



# Pandemic

NON-MEDICAL OPERATIONAL SAFETY ASPECTS

SUPPLEMENTAL MATERIALS

## FOREWORD

As global society struggles with the tragic and unprecedented COVID-19 pandemic, we in aviation are seeing a previously unimaginable impact on our industry. The International Air Transport Association's latest projection shows that 2020 passenger revenues could fall \$252 billion, or 44 percent from last year's level, assuming severe travel restrictions remain in place for up to three months and are followed by a gradual economic recovery later this year.

As has been well documented, passenger operations have been slashed, fleets of aircraft have been grounded, and thousands of employees have been furloughed. But, at the same time, the global aviation system is still functioning. Air traffic control towers and en route centers continue to guide aircraft to their destinations; airports are open and operating, albeit at much reduced capacity; and pilots and flight attendants continue to operate airplanes that maintenance engineers ensure are airworthy.

In the midst of crisis, safety must still prevail. It is essential to maintain high safety performance in continuing operations, in reduced operations and, hopefully sooner rather than later, in increasing operations as carriers begin bringing aircraft and services back online.

Flight Safety Foundation developed this document as supplemental material for safety and aviation professionals in flight operations, air traffic services, airports, ground operations and maintenance, as well as for regulators and manufacturers as they navigate the current environment and, eventually, a safe, harmonized and sustainable return to global air transportation. What follows are condensed safety-related considerations that serve as a roadmap for professionals in different segments of the aviation ecosystem and can inform and guide decisions under difficult circumstances. In developing this document, the Foundation has tapped into the considerable expertise of our advisory committees and other experts, many of whom offered input based on what they are seeing right now on a day-to-day basis and what they believe is necessary to maintain safe operations during this crisis.

This document should be viewed as a "work in progress," as the Foundation continues to enhance and expand it, moving forward. We will solicit inputs from the safety and operations communities to inform changes and future versions. In addition, the Foundation has several related projects under way, including work to collect and organize the various detailed recommendations and specific COVID-19 procedural steps that are being implemented around the world; a webinar series, *Managing the COVID-19 Crisis*; and the revamping of our previously scheduled conference events into virtual events focused on pandemic-related issues. More details are available on our website.

Finally, we would like to thank Foundation advisory committee leaders for their initiative and long hours of hard work to produce this document.

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## BACKGROUND

The coronavirus pandemic is having a devastating effect on aviation and represents the biggest strategic shock to the global aviation system since international air travel began. Whereas we need to acknowledge that the crisis is first and foremost a human tragedy, and everyone's first priority is to ensure their own family's safety, we also need to understand that our world as we know it will not be the same even after the virus is contained.

Flight Safety Foundation's mission is to connect, influence and lead global aviation safety. Never has there been such a critical time to bring together the world's aviation community for the protection of our people and our operations. Through its independence, impartiality and international community, the Foundation is in a unique position to assist with safe navigation through these exceptional times. Together we must establish a broad industry set of guidelines of "good things to do" in an increasingly fragmented and complex situation, recognizing that financial pressures will be acute and that there are no limits to the benefits of sharing information and learning.

Some airlines are shutting down their operations. Others continue to run on reduced schedules. Cargo operations, air traffic control, airport and ground services now become critical elements in society's efforts to overcome the crisis. Some routes and services are already reopening.

All these changes are putting a massive strain on the system and generating clear business, operations and safety risks. Industry leaders and managers will need to take care that the understandably intense focus on financial viability in the coming months does not include diversion of resources from key safety activities when previous risk levels have increased and new risks have become evident.

The advice in this and subordinate documents has been developed through collaboration across the Foundation community. Our combined efforts represent the voice of safety leaders from across the world, from every aviation sector, from operations to infrastructure, regulators to academia. This guidance represents a road map of sensible, practical actions that can supplement company procedures and lead to a safe, harmonized and sustainable return to global air transportation. We deliberately do not discuss specific coronavirus advice, which is properly the preserve of national governments. Specific aviation advice on detailed medical procedures associated with personnel protection, equipment cleaning, protective clothing and individual and group behaviour is well described elsewhere. A future document will condense the available thinking on how to secure safe travel through our airports and flights in the hope

that passenger confidence in the aviation safety system will encourage increasing numbers of people back to flying.

