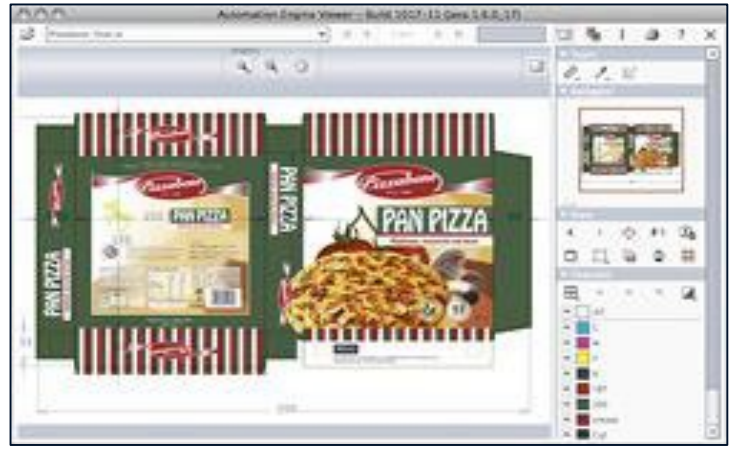


Complete | MIS Software – Optimus Dash

Options 4: Optimus and Esko, Integrated workflow for Packaging Printers

Dash and Esko Automation Engine

- Once a new folding carton is created in **Dash** a **JDF** is send to **Esko AE** with details of the article (number, customer name etc.)
- In **Esko AE** this leads to the creation of a **new product** with all the folders and files required for the one-up artwork production, proofing and approval
- When the one-up is approved a JDF is send from Esko AE to Dash with product details
- In **Dash** we **read the colour information** (separations in the final **PDF**) and extract the ink coverage and store the colour data in the optimus database
- When a production job is booked in and planned on a specific press a JDF is send from Optimus to Esko AE with the production details
- This JDF will point to the **imposed PDF** that has been created by **IMP**. This imposed PDFs (one for each press sheet) has all the one-up marks
- The press marks (colour bar etc) will be added by Esko AE and the resulting flat will be send to the **RIP** for plate making



Complete | MIS Software – Optimus Dash

Options 5: Optimus and Xerox, World class integration

What happens when you combine a best-in-class Web2Print with the award winning Optimus Dash MIS? You get a perfect system for your print business.

One contact database. Accessed by everyone.

Estimates in minutes. Revisions in secondes.

Tender easily. Purchase quickly.

Control stock. Increase efficiency.

Manage job flow. Stop bottlenecks.

Invoice in a click. Speed up cashflow.

Complete | MIS Software – Optimus Dash

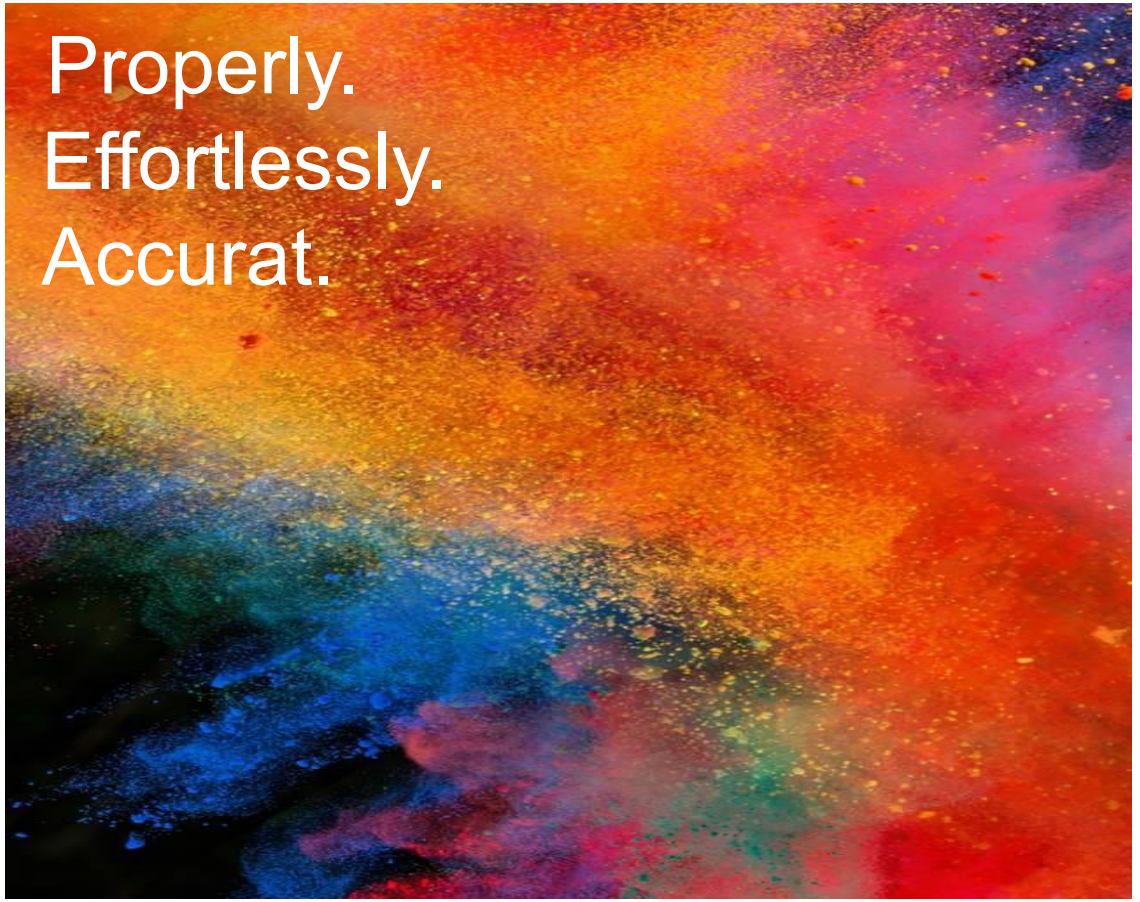
Options 5: Optimus and Xerox, integrated digital End-to-End workflow

XMPie Web2Print Integration

- A bidirectional integration to print with the **XMPie** web applications
- Products from **Optimus** can be accessed in real-time and the product prices are displayed on the websites in XMPie
- Orders that are placed in XMPie automatically flow into **Dash**
- Creation of complete production orders, job tracking in **real time**
- Status messages from production flowing back from Optimus into XMPie

Xerox Freeflow link

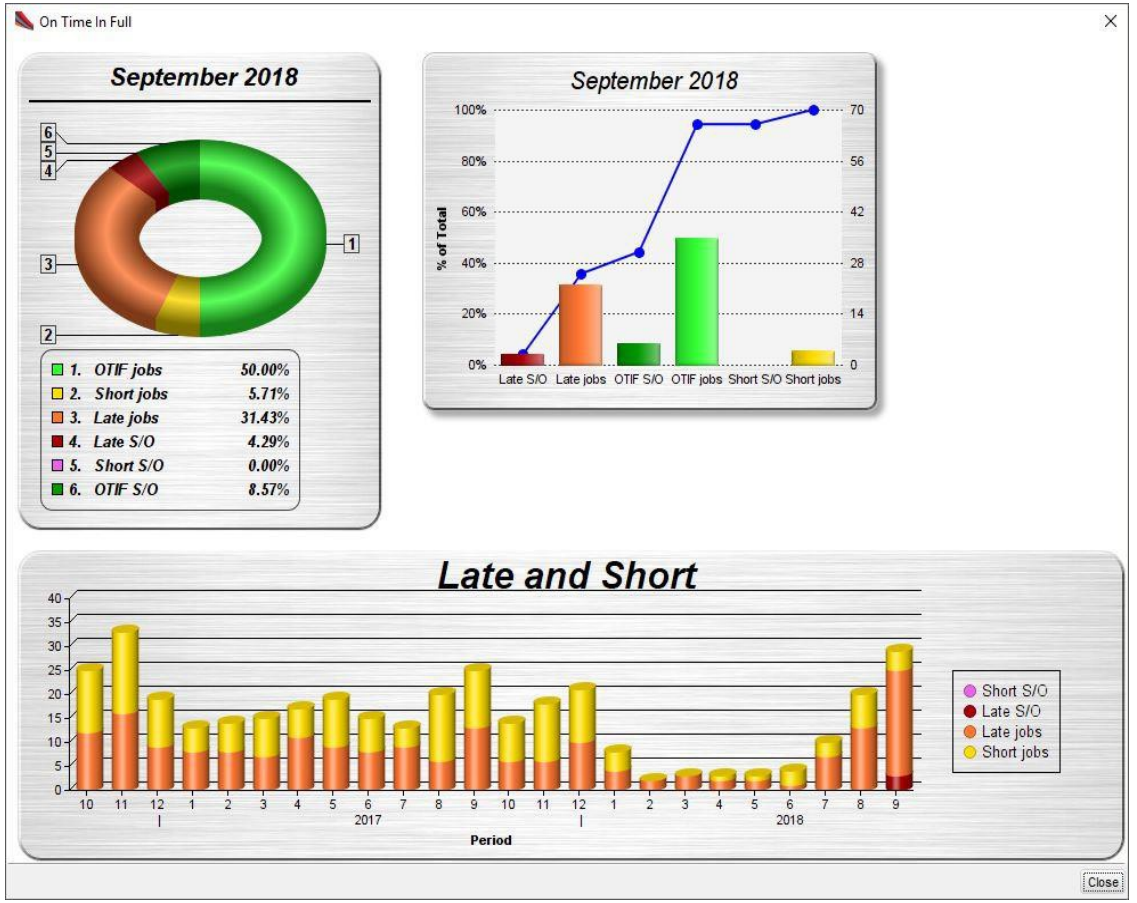
- Purchase orders from Optimus can be transferred to the **Xerox Freeflow** workflow system for production within an automated print workflow
- Combined with XMPie Web2Print integration, this enables a **fully integrated end-to-end workflow** for digital production