*SPECIAL NOTE: Safety Punch lists of all consideration lists are available through a link in the heading for each document section. The punch lists can be used as a tool to track implementation.*

## SAFETY ASPECTS OF CONTINUED OPERATIONS

### GENERAL CONSIDERATIONS

- Consider all operations as non-normal and therefore a threat to safety
- Ensure cost pressures do not unduly reduce acceptable safety levels
- Consider possible culture change as the company or organization goes into financial survival thinking
- Ensure sufficient staff available commensurate with the actual level of operations
- Ensure continued use of your safety management system (SMS) to its full potential
  - Be aware that risk levels of each flight will change from locality to locality and with each type of operation due to the state of the crisis progression
  - Consider the threat of increased risk acceptance (get the job done, save the airline, less loss of jobs)
  - Consider the risk of missed or reduced safety or quality assurance (audits, etc)
  - Share risk assessments and experiences with other operators
- Ensure effective internal and external communication
- Ensure continued facility access for staff (i.e., expiry of access badges, pass codes etc.)
- Consider staff involvement in process improvements
- Consider training
  - Use any down time for training and safety education
  - Use all available means for training delivery (video, video conference, etc)
  - Consider training intervals depending on staff experience
- Ensure contingency plans are available in case of significant staff shortages
- Consider team situations
  - Modify rostering to meet new demands
  - Consider creating non-overlapping teams (social distancing)
- Consider IT systems
  - Ensure critical software and hardware updates are made
  - Have a back-up for when IT systems fail
  - Avoid non-critical software and hardware updates
- Consider level of staff turnover

## HUMAN FACTORS

- Consider reduced performance of staff and increased risk in the system due to
  - Fear
  - Uncertainty about the situation and future
  - Increased stress
  - Increased pressures
  - Distraction
  - Complacency
  - Physiological reasons
  - Psychological reasons
- Consider staff support
  - Activate staff or peer support programs
  - Activate in-house human factors managers (if available)
  - Offer safety department for support in safety matters
  - Offer support by human resource department
  - Consider creating a company community for mutual support
  - Consider extending staff support to furloughed or redundant staff
- Consider personal relationships between staff retained and those furloughed or made redundant
- Ensure awareness of
  - The mental health state of those people continuing to work
  - The potential for special cases amongst the work force
  - Reduced quality of crew rest
  - Potential reduction in general fitness levels leading to reduced performance
  - The long term physiological and psychological consequences of the crisis
  - The possibility that staff fearing for their jobs might not behave as typically expected (decreased reporting, etc)
  - Ensure just culture policy is known and understood
- Ensure staff stay engaged with company policies

## FLIGHT OPERATIONS

### **People**

- Consider skills, knowledge and qualification distribution across the route network
- Consider management pressures on minimum fuel etc.
- Consider crew currency and knowledge of available airfields

- Consider physiological requirements for crews at airports and on layovers (hotels, food, etc)
- Consider fatigue risk boundaries
- Consider increased flight data monitoring to identify precursors
- Consider effects of increased pressure on the remaining crews to service the program as more crews isolate
- Ensure availability of adequately trained check flight crews
- Consider risks from handling aircraft at very light weights (over-speeds, altitude busts etc.)

## Process

### *Pre-flight*

- Consider increased attention to the accuracy and currency of NOTAMS
- Consider evaluation of possible destinations and proactively risk assess and organize: Airport analysis and risk assessment
- Consider creating semi-permanent crew pairings
- Consider the use of an out-and-back policy for flights to avoid stays at outstations where practicable
- Consider relaxing turn-around and initial report times
- Confirm timely availability of required regulatory approvals
- Consider applying for waivers if necessary
- Consider SOPs for airlines that do not routinely operate cargo only
- Consider processes for roundtrip flights, e.g. rest possibilities, increased crew, food, water and toilet capability, etc
- Consider a process for carriage of engineers
- Consider mutual support to facilitate movement of cargo aircrews in times where passenger flight schedules are reduced
- Consider mitigations for insufficient flight training device capacity to maintain crew currency
- Consider availability of medical examiners and potential impact on licensing
- Consider weight and balance issues due to unusual load factors
  - Cabin safety for passenger main decks
  - Consider emergency equipment for carrying cargo in passenger cabins
  - Consider Dangerous Goods Regulations and policy
- Ensure availability of maintenance at outstations
- Consider spare aircraft planning/availability for aircraft on ground at outstation

## *Flight*

- Consider the available air traffic service level
- Consider the availability of en-route and destination diversions
- Consider risk analysis and processes for non-normal/non-routine operations, e.g. mixed passenger/cargo
- Consider limiting access to aircraft by ground staff for non-essential activities
- Consider availability of transport and hotels
- Consider raising crew awareness of non-normal last-minute changes to loads, e.g. no shows, rebookings from other airlines
- Ensure limited crew exposure during turn around; consider limiting crew walk-arounds

## **Technical**

- Ensure that all required ground services are available
- Ensure that the fuel service meets regulatory standards
- Ensure that the de-icing service meets regulatory standards

## AIR TRAFFIC SERVICES

### **People**

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider reduced operating hours rather than reduced staffing levels if controller availability is low
- Consider using different sets of equipment for each shift
- Consider availability of medical examiners and potential impact on licensing
- Consider confinement of entire shifts (or group of personnel), if necessary, to ensure the continuation of service and to prevent the spread of infection
  - Organisation: Ensure sufficient food and drinks supplies
  - Organisation: Provide accommodation, beddings, cots
  - Individuals: Change of clothes, personal hygiene items

### **Process**

- Ensure accuracy, currency and timely transmission of NOTAMs
- Consider suspending all routine group training activities
- Consider alternative means of training, e.g. remote access
- Ensure safety assessments of any traffic pattern changes are performed
- Consider establishing crisis information flow channels with adjacent ATC units, airports in your airspace and emergency services



- Consider sectorisation plans
- Consider existing procedures and ‘Letters of Agreement’
- Consider development of plans in case adjacent ATC units close down

#### Technical

- Ensure adequate availability of qualified manpower for technical resilience
- Consider limiting maintenance activities to essential tasks
- Ensure availability and maintenance of a spare ops room and remote/mobile towers

### AIRPORTS

#### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency due to reduced ramp activity levels

#### Process

- Ensure accuracy, currency and timely transmission of NOTAMs
- Ensure maintenance of active wildlife control measures
- Consider allowing more crew rations food/water through security screening
- Ensure sufficient provision of ground handling services such as toilet cleaning and galley replenishment
- Ensure that the airfield has a master parking plan and that standard and crisis level capacity are known

#### Technical

- Consider requirement to keep aerodrome facilities and services operational and certified
- Ensure that sufficient engine running capability exists
- Ensure proper management of fuel in tanks, vehicles and feeder lines
- Ensure proper management of potable water supplies

### MRO / MAINTENANCE

#### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness

#### Process

- Consider possible reduced availability of spare parts
- Consider the reliability of ‘aircraft on ground’ service levels

- Consider potential for extended MEL/DDL ops

#### Technical

- Ensure that all “lifed” or life-limited items are in date

### GROUND OPERATIONS

#### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency due to reduced ramp activity levels

#### Process

- Consider possible reduction in service levels such as load sheet preparation

#### Technical

- Consider possible reduction in service levels such as de-icing, snow clearing,

### MANUFACTURERS

#### People

- Ensure sufficient staff in customer support and safety departments commensurate with the actual level of operations

#### Process

- Consider the reliability and continued capability of ‘aircraft on ground’ service levels
- Ensure assistance to airlines in their maintenance of continued airworthiness tasks

#### Technical

- Ensure availability of advice on aircraft storage, de-storage, cabin air systems and passenger safety

### REGULATORS

#### People

- Ensure sufficient staff available to handle system demands
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider reduced staffing levels when considering the rigour of audit response times, etc (i.e., do not unnecessarily increase pressure on organisations)

- Ensure the regulated community maintains effective safety resources

### Process

- Ensure rapid alignment at the political level so that operational clearances can be set in place rapidly, (i.e. European Commission approval for EASA to act on behalf of cargo teams)
- Consider short-term rule changes for protection of critical teams (like cargo crews)
- Consider receiving requests for waivers
- Consider crisis planning for the different stakeholders and involvement of the safety departments
- Consider reminding all stakeholders to involve their safety managers in crisis planning and discussions
- Consider flight time limit alleviations
- Consider availability of medical examiners and potential impact on licensing
- Consider a global waiver on current security procedures for cabin and flight crews for hand sanitizer or other essential safety material
- Consider extending training intervals
- Consider allowing more crew rations food/water through security screening
- Consider defining the minimum required level of ground handling services