Complete | MIS Software – Optimus Dash

Options 6: further options

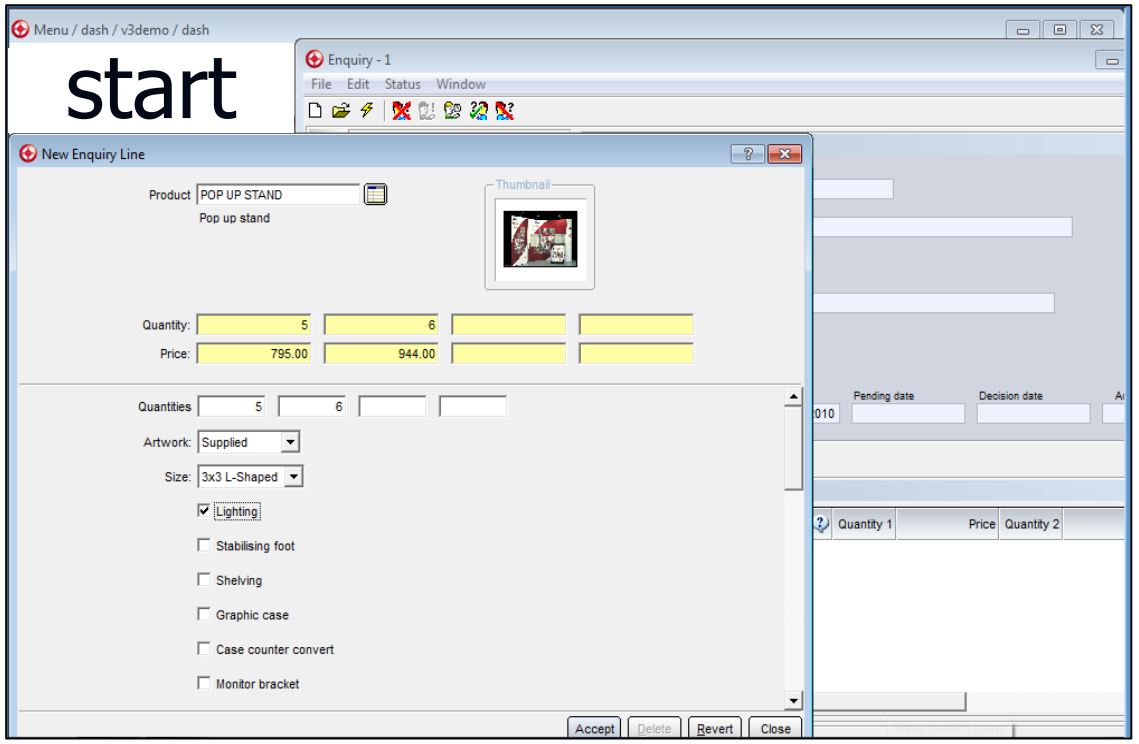
- **Vision KPI** to identify **Key Performance Indicators** on an operational level
- **Sales order processing** to process orders delivered directly from the warehouse
- **Outwork manager** for automated inquiries to different suppliers
- **Optimus RDC** is a browser based tool to record the time spent on the task within the Job
- **Optimus connect;** semi-automatic connection of non JDF-capable machines (via PLC)
- **Accounts link** for connection to an accounting system



Complete | MIS Software – Optimus Start

An scalable MIS that can growth with your business

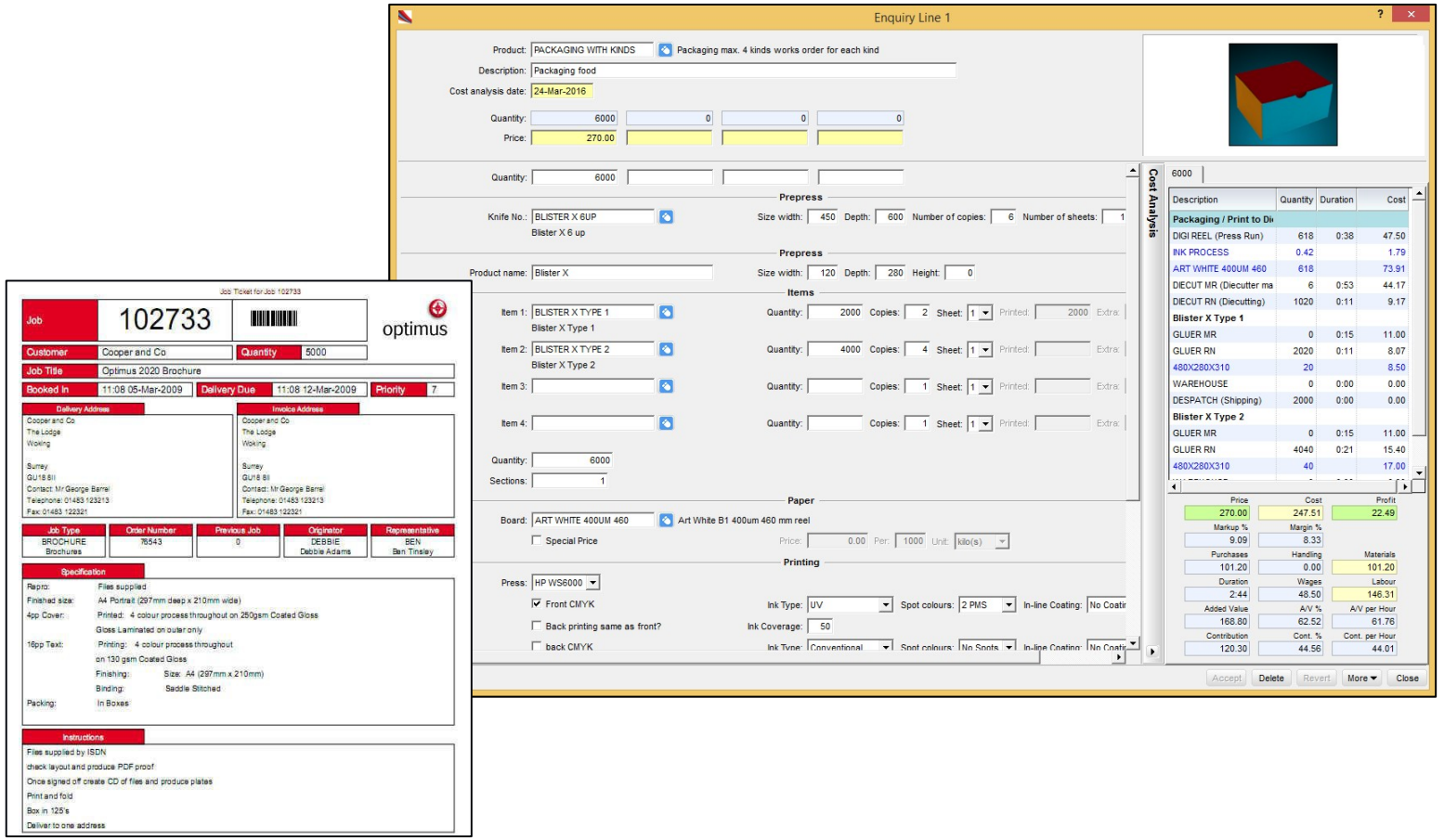
- **Entry-level MIS Solution** for all fields of application and markets „step by step“ expandable
- The award winning attributes of **Dash** have been incorporated into **Optimus Start**
- **Any substrate, any process!**
- Start offers common sense automation using **powerful and flexible templates**
- Available in **all languages**
- **Migration to Dash** is possible **at any time**
- **Attractive pricing model**, especially for "emerging markets“
- **no** mandatory **Software Maintenance Fee**



Complete | MIS Software – Optimus Start

Basic functions

- **Main Module (mandatory), incl. 1 concurrent user license**, with manual Estimating, Job System, Proof Tracking, Job Ticket, Job Files, Stock System, Dispatch, Invoicing, Active Work Screen, Sales & Transaction Analysis, WIP Summary & Multi Currency
- **Sales Enquiry & calculation engine;** easily create rapid and precise quotations and the automatic generation of a complete production order



Complete | MIS Software – Optimus Start

Options *)

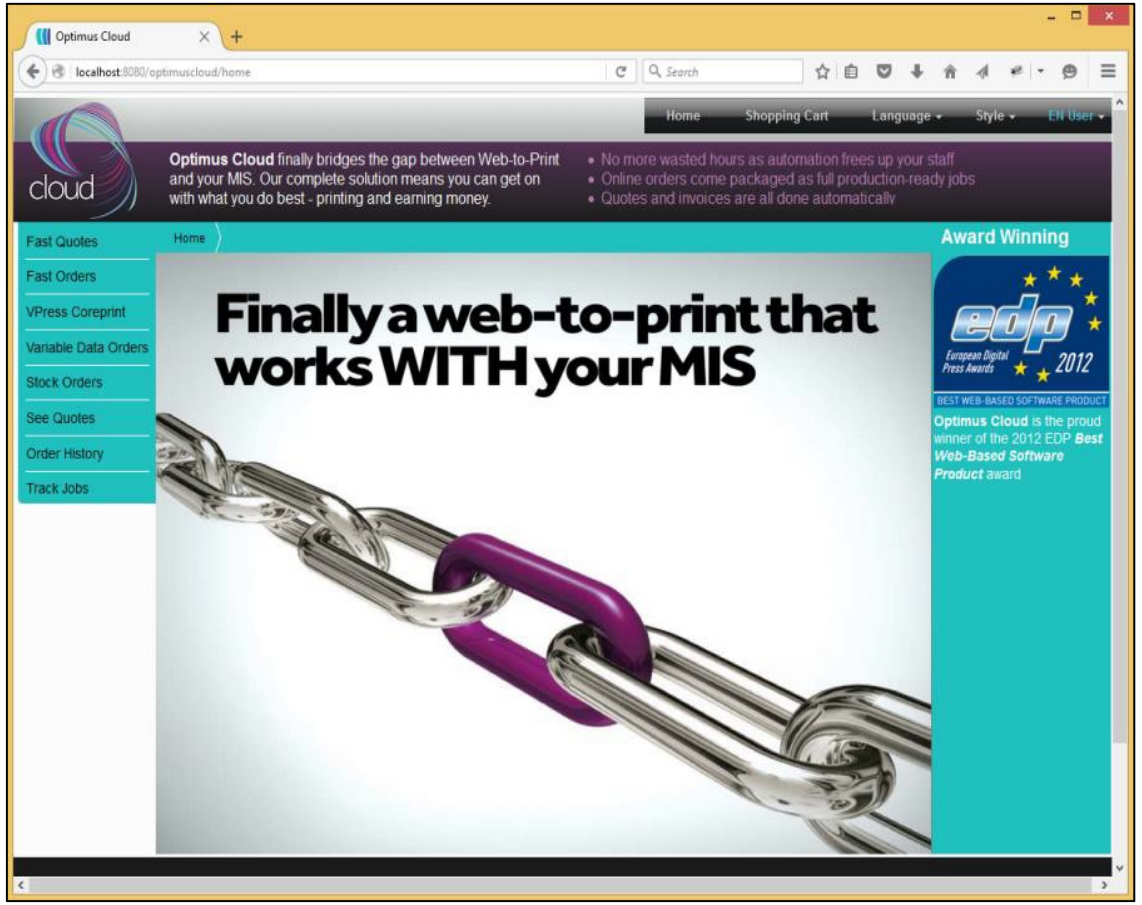
- **Purchase order processing** for purchasing of paper, materials and outwork
- **Optimus RDC**, is a browser based tool to record the time spent on the task within the Job
- **Optimus Connect,** semi-automatic connection of non JDF-capable machines (via PLC)
- **JDF Main Module**
- **Accounts link** for connection to an accounting system