## SAFETY ASPECTS OF REDUCTION/CESSATION OF OPERATIONS

### GENERAL CONSIDERATIONS

- Consider all operations as non-normal and therefore a threat to safety
- Consider a progressive and coordinated reduction/cessation of operations
- Ensure cost pressures do not unduly reduce acceptable safety levels
- Consider possible culture change as the company or organization goes into financial survival thinking
- Ensure sufficient staff available commensurate with the actual level of operations
- Ensure continued use of your safety management system (SMS) to its full potential
  - Be aware that risk levels of each flight will change from locality to locality and with each type of operation due to the state of the crisis progression
  - Consider the threat of increased risk acceptance (get the job done, save the airline, less loss of jobs)
  - Consider the risk of missed or reduced safety or quality assurance (audits, etc)
  - Share risk assessments and experiences with other operators
- Ensure effective internal and external communication, with all staff aware of latest instructions and information
- Ensure continued facility access for staff (i.e., expiry of access badges, pass codes etc.)
- Consider staff involvement in process improvements
- Consider training
  - Use any down time for training and safety education
  - Use all available means to deliver training (video, video conferencing, etc)
  - Consider training intervals depending on staff experience
- Consider opportunities provided by reduction or shutdown of operations
  - Consider developmental and learning opportunities
  - Revision of processes and regulations
  - Maintenance of aircraft and ground equipment
- Consider IT systems
  - Ensure critical software and hardware updates are made
  - Have a back-up for when IT systems fail
  - Avoid non-critical software and hardware updates
- Consider intensifying shared safety working across the industry through communication
- Consider level of staff turnover
- Consider availability of contracted service and maintenance/supplier support

## HUMAN FACTORS

- Consider reduced performance of staff and increased risk in the system due to
  - Fear
  - Uncertainty about the situation and future
  - Increased stress
  - Increased pressures
  - Distraction
  - Complacency
  - Physiological reasons
  - Psychological reasons
- Consider staff support
  - Activate staff or peer support programs
  - Activate in house human factor managers (if available)
  - Offer safety department for support in safety matters
  - Offer support by human resource department
  - Consider creating a company community for mutual support
  - Consider extending staff support to furloughed or redundant staff
- Consider personal relationships between staff retained and those furloughed or made redundant
- Ensure awareness of
  - The mental health state of those people continuing to work
  - The potential for special cases amongst the work force
  - Reduced quality of crew rest
  - Potential reduction in general fitness levels leading to reduced performance
  - The long-term physiological and psychological consequences of the crisis
  - The possibility that staff fearing for their jobs might not behave as typically expected (decreased reporting, etc)
- Ensure just culture policy is known and understood
- Ensure staff stay engaged with company policies
- Consider impact of loss of routine amongst staff, especially junior staff

## FLIGHT OPERATIONS

### **People**

- Ensure staff available to operate reduced schedule or ad-hoc flights
  - Possible prolonged staff loss due to sickness

- Consider skills, knowledge and qualification distribution across the route network
- Consider increased flight data monitoring to identify precursors
- Consider impact of interrupted training (initial and recurrent)
- Consider use of enhanced crew complements to help maintain currency
- Consider management pressures on min fuel, etc.
- Consider crew currency and knowledge of available airfields
- Consider physiological requirements for crews at airports and on layovers (hotels, food, etc)
- Consider the fatigue risk boundaries
- Consider effects of increased pressure on the remaining crews to service the program as more crews isolate
- Ensure availability of adequately trained check flight crews
- Consider risks from handling aircraft at very light weights (over-speeds, altitude busts etc.)

## Process

### *Pre-flight*

- Consider increased attention to the accuracy and currency of NOTAMS
- Consider evaluation of possible destinations and proactively risk assess and organize:  
Airport analysis and risk assessment
- Consider creating semi-permanent crew pairings
- Consider the use of an out-and-back policy for flights to avoid stays at outstations where practicable
- Confirm timely availability of required regulatory approvals
- Consider applying for waivers if necessary
- Consider SOPs for airlines that do not routinely operate cargo only
- Consider a process for carriage of engineers
- Consider mutual support to facilitate movement of cargo aircrews when passenger flight schedules are reduced
- Consider mitigations for insufficient flight training device capacity to maintain crew currency
- Consider prioritizing currency of instructors and check pilots
- Consider prioritizing qualification training for sim use and extending scope of line training
- Consider weight and balance issues due to unusual load factors
  - Cabin safety for passenger main decks
  - Consider emergency equipment for carrying cargo in passenger cabins
  - Consider Dangerous Goods Regulations and policy

### *Flight*

- Consider the available air traffic service level
- Consider the availability of en-route and destination diversions
- Consider risk analysis and processes for unusual operations, e.g. mixed passenger/cargo
- Consider limiting access to aircraft by ground staff for non-essential activities
- Consider availability of transport and hotels
- Consider raising crew awareness of last-minute changes to loads, e.g no shows, rebookings from other airlines
- Ensure limited crew exposure during turn around; consider limiting crew walk-arounds
- Ensure availability of maintenance at outstations
- Consider spare aircraft planning/availability for 'aircraft on ground' at outstation
- Ensure coordination between network planning, flight ops and maintenance when storing aircraft
- Consider management and nature of ferry flights to maintenance bases for aircraft storage

### **Technical**

- Consider aircraft storage plan (short, medium, long-term).
  - Rolling short-term storage may breach AMM
- Ensure maintenance plan reflects expected flying rates
- Ensure that all required ground services are available
- Ensure that the fuel service meets regulatory standards
- Ensure that the de-icing service meets regulatory standards
- Ensure transport back to base for crew having delivered aircraft to maintenance bases for shutdown

## AIR TRAFFIC SERVICES

### **People**

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider reduced operating hours rather than reduced staffing levels if controller availability is low
- Consider training and checking requirements and expiry dates
- Consider single point human failure in low staffing situations

### **Process**

- Ensure accuracy, currency and timely transmission of NOTAMS

- Consider suspending all routine group training activities
- Ensure safety assessment of any traffic pattern changes are performed
- Consider establishing crisis information flow channels with adjacent ATC units, airports in your airspace and emergency services
- Consider existing procedures and ‘Letters of Agreement’
- Consider development of plans in case adjacent ATC units close down
- Ensure regular risk analyses conducted

### Technical

- Ensure adequate availability of qualified manpower for technical resilience
- Consider only essential maintenance activities should be carried out
- Ensure availability and maintenance of a spare ops room and remote/mobile towers

## AIRPORTS

### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency due to reduced ramp activity levels

### Process

- Ensure accuracy, currency and timely transmission of NOTAMS
- Ensure continuation of active wildlife control measures
- Ensure sufficient provision of ground handling services such as toilet cleaning and galley replenishment
- Ensure that the airfield has a master parking plan and that standard and crisis level capacity are known
- Consider potential risk from blocked runway/taxiway due to parked aircraft

### Technical

- Consider requirement to keep aerodrome facilities and services operational and certified
- Consider potential for surface damage from long-term parking of aircraft

## MRO / MAINTENANCE

### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Ensure enough qualified maintenance personnel available for storage of aircraft



- Consider training and checking requirements and expiry dates

### Process

- Consider possible reduced availability of spare parts
- Consider the reliability of 'aircraft on ground' service levels
- Consider potential for extended MEL/DDL ops
- Ensure coordination between network planning, flight ops and maintenance for immediate availability and storage of aircraft and engines
- Consider risks arising from long-term parking, including wildlife ingress
- Consider adverse weather conditions when preparing long-term storage
- Consider process for switching from short- to long-term storage
- Ensure availability of sufficient equipment for aircraft storage, e.g. covers, plugs etc

### Technical

- Ensure compliance with AMM for aircraft and engine shut down and storage
- Ensure security of stored aircraft
- Check for adequate and suitable parking positions for stored aircraft
- Consider prioritizing calendar requirements
- Consider potential for delays in recalibrating tools and equipment

## GROUND OPERATIONS

### People

- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency due to reduced ramp activity levels

### Process

- Ensure continuous availability of sufficient ground service equipment
- Consider possible reduction in service levels such as load sheet preparation
- Consider the process for storage and maintenance of ground service equipment

### Technical

- Consider possible reduction in service levels such as de-icing, snow clearing,

## MANUFACTURERS

### People

- Ensure sufficient staff in customer support and safety commensurate with the actual level of operations

## Process

- Consider the reliability and continued capability of ‘aircraft on ground’ service levels
- Ensure assistance to airlines in their maintenance of continued airworthiness tasks

## Technical

- Ensure availability of advice on aircraft storage, de-storage, cabin air systems and passenger safety

## REGULATORS

### People

- Ensure sufficient staff available to handle system demands
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider reduced staffing levels when considering the rigour of audit response times, etc (i.e., do not unnecessarily increase pressure on organisations)
- Ensure the regulated community maintains effective safety resources