***) All Dash Options available after Upgrade!**

Complete | MIS Software – Optimus Cloud W2P

A Web-to-Print that works with your MIS

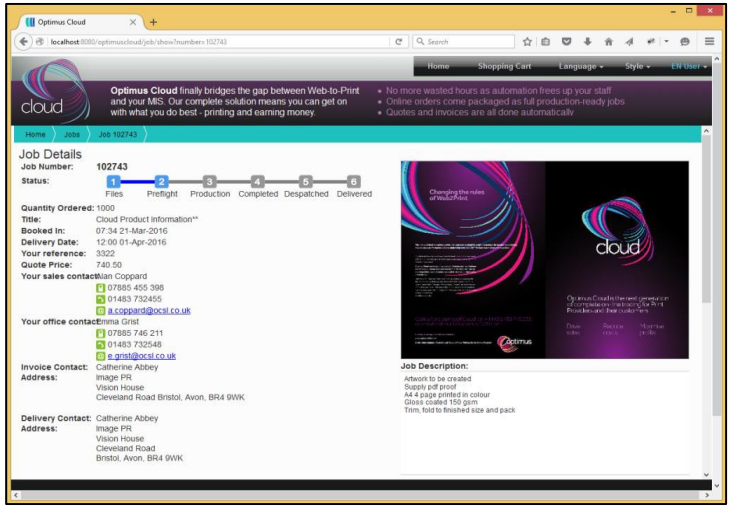
- Increase revenues, reduce unnecessary costs, obtain and improve customer loyalty – **Optimus Cloud** is the answer!
- Customers want accessible information - with **Cloud W2P** a matter of course
- Intuitive approach **to simplify and automate the purchasing of printing products**
- Quickly and precisely create offers, place orders, make stock call-offs or track orders
- Different products can be summarized in one purchase order
- **Optimus Cloud** is designed as a modular system and is seamless integrated into Optimus Dash
- Hidden administrative costs and multiple data entry are the past



Complete | MIS Software – Optimus Cloud W2P

Modules

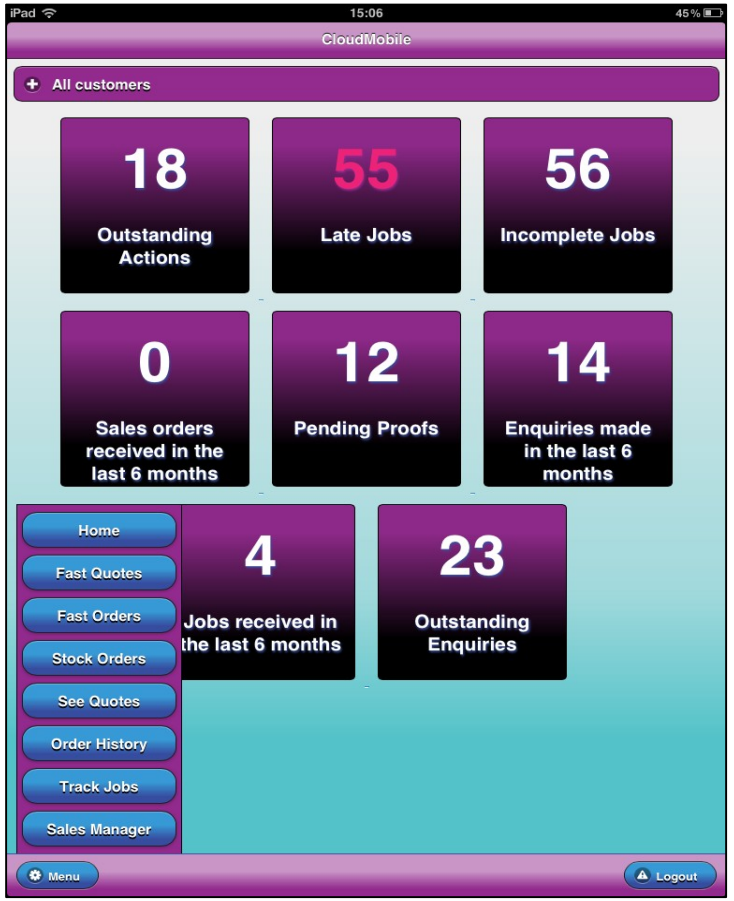
- **Cloud Fast Quotes** provides the Print Buyer with a price on screen, or he can request a hard copy with a simple click
- **Cloud Fast Orders** provides an simple purchase ordering process for the customer, once submitted, the order is automatically converted within Optimus Dash
- **Cloud Customer View:** Provides simple and easy access for the print buyer to get a full and comprehensive view of sales, financial or production information
- **Cloud Stock Orders:** Finished goods for sale online; Customer is able to view stock levels to ensure there are sufficient finished goods available
- **Cloud Variable Data Orders (available for EU):** Seamless integration with InDesign; Ability to import/export of customer-specific Indesign-Templates; The customer can directly edit and order their products. A print ready PDF file is also generated
- All processes are completed fully automated without intervention from the Provider!



Complete | MIS Software – Optimus Cloud Mobile

Empowering the Sales Team

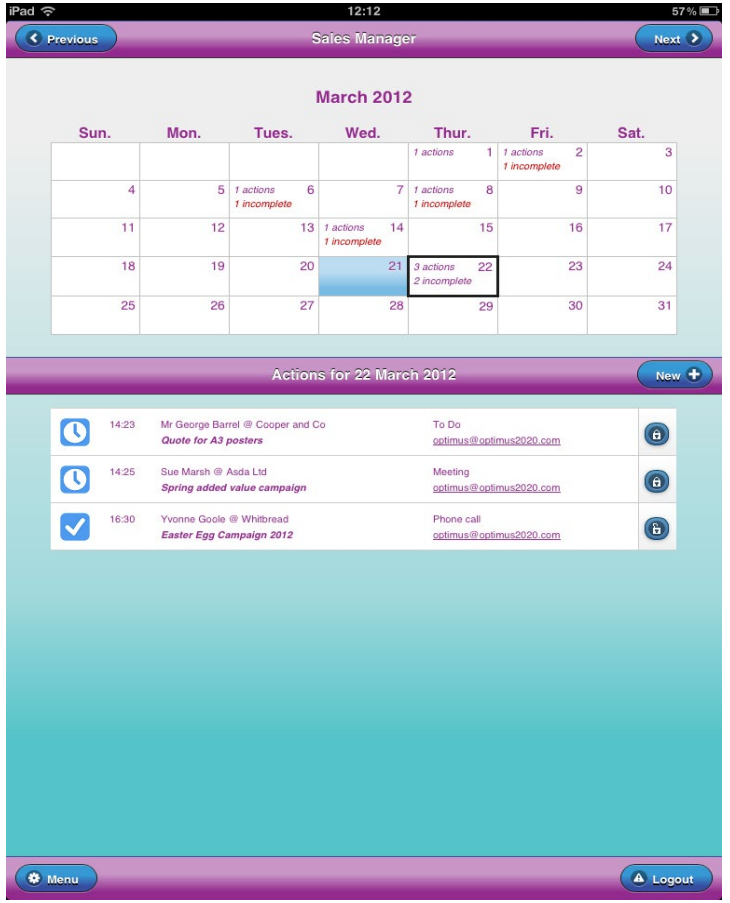
- **Cloud Mobile** is designed for tablet devices
- Based on the characteristics of **Dash** and **Cloud W2P**
- With Cloud Mobile, you do not miss a sales opportunity
- Provide instant, accurate quotations, take orders and provide customer specific information - all whilst visiting your customers
- Boost the sales activities by reducing paperwork
- Precise and fast submitting offers
- Fast processing of purchase orders
- All activities performed within **Cloud Mobile** will automatically appear within **Dash**
- Significant, hidden costs of re-keying and duplication of effort disappears
- Huge time saver, simple and intuitive usage



Complete | MIS Software – Optimus Cloud Mobile

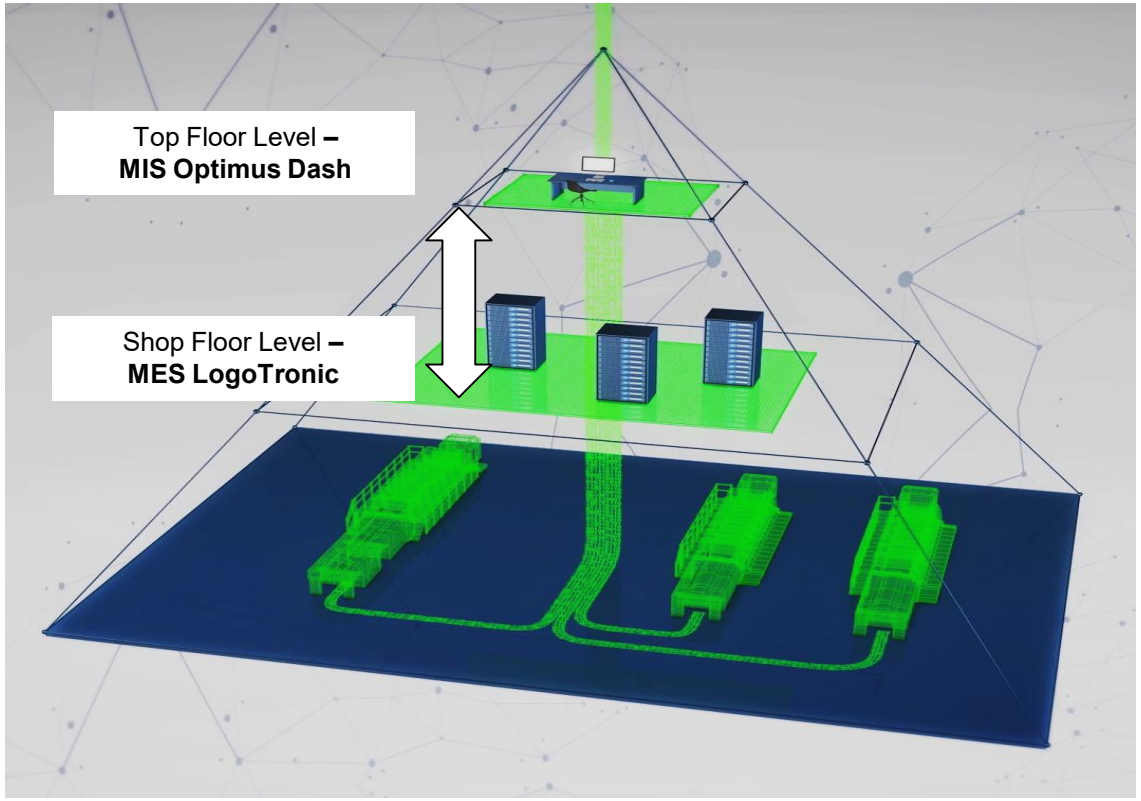
Modules

- **Cloud Mobile Fast Quotes:** Generates an instant price on screen and the quotation can be emailed immediately
- **Cloud Mobile Fast Orders**: Easy re-ordering, Capture Instant Buying Decisions
- **Cloud Mobile Stock Orders**: View the stock levels and call off stock items, If the items are re-ordered due to low stock levels, this will automatically appear in Dash as a full production job
- **Cloud Mobile Customer View**: Allows the Sales Representative to quickly and easily answer any questions raised by their customers
- **Cloud Mobile Sales Manager:** Provides the Sales Team with a diary view showing planned customer activities and contact required or completed, Synchronized with Dash, effective time management without multiple entries, Sales Manager allows Management a global view of the whole sales team – all by day, week and month



Complete | MES Systems for production control

The gateway from Shop Floor to Top Floor



Complete MES Solutions:

- To increase **Effectiveness and efficiency** of printing machinery
- For **automated machine presetting** and **acceleration of make-ready processes**
- For the **control, monitoring and analysis** of production
- As **gateway in Networking with an** MIS as **JDF Controller** and **JMF Messenger** of the production
- For **real-time communication** of order information from-, as well as operational and resource data to MIS
- **Basis for the analysis** of job costs **in post-calculation**
- **Automatic status updates** in the **digital planning board**
- **Production becomes transparent** - both for the operator, as well as production manager and controller a decisive advantage

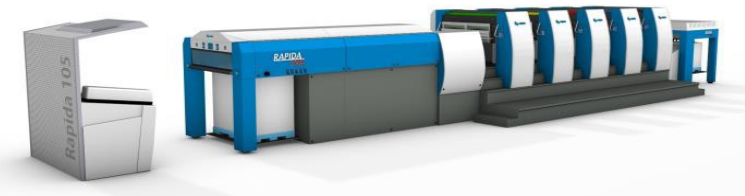
Complete | MES Software – Overview

The universal software for the Shop Floor

Complete MES Software

Complete MES – Software Solutions
LogoTronic Professional, CIP4 JDF-capable Production Planning- and Control software to interact with MIS and Pre-press
LogoTronic CIPLinkX – Interface to Prepress for converting the CIP3 PPF-data into preset data for the linked KBA presses

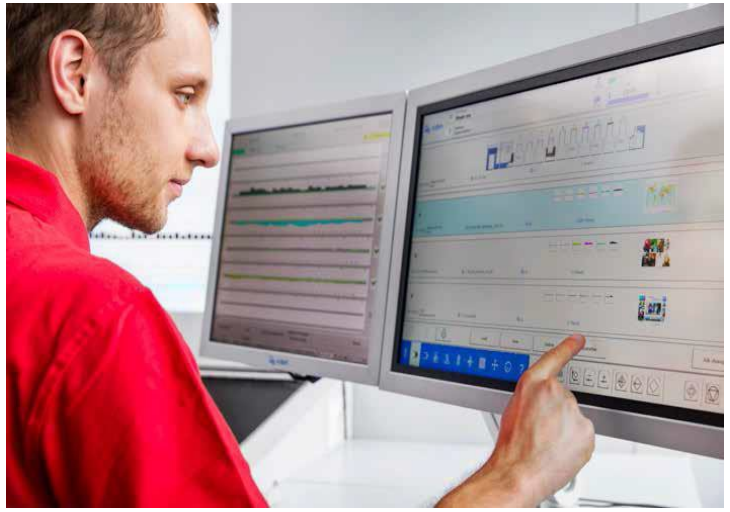
Complete MES – Special Solutions
MIS connection - additional interfaces for connection to MIS software (JDF, XML, ODBC)
Third-party connection - Software tools for linking machines from other vendors
LogoTronic Cockpit - Extension of the analysis functions for the representation of current production KPI's at a glance
LogoTronic Mobile - Mobile application for an access via web browser "on the go"!
LogoTronic Excellence Reports – Performance Indicators in one report



Complete | MES Software – LogoTronic Professional

The universal production controller

- Universal **MES software** for a clearly measurable **“Return-on-investment”!**
- Interface to Prepress for converting the **CIP3 PPF-data** into **preset data** for the linked KBA presses
- **Accelerate Make-ready** by taking over and saving of press preset- and repro data
- Real-time **Shop floor data collection** (SFDC)
- Jobtracking and Monitoring via **SpeedWatch©** and **PressWatch©**
- Order- and Processmanagement, with **flexible Reporting** functions
- Performance indicators always in view – Analysis and Benchmarking of **Key Performance Indicators** (KPI‘s) with **LogoTronic Cockpit©**
- Various **Interfaces** for interaction **with MIS, Prepress and Postpress** (JDF, XML, ODBC)
- Communication with Rapida Console and MIS: **Bidirectional**



Machine presetting

Real-time SFDC

Planning + Monitoring

Complete | MES Software – LogoTronic Professional

Basic functions 1 – Machine Presetting

- **CIPLinkX** as an interface to convert the CIP3 PPF-data from Pre-press into preset data; Setting the ink zone opening, Settings for ink and dampening duct rollers, ink vibrator
- **Teach-In function** for the transmission curves
- **Job-/Master data management**, storage of job data for repeat jobs
- Definition of Print- and Color **Standards** (LogoTronic Release 7.4.x or higher)
- **Color database** for console, **DensiTronic, ErgoTronic** and **QualiTronic**
- Providing the coverages for **dynamic ink control** with **ErgoTronic Color Drive** and **QualiTronic Color Control**
- Automated supply of job data in the form of a job list by reading the **CIP3 PPF**
- **Providing all fields of the CIP3 protocol** to the press

Machine presetting

Complete | MES Software – LogoTronic Professional

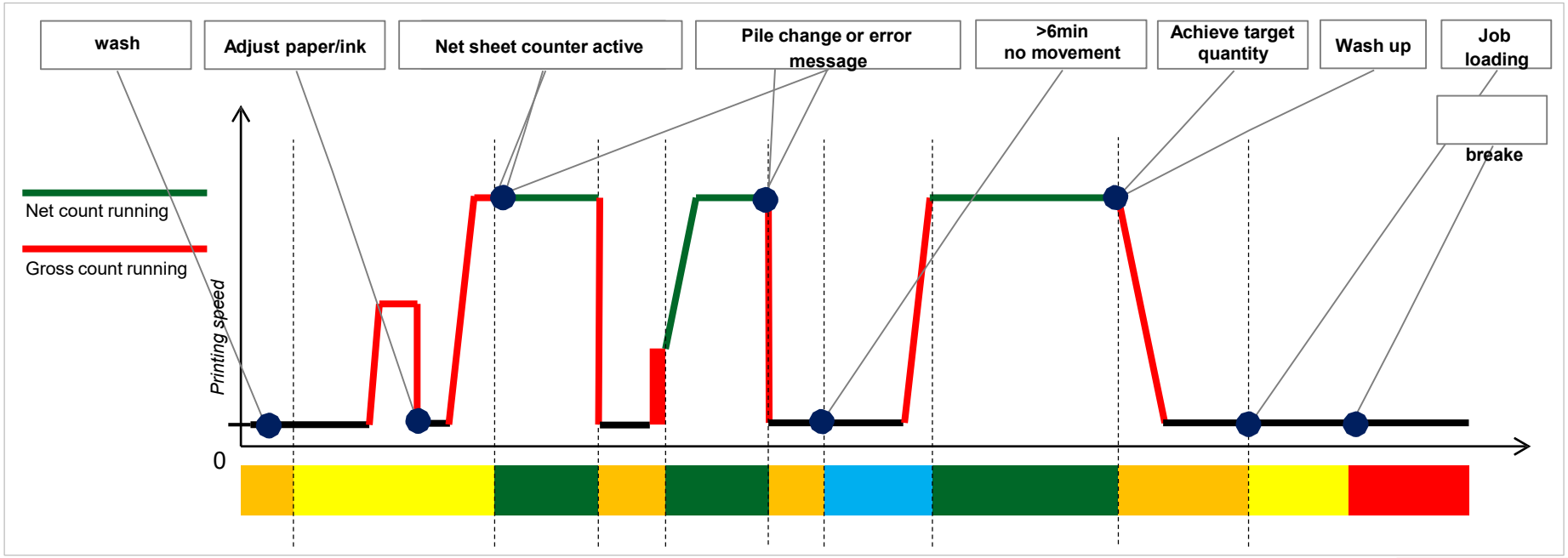
Basic functions 2 – Shop Floor Data Collection (SFDC)

- Integrated **CIP4 JDF** interface for data exchange with an MIS
- Shop Floor Data Collection in real-time at console-integrated terminal and with an so-called “**BDE-Schrittkette**” (**mandatory sequence chain**, activatable) for the correct time recording and accurate costing
- **JMF-Messenger** for shop floor- and resource data feedback to an MIS
- **Login/Logout** of personnel (printer, helper, shift leader) at the press console