### Process

- Ensure rapid alignment at the political level so that operational clearances can be set in place rapidly, (i.e., European Commission approval for EASA to act on behalf of cargo teams)
- Consider short-term rule changes for protection of critical teams (like cargo crews)
- Consider receiving requests for waivers
- Consider crisis planning for the different stakeholders and involvement of the safety departments
- Consider reminding all stakeholders to involve their safety managers in the crisis planning and discussions
- Consider flight time limit alleviations
- Consider availability of medical examiners and potential impact on licensing
- Consider the use of waivers rather than extensions to meet periodic licence and training requirements
- Consider developing a “go to” plan of short-term rules for such events (i.e., no one except crews on a cargo aircraft)
- Consider a global waiver on some current security procedures e.g. cabin and flight crews hand sanitizer
- Consider provisions to ground handlers on the minimum level of services to be provided during a crisis situation
- Consider extending training intervals

## SAFETY ASPECTS OF RE-ESTABLISHING OPERATIONS

### GENERAL CONSIDERATIONS

- Consider system ability to accelerate from a prolonged period of reduced ops
- Consider a progressive and coordinated restart of operations
- Ensure build-up of activity matches operational context capability
- Consider all operations as non-normal and therefore a threat to safety
- Ensure cost pressures do not unduly reduce acceptable safety levels
- Consider possible culture change as the company or organization goes into financial survival thinking
- Ensure sufficient staff available commensurate with the actual level of operations
- Ensure continued use of your SMS to its full potential
  - Carry out a progressive risk analysis prior to re-opening routes
  - Be aware that risk levels of each flight will change from locality to locality and with each type of operation due to the state of the crisis resolution
  - Consider the threat of increased risk acceptance (get the job done, save the airline, less loss of jobs)
  - Consider the risk of missed or reduced safety or quality assurance (audits, etc)
  - Share risk assessments and experiences with other operators
- Ensure effective internal and external communication, with all staff aware of latest instructions and information
- Ensure continued facility access for staff (i.e., expiry of access badges, pass codes etc.)
- Consider staff involvement in process improvements
- Consider training
  - Consider system capacity due to increased demand in the aftermath of a crisis
  - Ensure build-up of activity matches system capability
  - Carry out critical path analysis
  - Use all available means for training delivery (video, video conferencing, etc)
  - Consider training intervals depending on staff experience
- Consider IT systems
  - Ensure critical software and hardware is updated and functional
  - Have a back-up for when IT systems fail
  - Ensure build-up of activity matches system capability
  - Carry out critical path analysis
  - Avoid non-critical software and hardware updates in the early phases of re-establishing operations

- Consider level of staff turnover
- Consider potential for delays or cancellations to planned infrastructure improvements
- Consider availability of contracted service and maintenance/supplier support

## HUMAN FACTORS

- Consider reduced performance of staff and increased risk in the system due to
  - Fear
  - Uncertainty about the situation and future
  - Increased stress
  - Increased pressures
  - Distraction
  - Complacency
  - Physiological reasons
  - Psychological reasons
- Consider staff support
  - Activate staff or peer support programs
  - Activate in-house human factor managers (if available)
  - Offer safety department for support in safety matters
  - Offer support by human resource department
  - Consider creating a company community for mutual support
  - Consider extending staff support to furloughed or redundant staff
- Consider personal relationships between staff retained and those furloughed or made redundant
- Ensure awareness of
  - The mental health state of those people continuing to work
  - The potential for special cases amongst the work force
  - Reduced quality of crew rest
  - Potential reduction in general fitness levels leading to reduced performance
  - The long term physiological and psychological consequences
  - The possibility that staff fearing for their jobs might not behave as typically expected (decreased reporting, etc)
- Ensure just culture policy is known and understood
- Ensure staff stay engaged in “company thinking”
- Consider impact of loss of routine amongst staff especially junior staff
- Consider ability to ramp teams back to high workload state (normal work)

## FLIGHT OPERATIONS

### People

- Ensure staff available to operate growing schedule
  - Possible prolonged staff loss due to sickness or other reasons
  - Possible staff loss due financial situation
- Consider increased risk due to the potential for lack of currency
- Consider system capacity vs increased regulatory compliance load
  - Simulator availabilities
  - Medical certificates
  - OPC - LPC
  - Licence validities
- Consider skills, knowledge and qualification distribution across the route network
- Consider impact of interrupted initial and recurrent training
- Consider increased flight data monitoring to identify precursors
- Ensure availability of adequately trained check flight crews
- Consider risks from handling aircraft at very light weights (over-speeds, altitude busts etc.)
- Consider prioritizing currency of instructors and check pilots
- Consider prioritizing qualification training for sim use and extending scope of line training