Real-time SFDC

Complete | MES Software – LogoTronic Professional

Basic functions 2 – SFDC; Time classification



Real-time SFDC

Processing Times Make
Ready Other
processing
Production

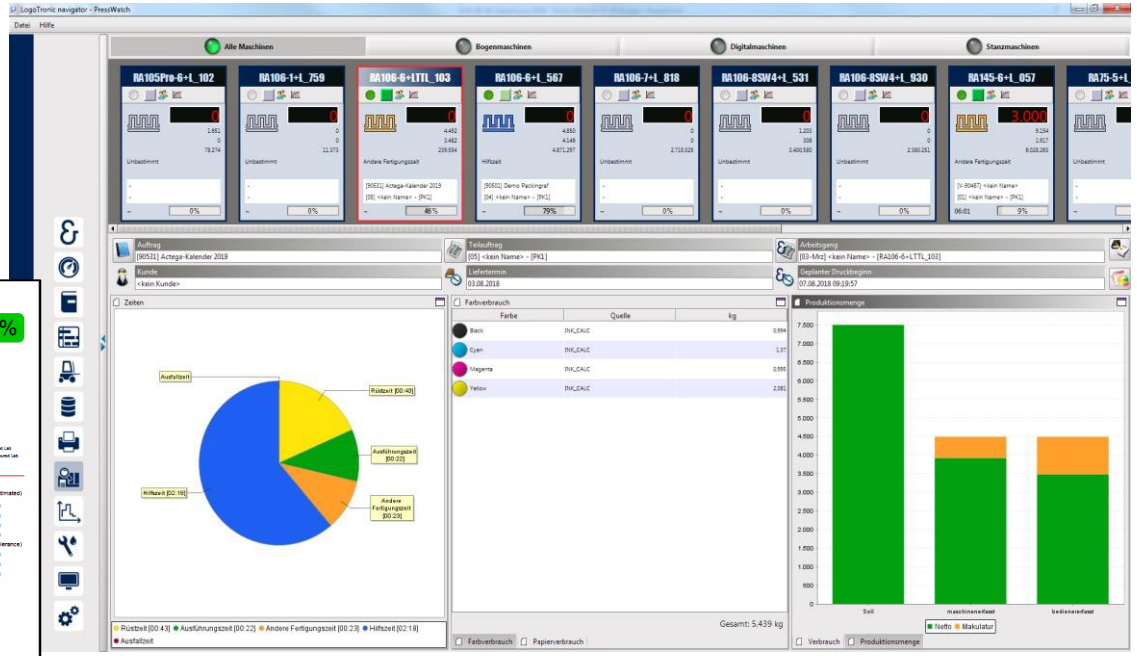
Auxiliary times
Technical
Working place
Organisational

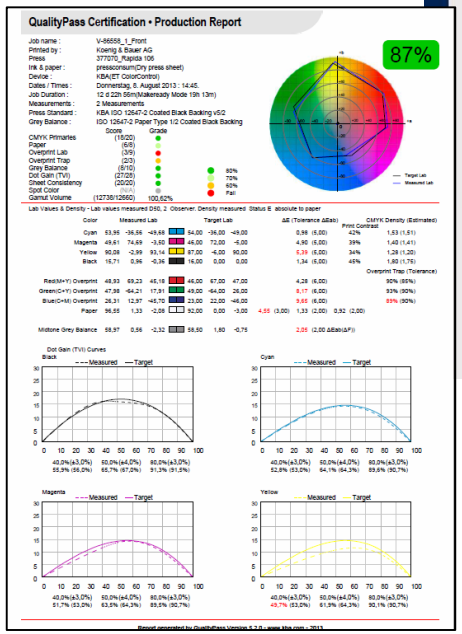
Down times
Technical
Employee
Standstill

Complete | MES Software – LogoTronic Professional

Basic functions 3 – Planning and Monitoring

- **PressWatch©** – Live display of production status
- **SpeedWatch©** – Live monitoring of the course of production
- Standard **Reports** – Analysis of the production process
  (Job, Day, Shift, Productivity etc.)
- Link to the embedded Quality Reports from **ErgoTronic** and **QualiTronic** (order related)



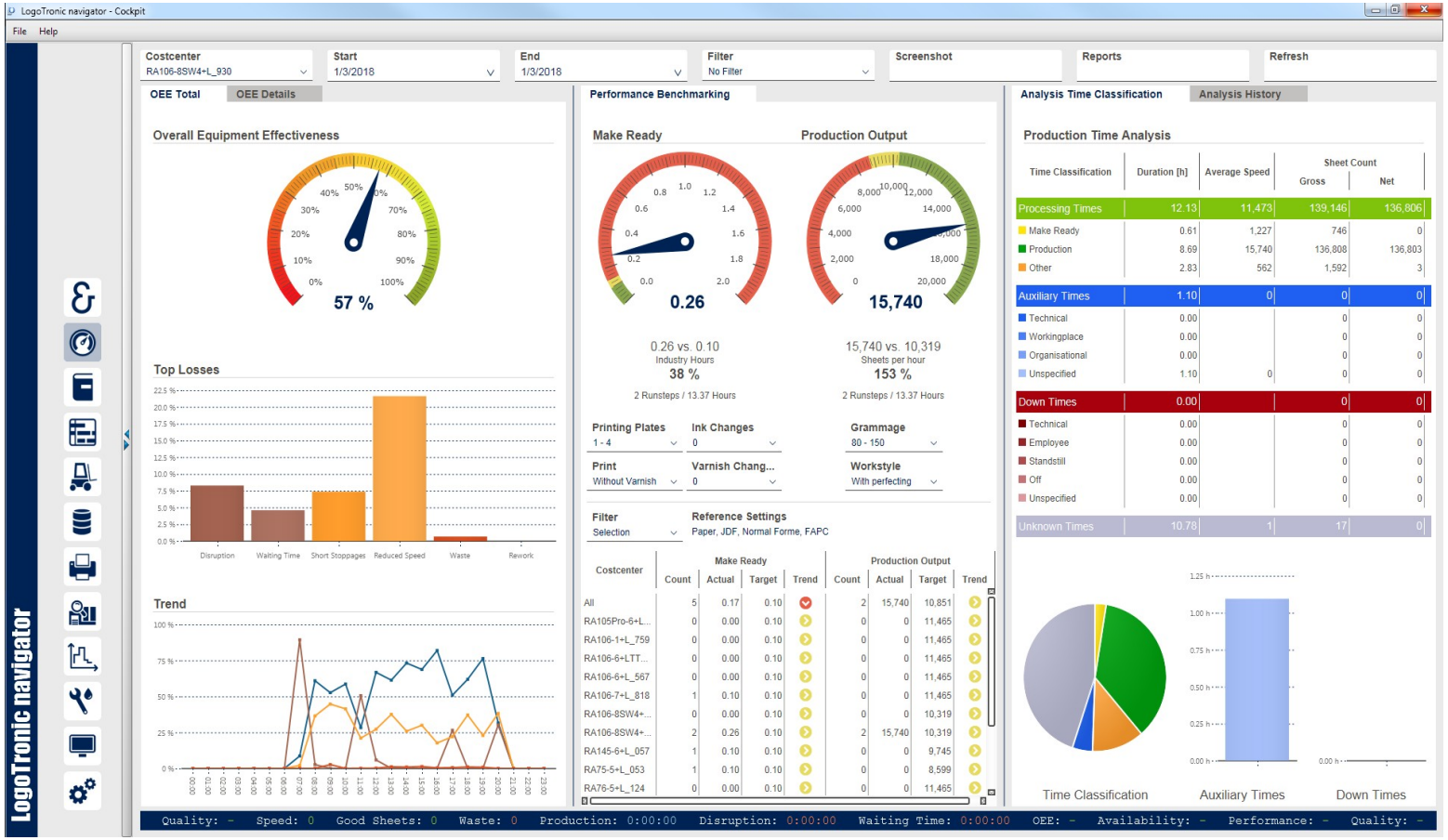


Planning + Monitoring

Complete | MES Software – LogoTronic Professional

Options 1: LogoTronic Cockpit (New from Release 8.0.x)

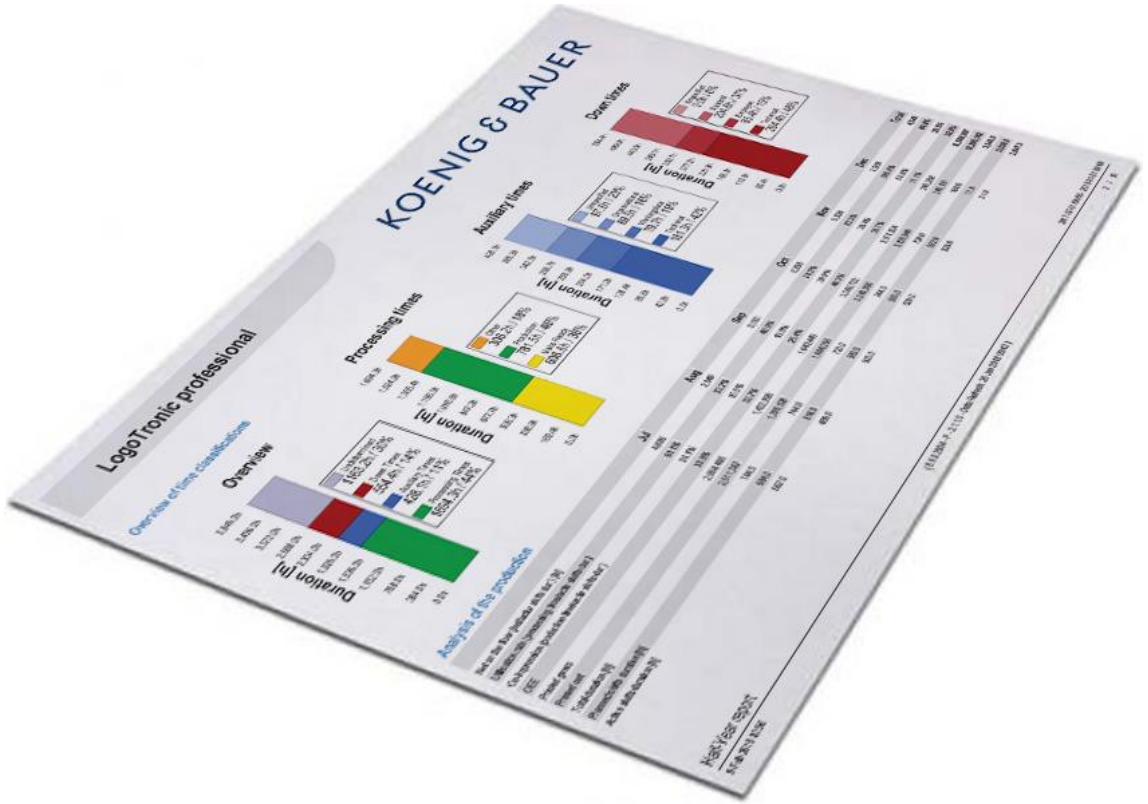
- **LogoTronic Cockpit** provides a extension of the analysis functions for the representation of current production **KPI's** at a glance
- Overall equipment effectiveness **(OEE)**
- **Benchmarking** (make ready time and production output)
- Detailed **disruption** analysis
- Basis for **process optimization**



Complete | MES Software – LogoTronic Professional

Options 2: LogoTronic Excellence Reports (Press Production Report, New from Release 8.0.x)

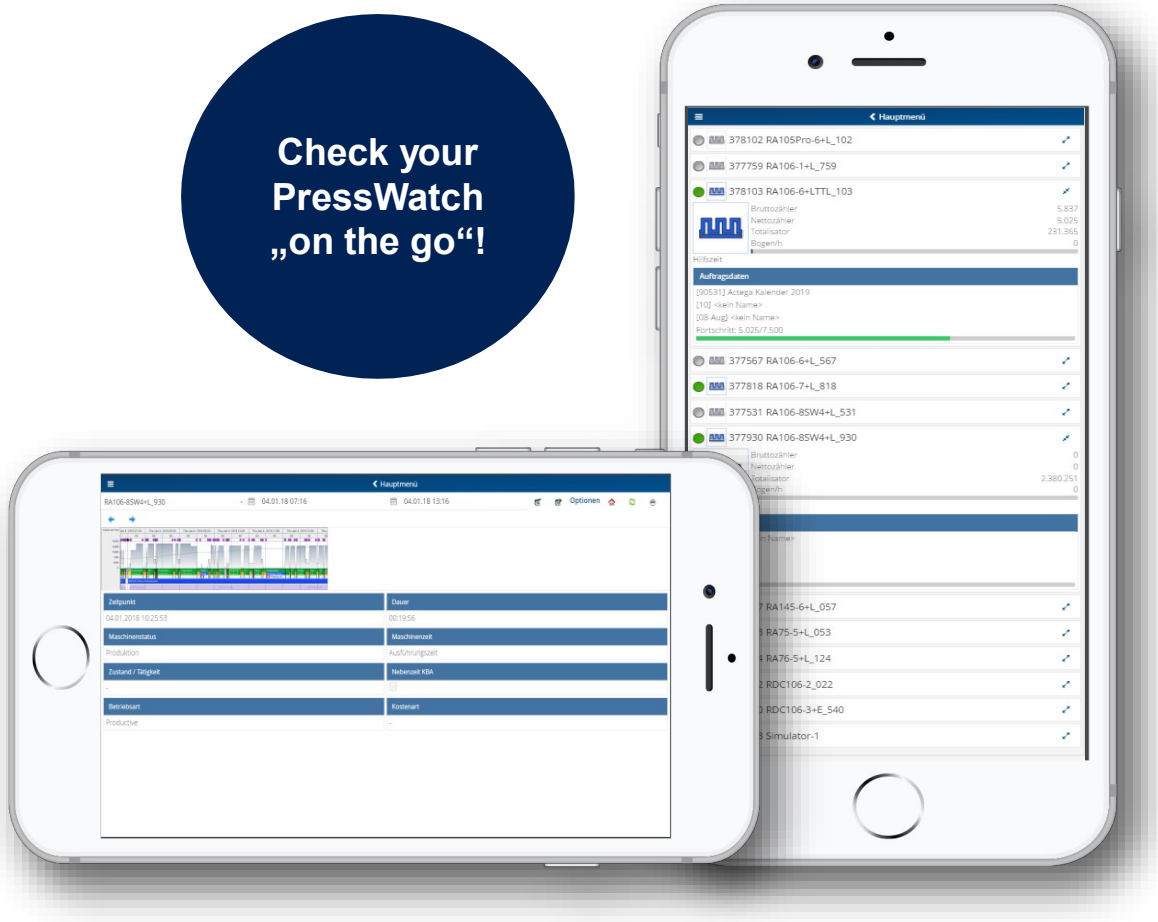
- The Press Production Report provides **additional indicators** for the performance analysis
- The report was developed with a **industry partner** to optimize the machine performance.
- Trend analyses over weeks, months and years can be created
- Analyzing of messages **with comments**
- Detailed **order analysis**
- Stopper analysis
- Further reports are under development ...



Complete | MES Software – LogoTronic Professional

Options 3: LogoTronic Mobile (New from Release 8.0.x)

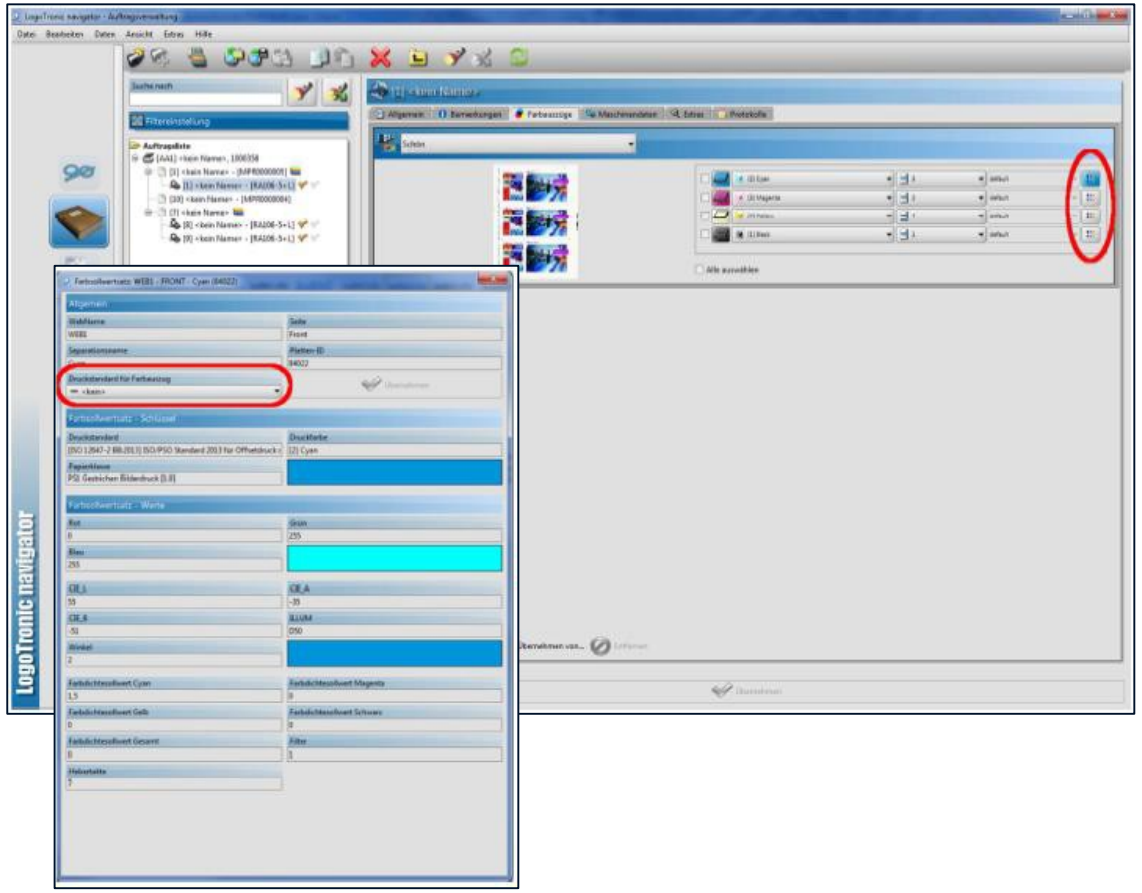
- **Don’t go away without your KPI’s**
- The LogoTronic has been completely re-designed and considerably extended for **smartphones and tablets**
- It contains the following features: **Order Management, PressWatch©, SpeedWatch©, Reports**
- Provides production specific information **“on the Go”**
- LogoTronic Mobile is not an "app" but a **server-side website**
- It can be used with every modern web browser, **independent** from the **operation system**
- LogoMobile is intended to display data, **data manipulation is not supported**



Complete | MES Software – LogoTronic Professional

Options 4: Print- and Color Standards (New from Version 7.4.x)

- **Print- and Color Standards (NEW from Version 7.4.x)**
- Possibility of definition of **print- and color standards**
- **Assign color information**, which vary depending on paper and self-defined mode
- for example a certain red principle be printed at matte paper with a different density than glossy paper
- **Newer versions** of the Rapida console center (**ErgoTronic TT**) **will support this feature**



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Options 5: Maintenance Mangager

- software tool for **planning and documentation** of maintenances
- **Access** to the maintenance list of all connected Rapida machines **from anywhere** (no disturbing of the press console to check the maintenance list)
- Quick overview of the **missed maintenance** events
- **Documentation** in writing as well as digital
- **Automated re-scheduling** of maintenance events
- Results in
  - higher **machine availability**
  - higher **resale value** (Opportunity to creating a maintenance book)

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Options 6: Automated job changeover with DataMatrixSelect (in conjunction with PlateIdent only)

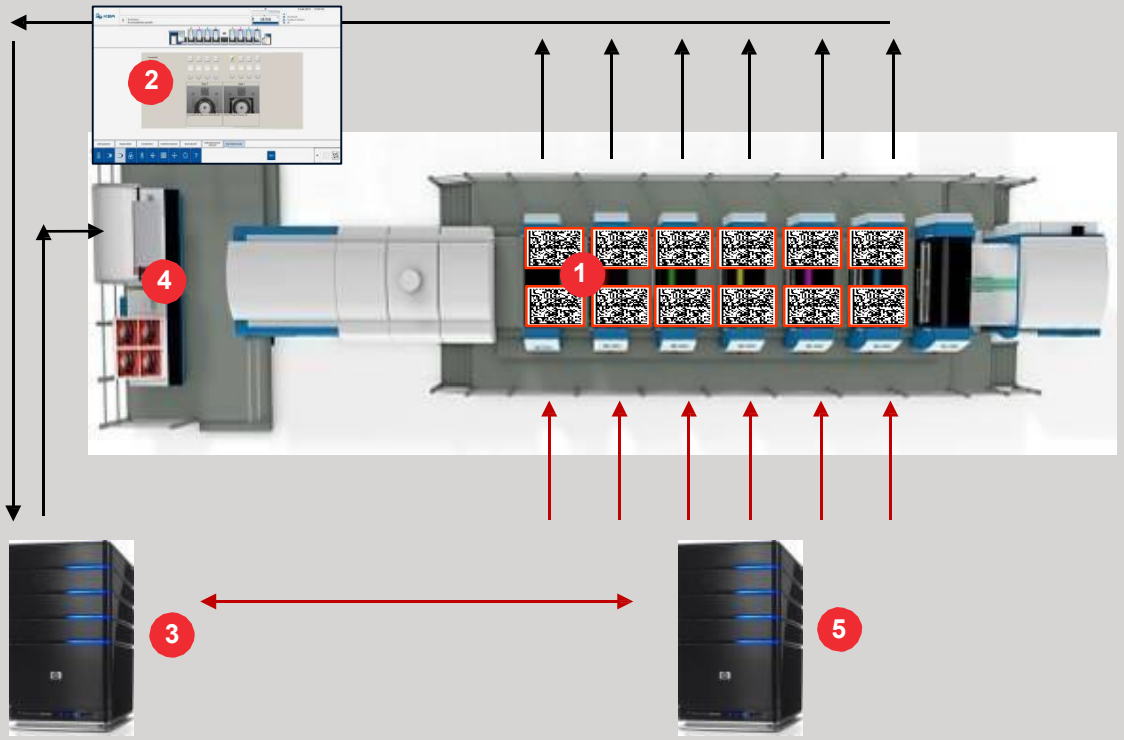
1. The Pre-press generates **two Data Matrix Codes** to each plate, which contain the job-specific data of an particular job. Those **QR-codes** to read out via cameras on each side of an unit, contain different job information for an exact identification