### Process

- Ensure appropriate risk assessments are conducted before contracting new ground handling or other service providers
- Consider risk from contractors sub-contracting services due to limited GSE and/or personnel

### *Preflight*

- Consider increased attention to the accuracy and currency of NOTAMS
- Consider evaluation of possible destinations and proactively risk assess and organize: Airport analysis and risk assessment
- Consider relaxing turn-around and initial report times
- Consider applying for waivers if necessary
- Consider mitigations for insufficient flight training device capacity to maintain crew currency
- Consider availability of medical examiners and potential impact on licensing
- Consider levels of experience when scheduling and pairing
- Ensure build-up of activity matches system capability e.g. training resources

- Consider altering the limitations on crew if the currency or training is significantly deferred:
  - limit the number of aircraft types on which a pilot can act as PIC
  - reduction in crew day
  - higher weather minima
  - crew pairing
  - airport selection
- Consider weight and balance issues due to unusual load factors
  - Cabin safety for passenger main decks
  - Consider emergency equipment for carrying cargo in passenger cabins
- Consider Dangerous Goods Regulations and policy
- Ensure coordination between network planning, flight ops and maintenance when de-storing aircraft
- Consider potential aeronautical information inadequacies due to crisis-related changes or staff shortages

### *Flight*

- Consider the available air traffic service level
- Consider the availability of en route and destination diversions
- Consider risk analysis and processes for non-normal/non-routine operations, e.g. mixed passenger/cargo
- Consider potential for increased numbers of disruptive passengers
- Consider the validity of the following processes
  - Ensure limited crew exposure during turn around; consider limiting crew walk-arounds
  - Consider limiting access to aircraft by ground staff for non-essential activities
  - Consider availability of transport and hotels
  - Consider management and nature of ferry flights for aircraft positioning

### **Technical**

- Consider technical flight capability and availability
- Ensure all software, firmware, navigation and terrain databases are up to date
- Consider validity of fuel statistics
- Ensure that all required ground services are available
- Ensure that the fuel service meets regulatory standards
- Ensure that the de-icing service meets regulatory standards

## AIR TRAFFIC SERVICES

### People

- Consider increased risk due to the potential for lack of currency
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider training and checking requirements and expiry dates
- Consider single point human failure in low staffing situations
- Consider simulator refresher training
- Consider capacity imbalances and unusual traffic patterns at regional and/or network level
- Consider need to manage increased volume of training flights
- Consider threat of increased runway incursions due to procedural drift for returning staff
- Consider conflicts/confusion due to unusual ground movements and taxi routes
- Consider potential aeronautical information inadequacies due to crisis-related changes or staff shortages

### Process

- Ensure accuracy, currency and timely transmission of NOTAMS
- Consider preparation of a service recovery plan
- Consider work in extended teams (an extra pair of eyes) as traffic levels increase

### Technical

- Ensure all equipment is up to date and functioning
- Consider equipment resources required to support new working patterns
- Consider unexpected behaviour of decision-support tools due to unusual traffic patterns
- Consider flight plan inconsistencies due to multiple AIRAC changes
- Consider potential increase in airspace infringements due to lack of general aviation traffic pilot recency

## AIRPORTS

### People

- Consider increased risk due to the potential for lack of currency
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency due to growing activity levels
- Consider risk of staff work overload due to growing activity levels

- Consider risk of returning/current staff inability to perform their duties due to pandemic-related restrictions
- Consider potential for increased numbers of disruptive passengers
- Consider risk from staff working in unfamiliar or non-standard locations

### **Process**

- Ensure accuracy, currency and timely transmission of NOTAMs
- Ensure maintenance of active wildlife control measures
- Ensure that all the equipment and airport surfaces are in safe condition
- Consider reduced or changed runway/taxiway availability due to parked aircraft
- Consider airport security provision<sup>1</sup>
  - Limitations in security provision resulting in an in-flight security incident
  - Providers at high/moderate risk destinations not ready to operate
  - Variable degradation of facilities and service provision
- Consider risk of deviations from regulatory and/or organizational requirements, policies and procedures
- Ensure all services (e.g. fuel, de-icing, water) meet regulatory standards
- Consider efficiency of emergency response due to lack of exercises, parked aircraft, obstructed access roads, staff availability

### **Technical**

- Consider requirement to keep aerodrome facilities and services operational and certified
- Consider potential for surface damage from long-term parking of aircraft
- Consider possible ground damage to aircraft during increase of ground activities
- Consider likelihood of delays or cancellations to planned infrastructure improvements
- Ensure that sufficient engine running capability exists
- Ensure proper management of fuel in tanks, vehicles and feeder lines
- Ensure proper management of potable water supplies
- Ensure proper management of de-icing fluids
- Ensure all delivery and storage equipment (e.g. fuel, de-icing, water) meets regulatory standards