2. The content is forwarded from the **Jobserver** toward **LogoTronic**

3. Once the job is available in LogoTronic and the selected printing units have been successfully verified, then the **Job- and Preset data** for that particular printing unit will be immediately loaded from LogoTronic into the “**Setup-storage**” of the press console

4. In this moment, **the zone profile** of the Ink key presetting is generated.

5. Pre-press Platemaking (2x DataMatrixCode exposed)



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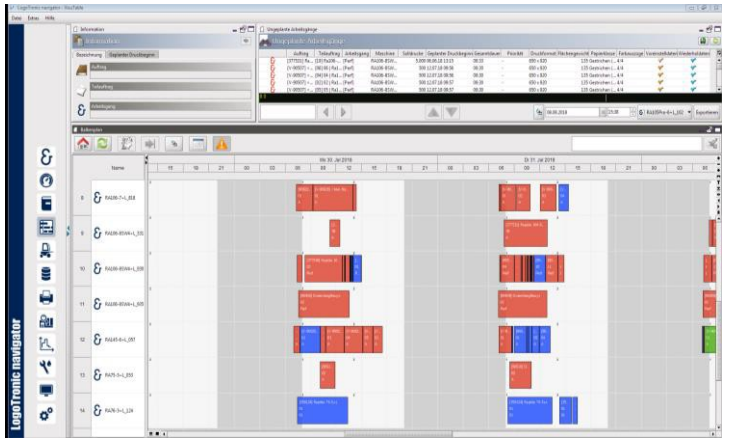
Options 7: further options

- **VisuTable** – Digital Planning board
- **Location management** – function for the separation of different production sites
- **PPS Interface** to customer **MIS** and/or **BIRT**–**Link** to any oracle-based report designer software
- **XML Job/BDE-Interface** to connect non-JDF capable systems
- **LogoTronic SFDC**–**Terminal** software with **LogoLinkBox** to integrate machines from other vendors
- **User-defined pile dockets** with sheet line-up and barcode
- **Customization of JMF-Link** of LogoTronic to Customer MIS
- **Online links** to a further new press or to an existing LogoTronic Professional
- **Customized reports**



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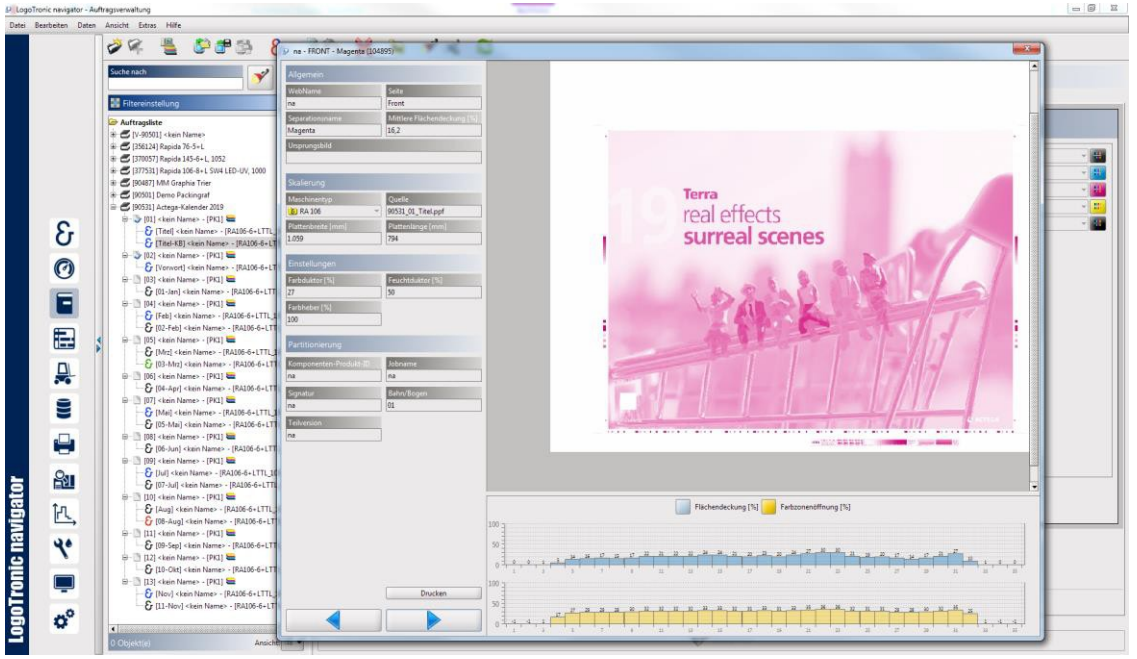
Preset data to the press (Pre-press Interface)

- Interface software to Prepress for converting the **CIP3 PPF-data** into **preset data** for the linked KBA presses
- **Accelerate Make-ready** by taking over and saving of press preset- and repro data
- **Communication** with console: **unidirectional**

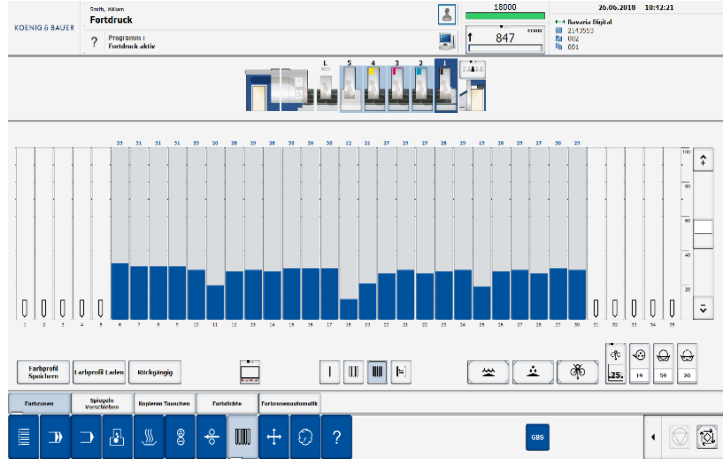


Machine presetting

Complete | MES Software – LogoTronic CIPLinkX

Basic functions – Machine Presetting

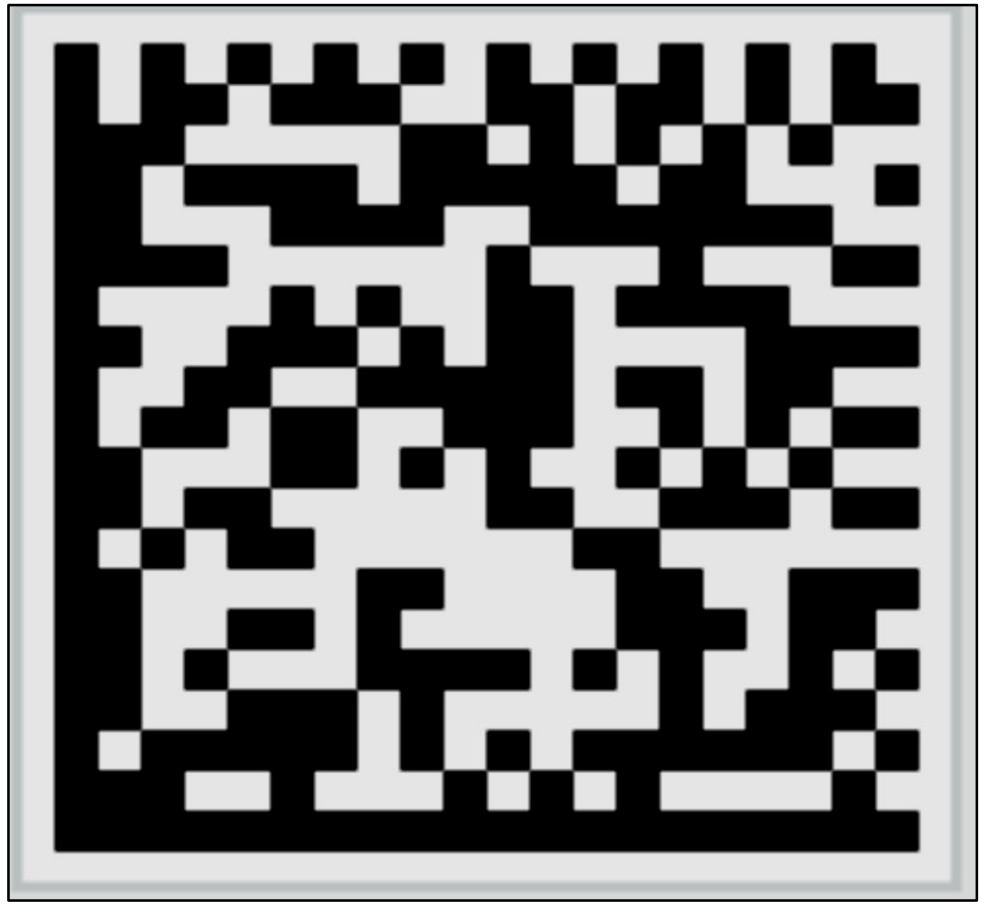
- **CIPLinkX** as an interface to convert the CIP3 PPF-data from Pre-press into preset data; Setting the ink zone opening, Settings for ink and dampening duct rollers, ink vibrator
- **Teach-In function** for the transmission curves
- **Job-/Master data management**, storage of job data for repeat jobs
- Definition of Print- and Color **Standards** (LogoTronic Release 7.4.x or higher)
- **Color database** for console, **DensiTronic, ErgoTronic** and **QualiTronic**
- Providing the coverages for **dynamic ink control** with **ErgoTronic Color Drive** and **QualiTronic Color Control**
- Automated supply of job data in the form of a job list by reading the **CIP3 PPF**
- **Providing all fields of the CIP3 protocol** to the press