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<sup>1</sup> See UK GHOST ground operational readiness for more information



## MRO / MAINTENANCE

### People

- Consider increased risk due to the potential for lack of currency
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Ensure adequate training and documentation for maintenance personnel in de-storage activities
- Ensure enough qualified maintenance personnel are available for de-storage of aircraft
- Ensure adequate availability of line maintenance crews to deal with initial bow-wave of defects

### Process

- Consider possible reduced availability and timeliness of spare parts
- Consider potential for extended MEL/DDL ops
- Ensure coordination between network planning, flight ops and maintenance for de-storage of airplanes and engines
- Consider risks arising from long-term parking, including wildlife ingress
- Consider the process for de-storage of aircraft and engines
- Consider optimization of the maintenance and aircraft component checks
- Consider the reliability of 'aircraft on ground' service levels

### Technical

- Ensure compliance with AMM for aircraft and engine de-storage
- Ensure all software, firmware, navigation and terrain databases are up to date
- Ensure that all "lifed" or life-limited items are in date
- Consider prioritizing calendar requirements
- Consider potential for delays in recalibrating tools and equipment
- Consider the need for technical flights in light of level and duration of storage
- Consider possible ground damage to aircraft during prolonged parking

## GROUND OPERATIONS

### People

- Consider increased risk due to the potential for lack of currency
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider risk of airside staff complacency during growing activity levels
- Consider risk of overload of staff due to growing activity levels

- Consider risk of returning/current staff inability to perform their duties due to pandemic-related restrictions
- Consider risk from staff working in unfamiliar or non-standard locations
- Consider risk of unfamiliar airlines and types with differing SOPs or standards

### **Process**

- Ensure a process for coordination between flight ops requirements and ground ops for de-storage of ground service equipment
- Consider de-storage and checks of ground equipment
- Consider airport security provision
  - Providers at high/moderate risk destinations not ready to operate
  - Variable degradation of facilities and service provision
- Consider risk of deviations from regulatory and/or organizational requirements, policies and procedures
- Consider loading errors due to unaccounted ULDs on aircraft (e.g. ground staff unaware of ULDs stored on grounded aircraft)
- Ensure all services (e.g. fuel, de-icing, water) meet regulatory standards

### **Technical**

- Consider possible ground damage to aircraft during prolonged parking
- Ensure proper management of de-icing fluids
- Ensure proper management of fuel in tanks, vehicles and feeder lines
- Ensure proper management of potable water supplies

## **MANUFACTURERS**

### **People**

- Ensure sufficient staff in customer support and safety commensurate with the actual level of operations

### **Process**

- Ensure assistance to airlines in their maintenance of continued airworthiness tasks
- Ensure all software, firmware, navigation and terrain databases are up to date

### **Technical**

- Ensure availability of advice on aircraft de-storage, cabin air systems and passenger safety

## REGULATORS

### People

- Ensure sufficient staff available to handle system demands
- Consider skills, experience, knowledge and qualification distribution across shifts
  - Possible prolonged staff loss due to sickness
- Consider reduced staffing levels and increasing workloads when considering the rigour of audit response times etc (i.e., do not unnecessarily increase pressure on organisations)
- Ensure sensitivity to the challenges faced by people as they recover normal operation
- Ensure sensitivity of inspectors and auditors
- Ensure the regulated community maintains effective safety resources

### Process

- Consider proportionate oversight during phased return to normal operation
- Consider receiving requests for waivers
- Consider reminding all stakeholders to involve their safety managers in the recovery
- Consider flight time limit alleviations
- Consider availability of medical examiners and potential impact on licensing
- Consider the use of waivers rather than extensions to meet periodic licence and training requirements
- Consider extending the training intervals

## ADDITIONAL INFORMATION

- User comments on this document are welcome and can be forwarded to Flight Safety Foundation as described on the Foundation's website.
- Coronavirus and COVID-19 guidance and other materials, as well as a list of relevant web-based resources, are available on [SKYbrary](#).
- [Additional resources available](#) on the Foundation website include *An Aviation Professionals Guide to Wellbeing*, the Safety Punch Lists referenced in this document, and recordings of the Foundation's [Managing the COVID-19 Pandemic](#) webinar series.