Machine presetting

Complete | MES Software – LogoTronic CIPLinkX

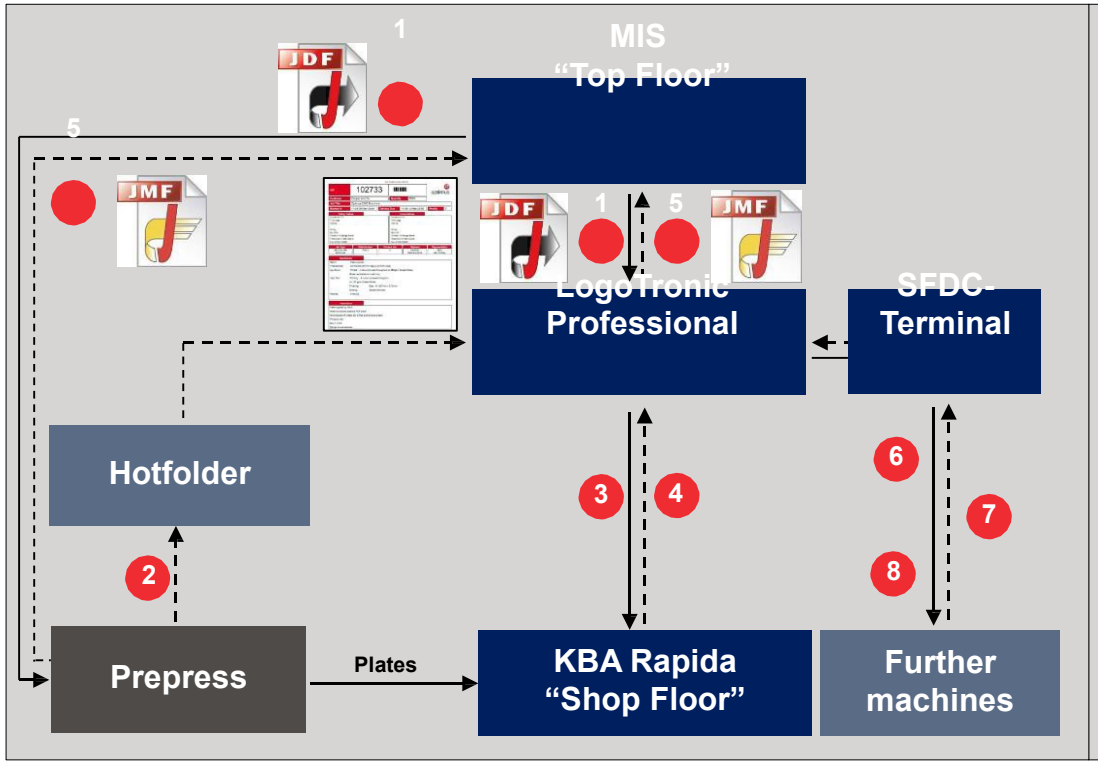
Options



- Standard pile docket
- User-defined pile dockets (without sheet line-up)
- Online links
  - to a further new press (license)
  - to an existing LogoTronic CIPLinkX
    (license and customization of interface between LogoTronic/Console => KBA Gateway)
- **DataMatrixSelect** - Reading of DataMatrix code for automatic job changeover (in conjunction with PlateIdent)

Complete | MES Software – LogoTronic Professional

LogoTronic Professional in an CIP4 JDF Workflow



CIP4 JDF (Prepress, Press, Postpress, Process) Job data, Material data, Planning data, perhaps Imposition (Stripping param's)

2 **CIP3 PPF**; Admin. Info's, Preview images, Ink coverage, cutting info's, Folding scheme etc.

3 **Job- and Preset data** from LogoTronic via **KBA Gateway** (XML)

4 Machine- and operational data via **KBA Gateway** (XML)

5 **CIP4 JMF**; SFDC States (Order progress), SFDC times (Production, Auxiliary and Down), SFDC Qtty (Good, Waste, Total), SFDC Resource data (Ink, Paper, Energy)

6 Job data with admin. Info's, Job start via **LogoTronic SFDC Terminal**

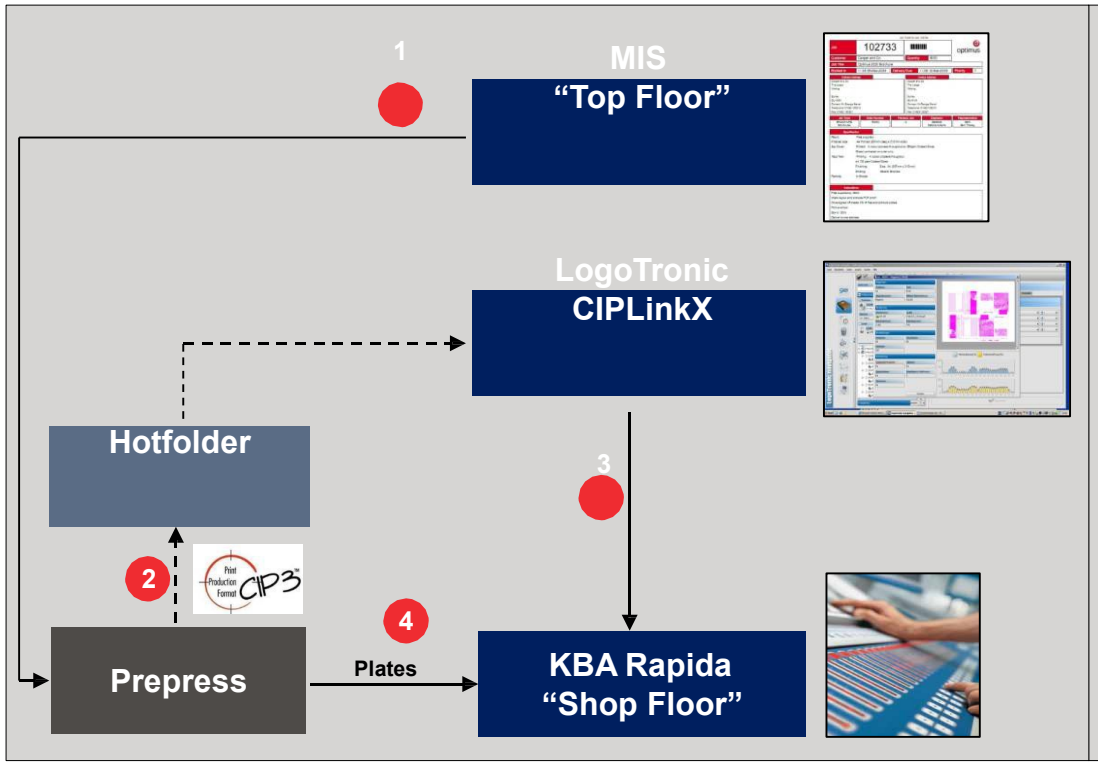
7 Operational- and resource data from **LogoTronic SFDC Terminal** to LogoTronic

8 Gross/Net count from **LogoLinkBox** to LogoTronic

Job-, resource- and operational shop floor data can be exchanged with an MIS in general via the integrated CIP4 JDF interface. An electronic Job Ticket contains all information for into production involved machinery (customer-, delivery- and planning data such as customer name, contact name, delivery date, calculated times, required quantity, substrate, grammage, waste and many others).

Complete | MES Software – LogoTronic CIPLinkX

LogoTronic CIPLinkX in an CIP3 PPF Workflow



1 Administrative Job Information, machine assignment

2 **CIP3 PPF**; Admin. Info‘s, Preview images, Ink coverage, cutting info‘s, Folding scheme etc.

3 **Job- and Preset data** from LogoTronic via **KBA Gateway** (XML)

4 Plates

On the way through production, all information is collected in the CIP3 PPF file and is directly available in later process steps without the need for time-consuming, personnel- and cost-intensive retrieval of information. (Source: http://www.cip4.org)

Complete | MES Sales Perspective

Impressive figures, Shop floor control with LogoTronic since more than 18 years

1,100

installed Rapida's worldwide since 2001 are controlled by LogoTronic Professional

700

LogoTronic Professional systems are installed with the ending of 2018

2,200

CIPLinkX systems are installed with the ending of 2018

140h

additional hours print a Rapida via JDF connection to an MIS p.a.

Complete | Case studies

JDF-enabled process automation at Four Films Printing Group

New capabilities

- through focus on the digital transformation of a leading print house in Kuwait in order to expand and respond faster to customers' needs

Result in Numbers

- Shortening of time required for creating a calculation from 20 to 5 min
- Shortening of average production time between order receipt to shipment from 4 to 2 days
- Production time saving with KBA equipment in the category of preparation time of approx. 168 output-hours per Machine/year at an hourly rate of KWD 100 x 5 machines = KWD 84,000 (approx. 250,000 €)
- Productivity increase to 105,2%

Complete 1 Case studies

JDF-enabled MIS Connectivity to Rapida Presses at Imprimerie Rochelaise

Graphisoft <-> KBA		
Time saving on KBA	140	h/year
Value of time saving on KBA	41,940 €	per year
Value of time saving obtained thanks to JDF Printing: Graphisoft -> manroland Graphisoft -> KBA	54,826 €	per year

Complete | Projects

References 2018/2019

Complete Optimus Dash MIS

- Silberdruck, Germany
- Metzgerdruck, Germany
- Imprimerie St. Paul, Switzerland
- Medialink, Singapore
- Koufu Packaging, Philippines
- Packages Ltd., Pakistan
- Anil Rasaneh Co., Iran

MIS…
Management Information System: also known as branch software, powerful modules for complete control of all business processes and costs in "real time"; e.g. Estimation, job ticket, scheduling, SFDC, final costing among others

CRM…
Customer Relationship Management: data on customers and markets. This includes names, addresses, communications, industries as well as personalization software for digital printing systems (using of fixed and variable data)

CMS…
Content Management Systems: editors, databases and analysis filters for texts, pictures, tables, graphics, videos, audio files and other multimedia elements

Pre-press workflows…
Partial or fully automated systems with trapping and imposition software, modules for PDF creation and RIP functionality for creating the printing formes (plates); e.g. Kodak Prinergy

e-Procurement/e-Commerce Software…
Simplify and automate the purchasing of printed products; Quotation, ordering and order processing as well as production and delivery control automation using open or of dedicated solutions

PPS…

Production planning and control Software ... Software for production management; Tracking, Monitoring and Shop Floor data collection; JDF Controller and JMF Messenger toward an connected MIS

CIP3 PPF…

Print Production Format: interface developed by the Fraunhofer Institut; Coding via PostScript; et al for the transfer of administrative information, preview images, color and density information, cutting and folding information

CIP4 JDF…

Job Definition Format: standardized interface of the printing industry; based on XML; developed by the CIP4 consortium (KBA is a member (www.cip4.org), for the exchange of job data, processing instructions and messages of operational and resource data between production systems

CIP4 JMF…
Job Messaging Format: part of the JDF specification, XML-based messaging language for feedback between JDF agents (MIS) and JDF controllers (KBA LogoTronic)

XML…
Extensible Markup Language, XML is used to represent hierarchically structured data in the form of text files. The format allows for a platform-independent exchange of data between computer systems